# Patent Valuation Techniques

*By David Drews**

There is no question that patents have become one of the leading drivers of wealth generation in the global business community. When managed properly, they serve to protect a firm's business strategy by erecting formidable barriers to entry. They also prevent existing competitors from profiting from the firm's research and development investments. Increasingly, a solid patent portfolio is the foundation for a company's success in the marketplace.

Understanding the value of your patents is an important part of successfully managing your resources effectively. There are a number of steps that are taken in a typical patent valuation. One of the first things determined when valuing patents is the reason for undertaking the analysis. The most obvious situations are those in which a third party has an interest in the value of the patents. For example, the tax authorities will want to know the basis of value if a portion of the purchase price is allocated to any patents included in the acquisition of another company.

Similarly, the bankruptcy court will be interested in understanding how the value of any patents and related intangibles was calculated when reviewing reorganization proposals. The use of patents as collateral in obtaining financing is another situation where a third party will have a valid interest in the value of your patents.

There are many situations where accurate value information is required for internal purposes as well. For example, the potential purchase or sale of patents obligates management to have an idea of their value before entering into negotiations. Similarly, negotiating a fair royalty rate or other compensation when licensing patents requires an understanding of their value.

## Context

Once the motive for the patent valuation has been determined, the second order of business is identifying the context of the analysis. Generally speaking, the context in which intellectual property is viewed is the single most important determinant of value. In any given industry, the value of a patent is likely to be worth more to a large manufacturer than to a small business entrepreneur. This is due primarily to the existence of complementary factors such as skilled labor, abundant capital, an effective marketing program, greater manufacturing capacity and proven distribution channels. Because these factors differ from one scenario to the next, the same patent may have different values when viewed in the context of a large corporation, a joint venture or a company going through reorganization.

An important part of identifying the context is determining which assets are to be included in the analysis. Of course, patents are the usual focus. However, there are other related intangibles that can have a very real impact on the firm's success. Among these are trade secrets, know-how and formulae. Rather than valuing a patent as a stand-alone asset, it may be more accurate to value it in conjunction with some of these related assets. Many times the focus of the valuation should be a bundle of technology consisting of patents, trade secrets and know-how. A notable exception is one in which Company A owns patents that are being infringed by Company B. While the patents were developed and are owned by A, the other technical intangibles associated with the utilization of the assets in the manufacturing of products were likely developed by B.

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## Value Standards

A formal valuation of intellectual property most likely will refer to a standard of fair market value. This is the standard of value to which the analysis and all assumptions necessary in the valuation exercise have been held. It differs in some very important aspects from a strict calculation of the benefits derived from using the IP.

The definition recognized by many authorities is essentially as follows: Fair market value is the price at which an asset exchanges between a willing buyer and a willing seller, neither being under compulsion to act and both having reasonable knowledge of all relevant facts.

With a fair market value standard, it is assumed that a hypothetical transaction takes place. The price associated with this hypothetical transaction is the determinant of the patent's value. This standard requires that the buyer and the seller be willing to transact and be under no compulsion to act. No compulsion to act simply means that neither the buyer nor the seller is required to enter into the transaction or is under any pressure to do so. Their participation is not due to a legal ruling or a bankruptcy, for example. Also, it is important to recognize the difference between a specific participant and a typical participant. A specific participant may have significantly more or less resources available to them than a typical participant.

It must be remembered that these parties are looking after their own best interests. Accordingly, the buyer and seller would view the proposed price in the context of the general economic environment in place at that time and the particular industry in which the patent is exploited.

Finally, both parties have reasonable knowledge of all relevant facts. A distinction should be made between publicly available information, which theoretically everyone has access to, and private information. Very seldom do the participants of an actual transaction possess knowledge of all relevant facts. The guiding term here is reasonable.

