Patent Infringement Risk Exposure Analysis

By Fadi Micaelian, Matt Huey, Richard Schank and Sanjay Prasad

Abstract

This paper analyses a company's overall exposure to patent infringement actions. While companies currently assess their risk mainly by evaluating the strength of their portfolio in certain key class codes, often referred to as heat-mapping, this paper advocates an approach that considers a statistical perspective to patent infringement litigation outcome. The rationale behind this work is that, on an aggregate basis, litigation outcome encapsulates all the factors that affect the exposure of an entity. In order to characterize this exposure we have attempted to develop some metrics around the size of the company–expressed in annual revenue. Largely based on this determination, a web application has been developed to allow users to determine several key characteristics of risk by entering basic company information. This paper explains the assumptions, determinations and applications of this analysis and is focused mainly on patent litigation occurring within the software industry.

Introduction

While patent infringement is a familiar concern across the software industry, until now it has been difficult to reduce the complexities of litigation exposure down to an easily understandable set of figures. Some companies have incorporated patent filing and licensing into their core business strategy. IBM is listed in the PTO database as the assignee of more than 40,000 issued U.S. patents, with a filing rate approaching 5,000 patents per year. While many of these inventions may not lend themselves to traditional commercial exploitation, these companies realize that patents are assets in and of themselves. IBM, Samsung and Microsoft have all become well known for their aggressive approach to patent filing. Other companies have taken a drastically different approach. Facebook, for example, despite being one of the pioneers in the realm of Social Networking, is currently the assignee of only two U.S. patents. Although such companies are situated quite differently with regards to IP portfolio, they both face similar threats from litigious patent holders looking to capitalize on the potential value of their assets.

Today, more patents are filed than ever before and predictably, this has gone hand-in-hand with patent litigation increasing at a proportional rate. Companies are forced to recognize the dangers of an unanticipated law suit (or suits) from claimants ranging from well-known industry rivals to obscure holding companies potentially leading to millions of dollars in liability. While many companies tend to settle infringement actions rather than risk a catastrophic award from an unpredictable group of jurors, negotiated settlements frequently reach tens or even hundreds of millions of dollars. It is necessary then for companies to be able to anticipate and quantify their risk of infringement so they may plan for the worst while at the same time shoring up their asset portfolio to mitigate overall risk. This may be accomplished through assignments, licensing or an increased effort to file patents concurrently or in anticipation of future research and development efforts.

Currently, a company will typically estimate their litigation exposure based on the size and quality of their IP assets. *Alison et al* finds that a patent's potential for monetization through litigation can be determined by examining a number of characteristics, including the number of claims, the rate of forward citations, the number of prior art citations, and the number of continuations filed. A company may use these factors to determine the value of their portfolio among the various class codes. The result, often referred to as a gap analysis, can be compared to the portfolio of other players in the industry to determine areas of strength and weakness. If a company's coverage is weak within an important class code when compared to their competition, they are indeed vulnerable to threats of patent infringement. Additionally, if a company's portfolio is concentrated in one key area, they may leave themselves open to threats of litigation involving ancillary technologies that were not considered during strategic planning of the company's IP. Evaluating a company's portfolio this way may help a to determine areas of weakness, however, it offers little insight into the actual likelihood of litigation or the resulting damages and costs.

Other factors identified to increase a company's exposure to patent litigation include growth rate and media coverage. A company that is experiencing a period of positive economic growth is more attractive as a litigation target simply due to the positive media attention. Similarly, while a company whose innovations become topics of media interest may ex-

perience the positive effects of public adoration, or at least awareness, their technology is now on the radar of litigious patent holders looking for an attractive defendant. Unfortunately, measuring media coverage and public awareness are difficult to quantify and by themselves, don't readily lend themselves to an infringement risk analysis.

Rather than focusing on the patent coverage of individual companies, this paper advocates a solution which considers an in-depth statistical analysis of patent litigation from the past 10 years. Although the size of company's patent portfolio is an important factor in determining its vulnerability to claims of patent infringement, the statistics of recent litigation reveal that the size of the company itself is often more telling. The larger the company, in general, the more likely they are to face threats of litigation. This is especially true in the case of patent infringement suits. Another key factor identified in calculating litigation risk is the recent litigation history of the company. If a company has faced several patent infringement suits over the past 30 months, it is likely that the company has been identified as especially vulnerable to law suits, and is therefore attractive to patent holders looking to assert their rights. Once there is blood in the water, more suits are likely to follow.

Exposure Assessment Methodology

This section describes our efforts to estimate the probability of a patent infringement action occurring. For purposes of our analysis, all infringement actions were assumed to begin with an assertion by the patentee. This assertion led to two possible outcomes. In the first outcome, the two parties successfully negotiate a settlement payment or ongoing licensing deal, avoiding any further court actions (*1-p1*). The other possible outcome is an answer by the alleged infringer which substantially denies the claims of infringement by the patentee (*p1*). From here, the process of litigation winds through various proceedings such discovery, expert testimony and oral arguments. Based on the outcome of these proceedings, one party may obtain clear advantage over the other. For example, if during discover a key piece of prior art is produced which places serious doubt on the validity of the asserted claims, the patentee will happily settle rather than risk a judgment of invalidity preventing the claims from any future assertion. If one party obtains a clear advantage during these proceedings, the parties are likely to agree to a settlement and voluntarily dismiss the case (*p2*). Where the parties are situated on an even playing field moving forward, or both sides believe they hold the advantage, ongoing litigation may be unavoidable (*1-p2*).