A simple example will serve to illustrate the difference between value and fair market value as outlined herein. Suppose an inventor has developed a process that would allow a manufacturer to save $1 million when compared to the expense currently incurred during his manufacturing process. The benefit of the technology is therefore in the form of a cost saving and the value of the development amounts to the $1 million in savings. However, $1 million is not likely to be considered the fair market value. According to the definition, fair market value is the price at which the asset would change hands. There is no incentive for the manufacturer to pay the inventor $1 million for the development when his benefit also equals $1 million. The true fair market value will likely be somewhere between $0 and $1 million, and will be determined by the various inputs that have an impact on a true negotiation. These will include items such as the competitive environment and the existence of alternative methodologies that provide the same benefit.

While this simple example does not explore all of the various inputs called for in a fair market value analysis, it does provide the basis for understanding how value and fair market value can sometimes differ significantly. Also, it is important to realize that fair market value is not the appropriate standard to use in all cases. Sometimes the assets in question need to be examined within a very narrow context comprised of specific participants and inputs, such as calculating damages resulting from a specific instance of infringement. Determining which standard to use is an important part of establishing the context of the valuation analysis.

## Methodologies

Once the assets to be valued have been identified, the context of the valuation has been determined, the proper standard of value has been selected, and the purpose for performing the valuation has been identified, it is time to consider which valuation methodologies to utilize.

The most widely recognized valuation methodologies fall into one of three categories: the Cost Approach, the Market Approach and the Income Approach. Each of these has strengths and limitations that make them more or less appropriate depending on the specific circumstances of each analysis.

## The Cost Approach

The cost approach seeks to determine the value of the patent bundle by aggregating the costs involved in its development. This may seem fairly simple. However, there is more to it than merely adding up all of the receipts for expenditures associated with the R&D. Indeed, there are two distinct Cost Approach methods: Reproduction Cost and Replacement Cost.

"Reproduction Cost" measures the level of expenditures necessary to reproduce the exact same asset. It is appropriate in situations such as litigation involving the specific patents in question. The "Replacement Cost" method measures the expenditures necessary to develop an asset with similar utility and is appropriate in situations such as determining a target price prior to negotiations or calculating a basis for suitable royalty rates or transfer pricing.

An important requirement for both methods is that the costs not be determined in accordance with the historical expenditures that actually took place. Instead, the necessary expenditures and costs to replace or reproduce the patent should be determined as of the valuation date. Only the expenditures necessary in relation to the environment in existence on that date should be included. The appropriate date may be current or it may be a historical date.

The impact of this requirement is twofold. If the cost of any of the relevant components has changed since the initial expenditure, the current cost needs to be utilized in the calculations. Also, any developments taking place in the interim that would materially impact the development process need to be factored in as well. An example of this would be the utilization of software applets in writing code. Software code developed prior to the widespread use of this technique could conceivably be developed in a far shorter time and at far less cost now than in the past, when each piece of code was written from scratch.

Not all costs encountered during the time period a patent was developed should be included, only those that would be required to duplicate the asset or an asset of similar utility. These will consist of both direct expenditures and opportunity costs.

The direct expenditures will consist of items such as materials needed in the development process, labor costs, and some overhead items. Again, these costs should be considered as of the date of valuation looking forward, not in their historical terms. If the available literature has progressed to the point where, say, a developmental process for a patented technology that took twenty researchers three years to develop could now be accomplished by four researchers working for one year, the latter structure is the template to use when estimating these costs. Also, make sure that the salaries, benefits, and other employment costs being attributed to those hypothetical researchers are based on current practices, not on the specifics in place historically.

Overhead and management costs, such as project supervision, utilities, and administrative costs, should be pro-rated to reflect their true involvement with the direct development process. When projecting the timetable needed to develop the patents in question based on the current environment of prices, knowledge, and available inputs, consideration must be given to the probability of success, which will act as a necessary discounting factor.

The opportunity costs consist of the other courses of action and investment opportunities that have been ignored in order to pursue the development of this patent. If structured properly, this element will recognize the required return on investment being made by the asset's owner. Another way to measure the opportunity costs is to assess the lost profits resulting from delays in commercializing the product. In other words, what could be earned during the period of development if the patents were licensed for use today?