■ Fadi Micaelian,
Intellectual Ventures,
Portfolio Architect
MountainView, CA, USA
E-mail: fmicaelian@intven.com

■ Matt Huey,
Intellectual Ventures, Intern,
Santa Clara, CA, USA
E-mail: mhuey@intven.com

■ Richard Schank,
Intellectual Ventures, Head,
Pricing and Portfolio Analytics,
Mountain View, CA, USA
E-mail: rschank@intven.com

■ Sanjay Prasad,
Intellectual Ventures,
Client Account Executive,
Mountain View, CA, USA
E-mail: sanjay@intven.com

The Markman hearing is considered the pivotal event in the majority of patent infringement cases. During the hearing, both sides argue their interpretation of the asserted claims. The patentee is seeking a broad, amorphous reading of the claim terms, while the accused infringer argues for a narrow, specific reading that does not include their allegedly infringing activities. Again, depending on the outcome of this hearing, that is, how the judge defines the claim terms in light of the parties' arguments, the relative positions of the parties may change dramatically leading to another opportunity for the parties to settle the matter out of court (*p3*). If the parties are still unable to meet on agreeable terms,

Figure 1. Litigation Tree With Possible Outcome And Respective Payoffs

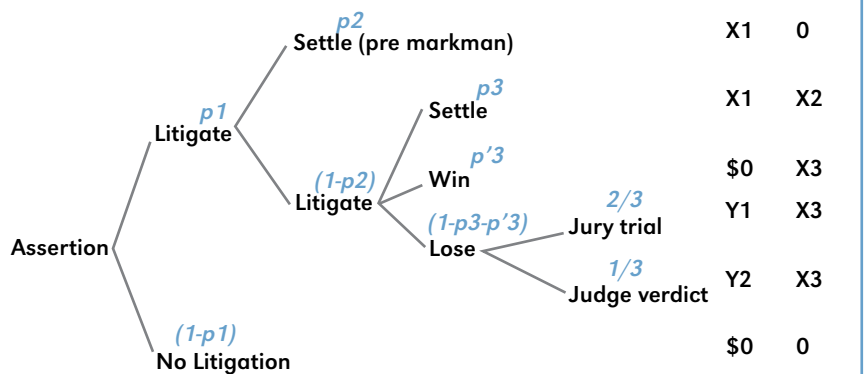


Table 1. Litigation Tree Variables

P_i	Probability of event
X1	Average Settlement. It is a function of the company size and the damage size
X2	is 1/3 to 1/2 of the litigation costs X3
X3	Litigation costs. Vary depending on the size of the damage size
Y1	Average Judgment of a Jury Trial. Depends on the company size and the damage size
Y2	Average verdict awarded by a Judge. Depends on the company size and the damage size

the case will proceed to a final adjudication on the merits. From here, we assume two outcomes: either the plaintiff wins and the court enters judgment in their favor, along with damages and sometimes costs (*p'3*), or the plaintiff fails to satisfy his burden of proof or the claims are found invalid (*1-p3-p'3*).

Recent research by *Kamprath* and *Kesan* indicates that between 80 and 85 percent of patent infringement actions are voluntarily dismissed before final adjudication, while about 10 percent reach a decision on the merits. However, because a voluntary dismissal by the Plaintiff does not necessarily indicate a settlement agreement between the parties, we elected to use the more conservative estimate of 80 percent. In our litigation tree, this data is represented by *p2*, the probability of a settlement before the Markman hearing, being equal to 50 percent, and *p3*, the probability of settlement subsequent to the Markman hearing equaling 30 percent. Adding these two probabilities together yields an 80 percent chance of litigation ending in a settlement. Cases that do reach a final decision are split down the middle, having an equal chance of a verdict or decision for the plaintiff or defendant. This data is reflected in the litigation tree, where *p`3* and *1-p3-p`3* both equaling 10 percent. We are therefore working under the assumption that all cases either settle or are finally adjudicated. While this is does not completely reflect reality, where many cases are transferred or dismissed on various grounds, for our purposes these possibilities were ignored due to the fact that they largely lead to subsequent litigation in a different forum.

Another assumption made was that 50 percent of settlements were assumed to settle before litigation began. Therefore, *p1* and *1-p1* are necessarily both equal to 50 percent. Additionally, for determining litigation costs, cases are divided among cases that settle before the Marksman hearing and cases that settle after. Of cases that settle during litigation, 63 percent were assumed to settle before the Markman hearing (*p2*), and 37 percent were assumed to settle after the Markman hearing (*p3*). Finally, it has been determined in a 2009 Patent litigation study that 66 percent of patent infringement cases are tried before a jury, and the remaining 33 percent of cases are heard by a judge.

Applying this data to the litigation tree, the following formula was developed, where S_R, J_R, and LC_R are equal to the estimated settlement (*X1*), judgment (*Y1*) and litigation cost amounts determined by revenue:

Table 2. Calculating Estimated Risk

$$0.8S_R + .1J_R + .35LC_R$$

Data Mining

The data gathered for this project was mined mainly from publicly available sources. While some sensitive information may be redacted upon request and court approval, nearly all documents filed in support of a patent infringement action are publicly available on the government-hosted website PACER (Public Access to Court Electronic Records). Within PACER, cases were filtered to include only civil cases filed within the past ten years with a nature-of-suite (NOS) listing of 830. This code is exclusively used for patent infringement actions. Based on the result from this search, a list of case titles was downloaded and examined for suits involving only defendants within the software industry. This process resulted in 91 judgment awards against software companies in patent infringement rulings.

Table 3. Judgment Data

Number of Data Points	Mean	Median	Minimum	Maximum
91	82.20	20.38	.184	1500

While judgment information is largely available from public court records, settlement data is largely undisclosed to the public. Companies tend to withhold settlement terms in order to maintain their advantageous bargaining position in future licensing efforts. For our purposes, this tends to make settlement data much more difficult to come by then judgment data. Even when settlement figures are disclosed, they are rarely contained in court documents. Instead, data was gathered from various online sources such as

Table 4. Settlement Data

Number of Data Points	Mean	Median	Minimum	Maximum
82	60.57	8.75	.09	750

Google, Law360, Westlaw and SEC EDGAR simply by searching for keywords, such as 'settlement', 'patent infringement' and 'software'. This method yielded 82 settlement figures resulting from software related patent infringement actions.

The challenge at hand is that the settlement data available represent only a skewed subset of the entire settlement population. Typically settlements are not disclosed. Organizations are obligated to disclose settlement data only when the settlement will have a significant financial impact on the overall organization. This means that in general only large settlements are made public. We will discuss later in the "Settlement Analysis" section hereafter how to assess the settlement average of the entire population, rather than the average of the skewed sample set of publicly available data.

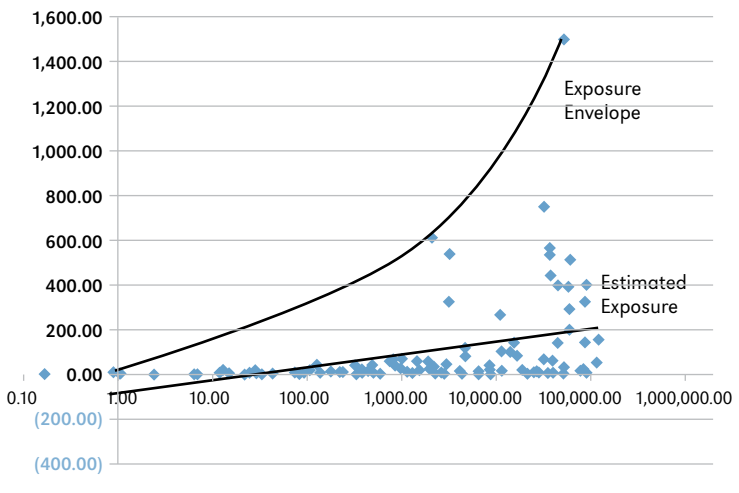
The final information mining exercise comprised gathering revenue figures for each company in our list of cases that was sued for patent infringement. To most accurately compare company revenues and litigation outcomes, it was necessary to determine specific revenue figures for the particular year in which a company was sued. For example, Apple, Inc. was sued for patent infringement in 2005, 2006, and again in 2007. It was therefore important to determine how Apple's revenue numbers changed over the span of three years to reflect the true relationship between the outcome amount and company size. For publicly held companies, revenue information was readily available from the SEC EDGAR website. Revenue information for private companies is not typically disclosed and therefore our database is comprised mainly of publicly held companies. Any private companies represented by our data have either disclosed their revenue figures or third-party estimates were used in place of official figures in Table 5.

Table 5. Revenue Data

Number of Data Points	Mean	Median	Minimum	Maximum
140	16,433	1,703	.05	118,928

Because the outcome of actions against high-revenue companies varied widely from hundreds of thousands to hundreds of millions of dollars, we elected to express the relationship in terms of outcome-over-revenue compared to revenue rather than showing a direct correlation between outcome and revenue. Taking the data as a whole, there is a very clear correlation between this ratio and the outcome of litigation. Figure 2 represents every settlement and judgment data point mapped against revenue on a logarithmic scale. A logarithmic scale is useful to mitigate the wide range of company sizes that populate our database. This chart also shows the distribution of judgment and settlement amounts clustered within discreet buckets of revenue.

Figure 2. Judgment And Settlement Data Against Revenue Scaled Logarithmically



Judgment Costs

As a starting point, it was first assumed that the outcome of patent infringement cases finally adjudicated would be binomial–either the plaintiff wins or loses. However, after looking at the distribution of judgment amounts, it has been determined that the data points are aligned on a normal distribution curve. The results are shown in Figures 3 and 4: the first graph shows judgment amounts along the normal distribution curve, while the second graph shows the normal distribution of the ratio of judgment amounts to revenue per year.

After analyzing the distribution of data points, the judgment and settlement outcomes were divided into distinct buckets based on the annual revenue of the defendant. It was determined that four groupings would maximize the