Also, whether utilizing the reproduction method or the replacement method in a current or historical environment, any impact on the patent bundle due to obsolescence needs to be addressed and incorporated into the analysis.

The cost approach is most useful in cases where there is no economic activity to review, such as early-stage technology. It also is effective at establishing a maximum price for the asset if the context is a proposed transaction. This situation exists when there are many candidates for substitution available. The relevant theory is that an investor will pay no more for an asset than the cost to develop or obtain an asset of similar utility. The main drawback associated with the cost approach is that it does not recognize any economic benefits associated with marketplace activity. There is no mechanism to incorporate revenue or profit data, and therefore it ignores important criteria of value by which many assets are measured.

When using the Cost Approach, an accurate valuation is one in which all relevant costs, including opportunity costs, have been factored into the analysis; that they have all been treated appropriately; that the probability of success has been considered; and that the issue of obsolescence has been addressed.

## Market Approach

The Market Approach to patent valuation is similar to valuation techniques used for assets such as real estate and artwork. With real estate, the value of a four-bedroom house close to good schools can be accurately estimated by researching recent transactions featuring comparable homes in the same neighborhood. Similarly, patent value can be determined by comparing the subject patent to comparable assets that have recently exchanged under similar circumstances.

Because the indication of value is based on comparable transactions and there is a high degree of familiarity with the intrinsic concepts established through other asset valuation experience, this method is usually preferred by finders of fact, tax authorities and other third parties. This approach is best if an active market exists that includes many recent examples of arm's length transactions for comparable intangible assets.

Since patents are unique by definition, it is often difficult to establish that assets included in guideline transactions are indeed comparable. Before making this claim, it must be verified that the transactions contain adequate information on terms and conditions. Information necessary to establish comparability includes the type of asset, the relevant industry, geographical constraints, exclusivity, payment mechanisms and timeframe, among others. It is also important to know if there are extenuating circumstances such as a bankruptcy filing or forced divestiture. These will likely have had an impact on the terms contained within a potentially comparable transaction and thus may render it unsuitable for the analysis without appropriate compensating adjustments. Also, the conditions of the market at the time a transaction takes place will influence the sales or license terms for patents.

When using the Market Approach, accurate and complete data analysis is of vital importance. Once empirical sales and licensing transactions have been selected based on circumstantial comparability such as timeframe, type of asset, geographical use and other factors, it must be determined whether the financial characteristics of the underlying operations are comparable. The price information contained in these comparables will frequently have to be adjusted using a common reference point such as sales of related products or some type of margin analysis.

An advantage of this approach is that it can be applied to a wide variety of patents under a wide variety of circumstances. It is equally valid when applied to an established patent bundle or an early stage technology. As long as there is transactional data for comparable assets, the Market Approach will prove to be effective.

Unfortunately, information on patent transactions is rarely published and it is therefore difficult to gather enough data to provide a significant number of comparable transactions. The bottom line is that market information can be very useful in analyzing and valuing patents, but it seldom is comprehensive enough to provide the basis for a satisfactory conclusion of value on its own.

## Income Approach

The Income Approach utilizes the ability of the patent to generate cash flow as a basis for calculating its value. While the Cost Approach has specific applications in certain situations and the Market Approach has its own limitations, the Income Approach is generally applicable to most situations.

This approach is based on discounted cash flow theory and defines the value of the subject property as the present value of the anticipated net economic benefits to be achieved over the duration of the property's useful life. When using the Income Approach to value patents, future income or cash flow related to the business, business segment or product line under consideration is estimated. The forecasted cash flow is then discounted via present value calculations to determine the current value. This discounted cash flow may either reflect the value of the patent if in the form of a royalty stream, or the value of the operation if in the form of net income. If the latter, it is necessary to ascertain the portion of this value that is attributable to the patent bundle via a profit split or relative contribution analysis.

With the Income Approach, particular attention is paid to five main parameters that determine value:

- revenue or income associated with the use of the patent;
- expected growth characteristics of the identified revenue or income;
- expected duration of the revenue or income;
- risk associated with generating the estimates of revenue or income; and,
- the proportion of the revenue or income that is attributable to the subject patent.