Figure 3. Probability Distribution Of Judgment Awards

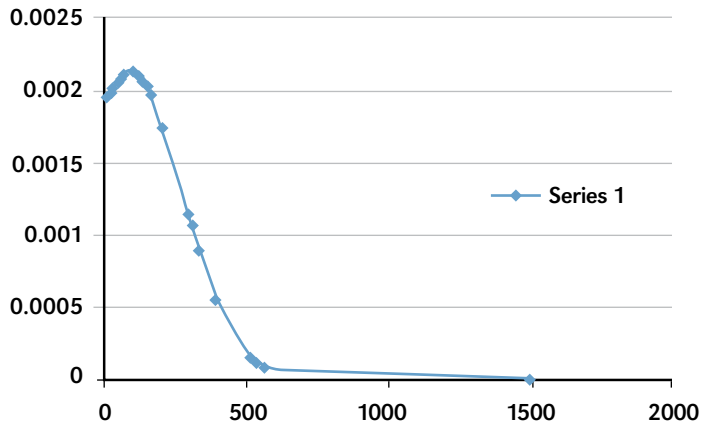


Figure 4. Distribution Of Judgment Awards Over Revenue Per Year

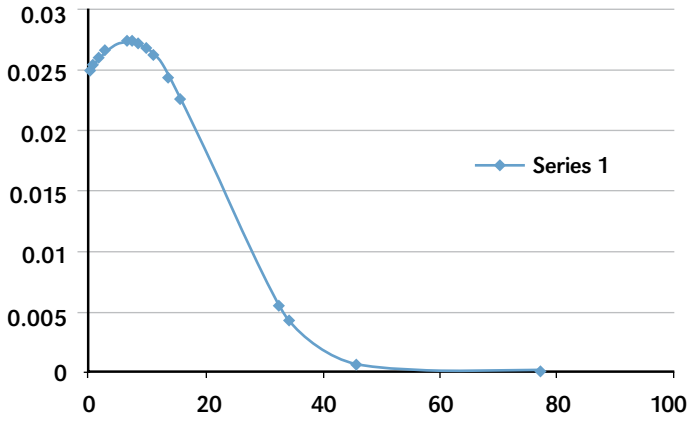


Table 6. Judgment Data By Bucket

Revenue Bucket	$0-$80M	$80M-$800M	$800M-$5B	>$5B
Mean (Judgment)	6.75	20.53	55.04	168.64

Table 7. Judgment Estimate
(x= annual revenue in Million US$)

Judgment	$J(x) = 1.0232\ Revenue^{.5}$

correlation between revenue and the magnitude of the outcome (see Table 6 and Figure 5).

After grouping the data points into buckets, the average judgment was calculated for each bucket with a significantly higher correlation. This means that the data was normally distributed within a revenue bucket centered around the average. We then used the averages of each bucket to calculate the best fit curve that traversed these data points. The high correlation in each bucket meant that the data was evenly distributed within each bucket and could therefore be represented by its average and would align nicely on a best fit curve. Because the average data points were tightly aligned between buckets, the curve showed an increasing rate of exposure while maintaining a high R^2 correlation. The results are shown in Figure 6.

As a result we concluded that the Average judgment of a company was reasonably represented by the equation in Table 7.

To validate these equations, we first determined that the overall correlation was just under 0.5. Because the data is closely aligned within the four revenue-buckets, correlation within each bucket was also calculated. While the data points were in general tightly aligned, each bucket contained outliers that had the effect of distorting the effective correlation. To compensate for these outliers, the two data points furthest removed from their expected value within each bucket were disregarded. For example, in the largest bucket, a $1.5 billion judgment was recorded against a company with annual revenues of $54 billion. The expected value of this judgment was $231 million dollars, which is only about 15 percent of the actual outcome.

The values demonstrate a markedly higher degree of correlation within the middle two buckets compared to the bucket with the largest and smallest revenues. First, this can be attributed to the high variability of outcomes in the largest bucket. After excluding the two most extreme data points, outcomes in

Figure 5. Judgment Data And Bucket Averages
(logarithmic x and y-axis)

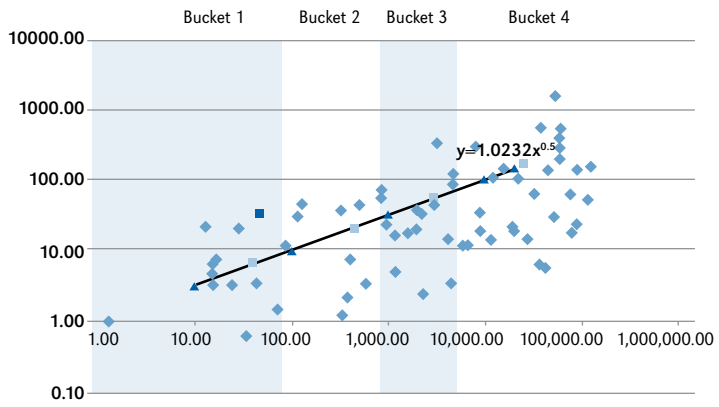


Figure 6. Average Judgment Data Per Bucket And Estimated Judgment Amounts

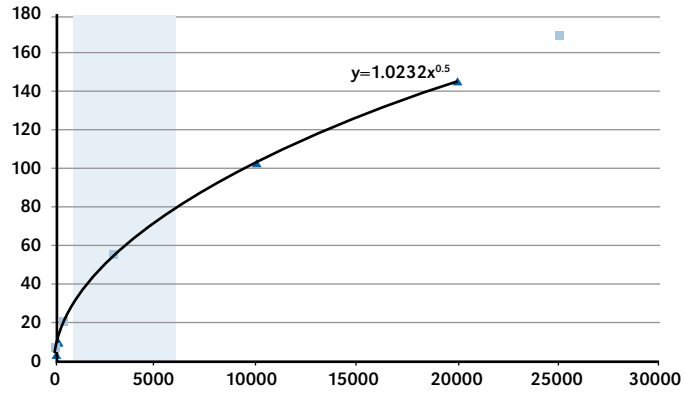


Table 8. Publicly Available Settlement Data

Revenue Bucket	$0-$80M	$80M-$800M	$800M-$5B	>$5B
Mean (Settlement)	4.63	12.09	129.56	153.23

Table 9. Hi End Settlements Estimate
(x= annual revenue in millions of dollars)

"Hi End" Settlement	$S_{HI}(x) = 0.2786 \text{ Revenue}^{0.545}$

this data set range from $6.5 million to $512 million for companies of revenue greater than $5 billion. The average calculated judgment amount within this bucket is $192 million, which represents the expected outcome in general but is not a good approximation of extreme cases. Second, within the smallest data set, the outcomes range from $630,000 to $6.5 million. While these outcomes do not appear extreme compared to the other buckets, when compared to the relatively small revenues of the defendant companies, the extremes greatly affect the correlation within the bucket.