These parameters are based on observations of relevant markets, including size, growth trends, market share dynamics among participants and overall market risk characteristics. Comprehensive knowledge of the attributes of the specific patents and associated claims in relation to available alternatives is also important, including stage of development, unique characteristics such as bankruptcy or market leadership, and relevant pricing information associated with the products that feature the subject patents.

Producing an accurate forecast of revenue is dependent upon accurate knowledge of the competitive and economic environment in place during the appropriate timeframe for the valuation. It will also need to accurately depict an appropriate estimate of the property's remaining economic life. The estimation of a property's useful economic life must incorporate a variety of factors such as potential obsolescence, historical usage, expiration of patents, etc. For example, a forecast of future revenue should not extend beyond the protection offered by a patent. Keep in mind that the estimate for the remaining economic life of the assets is dependent on the projected prospects of the property and the history of the assets.

The discount rate used in the calculations must incorporate all of the risks that have an impact on the generation of the future income or cash flow. Risks to consider when determining the discount rate to use in the calculations include the overall market risk, specific industry risk and risks associated with the specific intangibles and operation being analyzed. Several methods are available to calculate an appropriate discount rate, including the capital asset pricing model ("CAPM"), the weighted average cost of capital ("WACC") and the Arbitrage Pricing Theory model ("APT").

As stated above, it is important to differentiate between the business enterprise value and the value of the intellectual property that supports the business. Two of the more effective techniques for separating these two elements are Relief from Royalty and Technology Factor.

## Relief from Royalty

The Relief from Royalty approach measures value by estimating future revenue associated with the patent over its useful life and then applying an appropriate royalty rate to the revenue estimate. It is called relief from royalty because it measures the costs that are avoided (the royalty payments that are not made) due to the firm's ownership of the assets. Of course, if the patents are licensed to third parties, the royalty stream associated with the patents can be measured directly.

The royalty rate used in this analysis isolates the portion of value that is attributable to the associated patent bundle. When marketplace royalty rates are used, the willing buyer / willing seller dynamic required by the fair market value definition is preserved due to the negotiation process used to arrive at the comparable transaction royalty rate in the first place. The present value of the estimated royalty payments is then calculated using a discount rate that incorporates all the associated risks involved in achieving the revenue forecasts and royalty streams. Keep in mind that it may be necessary to add a specific asset premium to the discount rate to capture the unique risk characteristics associated with individual patents.

When identifying appropriate royalty rates for this analysis, the license agreements should feature attributes similar to the circumstances surrounding the subject patents. As with the Market Comparables discussed above, these will include the type of asset, relevant industry, geographical, exclusivity, sub-licensing and advertising constraints, payment mechanisms and the appropriate timeframe. Also, the license agreements should be of an arm's length nature and be free of distortions such as different market characteristics or an associated bankruptcy filing.

Based on our experience, research on appropriate royalty rates will likely uncover a fairly wide range of applicable royalty rates. For example, royalty rates for patented chemicals may range from 0.5 percent of net sales to 10 percent of net sales. The differences among the various agreements will largely be due to the relative strength of the properties being licensed and their associated market share characteristics. Of course, a property commanding 10 percent of net sales is going to be much more valuable than a property commanding 0.5 percent of net sales, and the range of value calculated if both extremes are used will be unacceptably large.

Obviously, one of the keys to an accurate valuation based on the Relief from Royalty technique is to utilize the correct royalty rate in the calculation. A relative strength analysis on the patents will help to narrow the range of royalty rates to a more accurate and acceptable range. Factors that will influence the relative strength analysis are financial characteristics such as growth rates and market share, legal and historical factors such as duration of use and registration protection, risk factors such as potential obsolescence and barriers to entry, and the availability of complementary assets such as breadth of distribution and marketing expertise. An objective analysis of factors such as these will help to determine if an appropriate royalty rate for the subject patent is closer to the 0.5 percent rate or the 10 percent rate in our example.