We finally compared the R square for the equation derived from the entire data set (0.38) and found out that by using the buckets approach we obtain a higher R square (0.49). The explanation behind the result stems from business facts. The division in several buckets seems tied to the fact that large organization attract more litigation of diversified nature than smaller organization. For example non-practicing entities rarely pursue organization that falls in the lower buckets. Large organization will assert their IP rights against smaller organization both as an IP protective measure mostly. While small organization may assert their IP right both as a means to generate revenue and to protect their intellectual assets. By analyzing the possible scenarios one finds a distinct behavior towards litigation by bucket.

Settlement Costs

Settlement costs were a more complex to assess for several reasons. The most important one was that settlements were not all publicly available. The only data that is made public are Settlements that are fiscally material to an organization. This leads us to conclude that, within a bucket, these settlements are the larger end of the settlement range. This means that we only have access to a skewed set of data. The calculated average results of the skewed data set are shown in Table 8.

Using the same approach as the one followed with the judgments and given the averages per bucket the best fit curve for "Hi End" settlements can be approximated by the function shown in Table 9.

Our objective though, is to estimate the entire population settlements, not only the average of the data we collected. To achieve our goal, we assumed that, similar to judgments, settlements follow a normal distribution; our challenge is to measure the "actual average" (μ) from a set of data that represents only the tail end of the distribution in Figure 7.

The normal distribution is described by

$$f(x) = \frac{1}{2\pi\sigma^2} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

where f(x) is the probability and x is the size of the company, μ is the mean and σ the standard deviation.

In order to figure out how far down the "right tail" of the curve was our representative sample we counted the number of cases that ended in a settlement via PACER and compared that number to the data we were able to collect for each one of those settlement cases. We noticed that we had gathered just under 15 percent of the cases that ended in settlements. Based on this data we made an assumption that we were covering all the data beyond 1 standard deviation, σ (or 15.7 percent of the data). From the distribution of the data in the tail end of the normal distribution curve, we can retrace the entire curve

$$f(x) = \frac{1}{2\pi\sigma^2} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

using Gaussian function:

To calculate the actual average, $\mu = \alpha * \mu 1$ as a function of the measured high end average, we use the following element: The high end average $\mu 1$ is located 1/3 of the way between 1 σ and 3 σ. In other words $\mu 1 = \mu + 1.666\sigma$.

This conclusion can be derived either by measuring the area under the cumulative probability curve $\phi(x)$ below between $x = \sigma \rightarrow \infty$ and equating it to 15.7%

$$\Phi(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} e^{-t^2/2} dt = \frac{1}{2}\left[1 + \operatorname{erf}\left(\frac{x}{\sqrt{2}}\right)\right], \quad x \in \mathbb{R}$$

for $x = -\infty -> \sigma$ $\quad \phi(x) = 100\% - 15.7\% = .843$

This can be approximated by a triangle the base of which spans from 1σ to 3σ. See Figure 8.

By calculating the area under the curve and dividing by the average $\mu 1$ we can obtain the location of this average. The calculation shows that this point is at 1/3 of the distance between 1σ and 3σ. This leads to the conclusion that we can approximate the average $\mu 1 = \mu + 1.666\sigma$. Thus,

$$\sigma = 0.6 * (1 - \alpha)\, \mu$$

If we replace σ in the cumulative distribution function $\phi(x)$ and solve the equation for the Settlement data, we obtain:

$$\alpha = \frac{1}{1 - \sqrt{2\pi}} = 0.663733727$$

In other words we can approximate the actual average of the entire population of settlements by calculating the high end settlements and multiplying the estimated result by α. It goes without saying that this is only an estimate and it applies to the sample data we analyzed under the assumption that the distribution of the entire Settlement population is normally distributed. This means that we can use the Hi End estimates and multiply these estimates by α to measure the estimated Settlement for the entire population. See Table 10.

Figure 7. Normal Distribution Curve

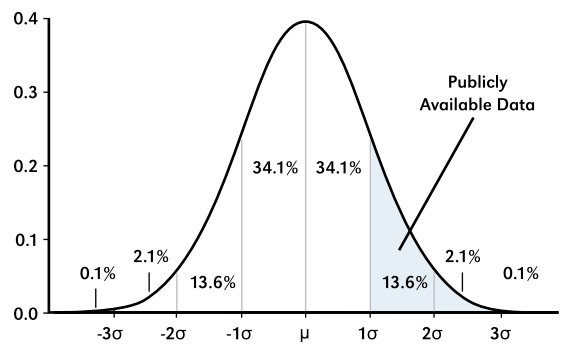
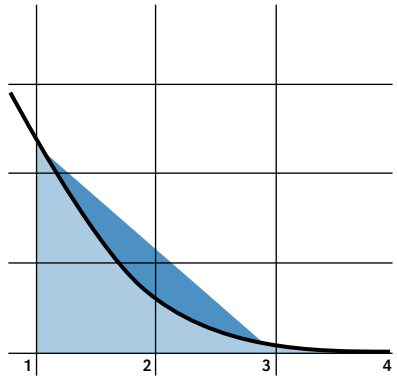


Figure 8. Tail End Of The Normal Distribution Curve



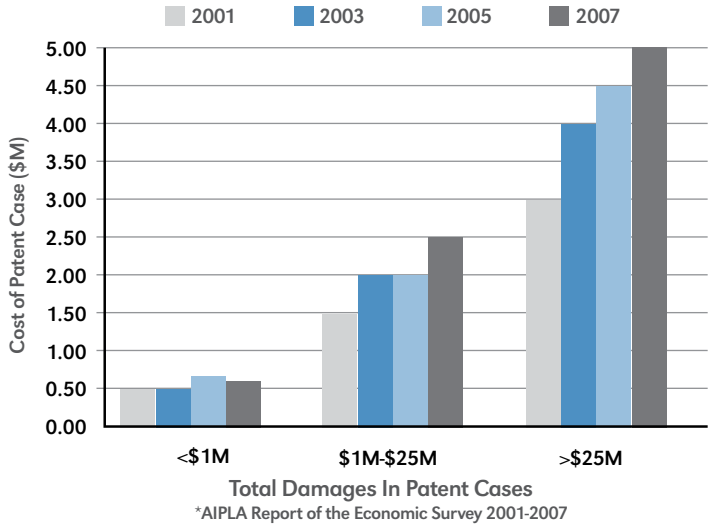
Litigation Costs

Next, it was desirable to determine the total litigation costs associated with a patent infringement trial. The litigation costs of an average patent infringement case will typically run between $3 million and $10 million over two or three years of litigation. This high cost of litigation is one factor that motivates parties to reach an agreement out-of-court, avoiding years of uncertainty and expense. A more detailed study, performed by the AIPLA, found three distinct buckets of infringement actions yielding different costs of litigation depending on the Total Damages. See Figure 9.

Table 10. Settlement Estimate
(x= annual revenue in Million US$)

Entire Population Settlement	$S(x) = 0.185\ Revenue^{0.545}$

Figure 9. AIPLA Report On Litigation Costs



*AIPLA Report of the Economic Survey 2001-2007

In our exposure model, we were interested in quantifying the cost of a litigation based on the size of the company. Given that there was a tight link between the size of the company and the size of the judgment, *i.e.* a small company with revenues of $100M could not be assessed damages of the same amount, while for a company of several billion dollars a judgment of $100M is not uncommon. Based on the fact that the bigger the company the larger the possible judgment cost will be, we transposed the data from damages to company size measured in revenues.

Using these data and their middle points we have derived the best fit curve to be in Table 12.

Table 11. Litigation Costs By Company Size

Total Damages	<$1M	$1M - $25M	>$25M
Litigation Cost	$.5M	$2M	$4M
Company Size	<$80M	$80M - $800M	>$1B

Table 12. Litigation Costs Estimate
(x= annual revenue in millions of dollars)

$Litigation\ Cost = 0.1678\ Revenue^{0.388}$

Discussions

- **Post litigation settlements**

While some data may sound redundant as a settlement occurred post verdict, we consider that the extent of the exposure of the company has been the amount of the judgment.

- **Average versus Maximum Exposure**

It can be argued that using averages does not reflect the exposure of a company. Instead of the average, the maximum envelope should be used as companies should shield themselves against the high risk events. While this argument has its merit, there are two elements to bear in mind:

a. The purpose of this exercise is to characterize the exposure and obtain some metrics around its order of magnitude for an organization. It is by no means intended to provide a specific value to exposure.

b. While a company may be exposed to a high risk event every year, over the long run it should not be subject to a high risk event repeatedly year after year. In other words, on an aggregate basis and over several years, using the estimated exposure of a company should better reflect the company's exposure than using its maximum exposure.

- **Limitations of this model**

This model was built for the software industry where there is very little benchmark on patent li-

censing. It is not clear that the model can be applied to other industries or sectors without significant modifications. It is important to note that while the model may not be applicable to other industries, the methodology used is independent of the industry and can be repurposed.

- **Exposure versus Revenue**

The exposure by itself has very little meaning for a company. What is pertinent is its impact on profits. Every company strives to achieve a certain level of profitability, often measured as a ratio of its income. Quantifying Exposure is meaningful when it is related to the size of the company. In other words, an exposure of $10M is significant for a company with revenues of $80M and profits of $8M as this exposure can mean the difference between profitability and "dipping in the red." While the impact on a company of $8B with profits amounting to $80M,the impact is significantly less.

Web Application

A web-based SaaS application has been created based on the findings and observations discussed above. The application allows a user to input company information, including annual revenue, growth rate, and recent litigation history, and returns various information related to patent infringement risk analysis (Figure 10).

The first group of data returned by the application is the result of prior litigation faced by similarly situated companies (Figure 11). The mean, median, maximum and minimum judgments and settlements of companies from within the same revenue-bucket are displayed. This helps give the user some feel of what their best or worst-case scenarios may be. Likewise, the mean and median outcomes make the user aware of what the most likely range of outcomes may be.