Absent any valid comparable transactions, an appropriate royalty rate can be estimated by using options analysis. By substituting various inputs for lifespan, risk, pricing and discount rates in the Black-Scholes model with those specific to the patent's characteristics, a fairly valued royalty rate can be calculated. The royalty rate is then used in the royalty stream analysis described above.

Once all of the various factors have been determined, including the revenue forecast, appropriate royalty rates, associated expenses and an accurate discount factor, the calculation of the present value can be performed. This is accomplished by aggregating the present values calculated for each year in the cash flow projection. The corresponding sum of the annual present values provides the overall estimate of the patent's value.

## Technology Factor

The Technology Factor approach is designed to measure the portion of a business unit's overall market value that is based on the utilization of the underlying technology. The willing buyer / willing seller aspect of the fair market value definition is incorporated by scoring a series of attributes as to whether they favor a buyer or a seller in a hypothetical negotiation.

The first step is to determine a forecast of operating results for the business or business unit using the technology. The present value of this cash flow is then calculated using a discount factor that encompasses all risks associated with the generation of the estimated future results. Using this technique to then accurately calculate the value of the patent depends on ascertaining the appropriate Technology Factor.

This factor is determined by establishing an upper limit for the contribution of value provided by technology used in that particular industry and then performing a relative strength analysis via various utility and competitive attributes to narrow the contribution of the subject technology to a specific percentage.

The upper limit represents the maximum percentage of total business value that can be attributed to the technology for that industry. Industries whose products feature large contributions from technology such as scientific instruments and medical devices will have relatively high upper limits while those with products requiring little technology will have relatively low upper limits.

Once an appropriate upper limit has been determined, various competitive and utility attributes that reflect the strengths and weaknesses of the technology are reviewed. Examples of utility attributes that may be included in the analysis are the current stage of the technology, the level of capital required to commercialize the technology, the size of the potential market and the margins associated with the operation. Competitive attributes may include the existence of alternative technologies, the potential for obsolescence, the likely response by competitors and the technology's potential to displace existing products.

These attributes are selected, weighted and scored based on the circumstances specific to the present valuation. Depending on how they are scored, some of these attributes may indicate a higher value; others may indicate a lower value and others may be neutral to the final value. Not all attributes will be of equal importance and should be weighted accordingly. These attribute scores essentially indicate whether the subject technology is considered to higher than average, average, or lower than average in a particular aspect.

In a fair market valuation, the utility and competitive attribute averages are usually given equal weight, although that is not mandatory. The mean of these two averages is then taken to arrive at the final Technology Factor. The resulting Technology Factor is then multiplied by the net present value of the subject business or business unit to arrive at the value of the technology. In this way, the value of the technology is segregated from the value contributed by other assets of the business.

Because the upper limit is based on the contribution of all intangibles to overall value, it limits the viability of the Technology Factor when used on any operations that feature a mix of both technology and valuable trademarks. Similarly, the presence of several different technologies in one product can lead to erroneous conclusions when determining the value of only one of them is the goal. The Technology Factor approach is very effective at calculating the value of technology when the operation being analyzed utilizes only the subject technology.

## Conclusion

There are a number of methods available to calculate the value of patents. Some are specifically designed to measure the value of assets in relative isolation, such as the Technology Factor, while others are flexible enough to use in any situation. The Cost Approach is better suited for early stage technology than others while the Market Approach may suffer from a lack of available information. The method used in each case will depend on the assets being valued, the circumstances surrounding the analysis, and the availability of necessary information.

The quality of any valuation analysis is a function of the accuracy of the data and assumptions that form the basis for any conclusions reached. If available, it is always better to use actual data or historical results than to rely on assumptions. Unfortunately, this is not always possible. It is possible, however, to make sure that any assumptions made are based on the financial, market, economic and competitive characteristics in place during the appropriate timeframe for the analysis.

Used effectively, these techniques can provide the kind of accurate information that is necessary to make correct decisions. As long as the analysis has been designed correctly, it is possible to provide a calculated answer to any question associated with the value of patents, whether it has to do with the level of damages related to infringement or the price to pay in a transaction. ■