The next figure displayed is the company's estimated annual exposure. The following formula is used:

Figure 10. Data Entry Screen

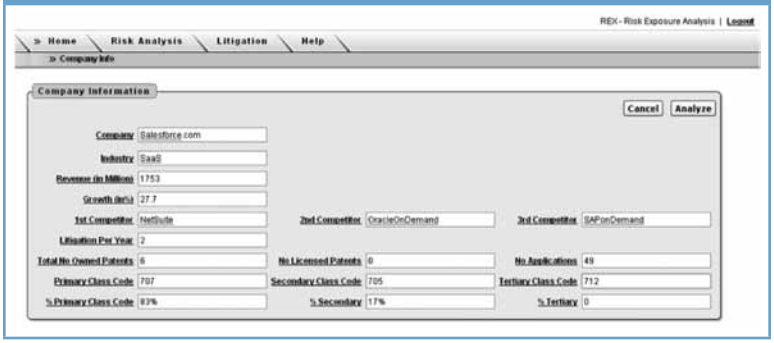
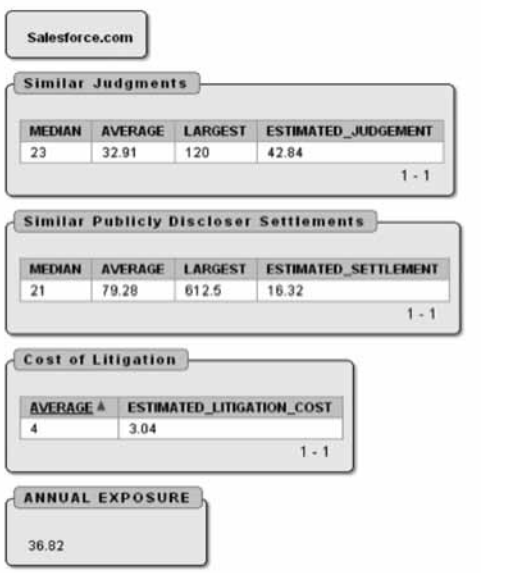


Figure 11. Exposure Analysis Screen



Estimated Annual Exposure	$R * G * L * C * 1/(P+P_L/2+P_A/3)$
R	Annual revenue in millions of dollars
G	Annual revenue growth rate as a percent
L	Number of patent infringement actions brought against the company in the past 2.5 years
P	Number of patents held by the company
P_L	Number of patents licensed to the company
P_A	Number of active patent applications held by the company
C	This number reflects the distribution of patents across various class codes

First it is important to point out that in order for the results to make any sense it is necessary to normalize them. This way we can compare revenues (R) with number of patents (P), etc. All the subsequent discussion in this section refers to the normalized data.

In order to determine the magnitude of risk, first the company's annual revenue (R) is multiplied by a fraction of the company's annual growth rate (G). This takes into consideration smaller companies that may be growing at high rates, placing themselves on the radar or potential litigants. The next factor considered is the distribution of the company's patent portfolio among the various class codes. A company with a more diverse portfolio is always better protected from threats of litigation than a company with patents isolated in a single class code. Next, the rate of patent litigation suites brought against the company (L) is included to determine who many suites are likely to be brought against the company. We then take into account the portfolio distribution over various class codes (C). A portfolio offers more coverage as it is better spread over various class codes. A portfolio focused on a single class code will leave the company with a higher exposure than a portfolio that spans several class codes. Thus, the higher the concentration in a class code, the higher the overall exposure. These factors are then divided by the strength of the company's patent portfolio, including the number of U.S. patents, the number of U.S. patent applications, and the number of assets licensed from third parties, since the larger amount of patents will yield a lower exposure. (Note that since this is based on a statistical distribution, there is no measure of the quality of the portfolio

Figure 12. Risk Meter

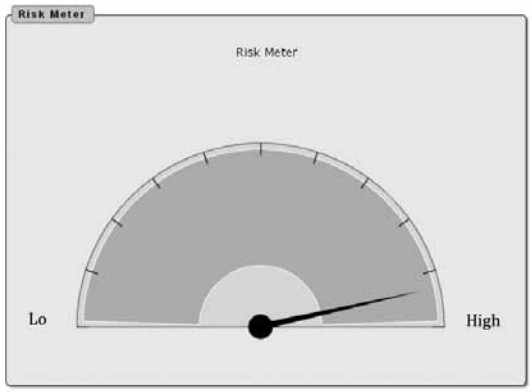


Figure 13. Litigation Database Search Screen

LITIGOUT

Reset

Advanced Search

Search Microsoft Display 30 Go

Plaintiff	Defendant	Symbol	Outcome	Amount	Revenue	Year	Source	Amount Per Revenue
Alcatel Lucent	Microsoft	MSFT	Judgment	512	60420	2008	E	.008474015
Alcatel-Lucent	Microsoft	MSFT	Judgment	1500	51122	2007	E	.029341575
Amado	Microsoft	MSFT	Judgment	5.91	39788	2005	E	.000148537
Burst.com	Microsoft	MSFT	Settlement	60	39788	2005	E	.001507992
David Colvin	Microsoft/Autodesk	MSFT	Judgment	133	44282	2006	D	.003003478
Eolas Technologies, Inc. and University of California	Microsoft	MSFT	Judgment	565	36835	2004	E	.015338672
Imagexpo	Microsoft	MSFT	Judgment	62.3	32187	2003	E	.001935564
InterTrust Technologies	Microsoft	MSFT	Settlement	440	36835	2004	E	.011945161
Liquid Audio	Microsoft	MSFT	Settlement	7	28365	2002	M	.000246783
Michel Vulpe	Microsoft	MSFT	Judgment	290	58437	2009	M	.004962609
Microsoft	Immersion	IMMR	Judgment	20.75	27.98	2008	D	.74157464
Microsoft	Stac Electronics	STAC	Judgment	6.86		1994	E	
Microsoft	Stac Electronics	STAC	Judgment	43		1994	E	
Netscape Communications	Microsoft	MSFT	Settlement	750	32187	2003	E	.023301333
Novell	Microsoft	MSFT	Judgment	536	36835	2004	D	.014551378
SPX	Microsoft	MSFT	Judgment	62.3	32187	2003	D	.001935564
Stac Electronics	Microsoft Corp.	MSFT	Judgment	82.9	4649	1994	D	.017831792
Stac Electronics	Microsoft	MSFT	Judgment	120	4649	1994	E	.025812003
Timeline Inc.	Microsoft	MSFT	Settlement	5	51122	2007	E	.0000978
Uniloc	Microsoft	MSFT	Judgment	388	58437	2009	E	.006639629
University of California	Microsoft	MSFT	Judgment	30.4	51122	2007	D	.000594656
VirnetX Holding Corporation	Microsoft	MSFT	Judgment	200	58437	2010	E	.003422489
Z4 Technologies	Microsoft	MSFT	Judgment	142	44282	2006	E	.003206721
i4i Ltd	Microsoft	MSFT	Judgment	200	58437	2009	E	.003422489

Spread Sheet

1 - 24

Figure 14. Litigation Database Advanced Search & Reporting Screen

other than taking into account its concentration). We use in the software the weighted sum of the patents owned by the company (weight 1), the number of applications submitted (weight 1/3 as we believe that some of the applications will be denied) and finally the number of licensed patents (weight 1/2 as they do not have the exclusivity aspect of an owned patent).

In order to best represent the risk to a particular company, it is necessary to compare the magnitude of risk to the size of the company based on annual revenue. The risk of a 10 million dollar judgment is of much greater impact on a small software firm compared to a multi-billion dollar corporation like Microsoft or Google. With this in mind, we developed a revenue exposure meter (Figure 12) which would display the overall exposure to a company in relation to their overall revenue. This allows a company to look at the output of our formulae and determine the immediate impact on their company. The application also provides access to the underlying data through a standard single field search interface (Figure 13) or through an advanced search and reporting capability (Figure 14). ■

Appendix: Application user's guide

Company Information

Use the forms on this page to enter basic company information. This information is used to analyze your company's risk of patent related litigation, predict the likely magnitude of an infringement-related judgment or settlement, and identify problematic gaps in patent coverage.

Company: Enter your company name or ticket symbol

Industry: Select the industry most relevant to your business

Revenue: Enter your total annual revenue in millions of dollars

Growth: Enter your company's growth as a percentage of annual revenue

Competitors: Select up to three competitors from your industry for portfolio comparison

Litigation/year: Enter the number of recent patent infringement suits brought against your company.

Risk Analysis

Similar Judgments: This section displays judgment information against companies with similar annual revenues. The median, average, and largest judgment are derived from a litigation database comprised of similarly sized companies. The estimated judgment size is calculated with respect to a company's annual revenue based on litigation trends observed in the software industry. The coefficient of determination is equal to 0.9991.

Similar Settlements: This section displays settlement information against companies with similar annual revenues. The median, average, and largest judgment are derived from a litigation database comprised of similarly sized companies. The estimated settlement size is calculated with respect to a company's annual revenue based on litigation trends observed in the software industry. The coefficient of determination is equal to 0.9824.

Cost of Litigation: This section includes the sum of estimated attorney's fees and other related litigation expenses based on the revenue of a company. The coefficient of determination is equal to 0.9262.

References

1. Isumo Bergmann, *Evaluating the Risk of Patent Infringement by Means of Semantic Patent Analysis: The Case of DNA Chips*, R&D Management, Vol. 38, Issue 5, 550 (2008).

2. James E. Bessen, *The Private Cost of Patent Litigation*, Boston University School of Law Working Paper No. 07-08 (2008).

3. Bryan W. Butler, *Patent Infringement: Compensation and Damages* (Law Journal Press 2006).

4. Claude Crampes, *Litigation and Settlement in Patent Infringement Case*, RAND Journal of Economics, Vol. 33, No. 2 (2002).

5. Alberto Galasso, *Patent Thickets and the Market for Innovation: Evidence from Settlement of Patent Disputes*, CEPR Discussion Paper No. DP6946 (2008).

6. Herbert J. Hovenkamp, *Anticompetitive Settlement of Intellectual Property Disputes*, Min. L. Rev., Vol. 87, p. 1719 (2003).

7. Richard A. Kamprath, *Gaming the Patent System: An Empirical Analysis of Litigation Economics and Possible Solutions*, July 2010.

8. Jay P. Kesan, *How are Patent Cases Resolved? An Empirical Examination of the Adjudicatino and Settlement of Patent Disputes*, Wa. U. L. Rev. 237 (2006).

9. David W. Opderbeck, *Patent Damages Reform and the Shape of Patent Law*, Seton Hall Public Law and Legal Theory Research Paper No. 1213160 (2008).

10. Fiona Rotstein, *Filing and Settlement of Patent Disputes in the Federal Court*, U. of Melbourne Legal Studies Research Paper No. 226 (2007).

11. Patent Litigation Cost, *http://www.inventionstatistics.com/patent_litigation_costs.html.*

12. *Patent Litigation Trends and the Increasing Impact of Nonpracticing Entities*, Pricewaterhouse-Coopers, August 2009.