

From breakdown to breakthrough

While negotiating parties can usually agree on the major elements in any licensing deal, things get trickier when it comes to looking at the minutiae. To prevent negotiations breaking down, multi-faceted valuation methodologies should be employed

By **Sam Khoury**

Business licensing of a patent portfolio requires significant preparation work in order to transmit the information to the potential buyer or licensee, and to ensure the success of the business supported by the intellectual properties.

In the recent past, licensing executives felt that deals could be done through effective negotiation with no or little preparation. Most negotiations took a long time and often broke down in the last part of the transaction. This was because one party was not as prepared as the other during the negotiation proceedings. Nowadays, there are specific tools available to the licensing executive to help in the preparation of a negotiated deal. It is the responsibility of the licensor to educate the licensee on the results of the analyses so that they can progress at the same pace as the licensor. This improves the chances of closing a deal and concluding the sale or license of technology.

The basic step in successful licensing is to select winning technologies that companies would like to acquire and commercialise. There are a number of ways of doing this. One, for example, is the Technology Valuation Management System (TVMS), which reveals the strengths and exposes the weaknesses of a specific technology bundle. This allows users to select the best technologies with good commercial potential and to conduct a valuation due diligence using the net present value of the technology. Assigning a single number to a technology value might not be enough to give the licensee a good

understanding of value, so a detailed Monte Carlo analysis can show the impact of different parameters on the final value.

Finally, it is a case of applying real options tools in unique ways to the specific deal parameters to bridge the gap between the differing views of the licensor and the licensee in order to reach a final deal.

In addition to this financial analysis, you could use other qualitative tools to map the technical activities of corporation in competitive or similar technology. Owners of competitive or similar technologies become the starting point for internet searches to identify commercial products in the market place that could perform the same function. Also through personal knowledge and marketing studies conducted by other experts in the field of the technology, you could start formulating a

Prioritisation process for business licensing

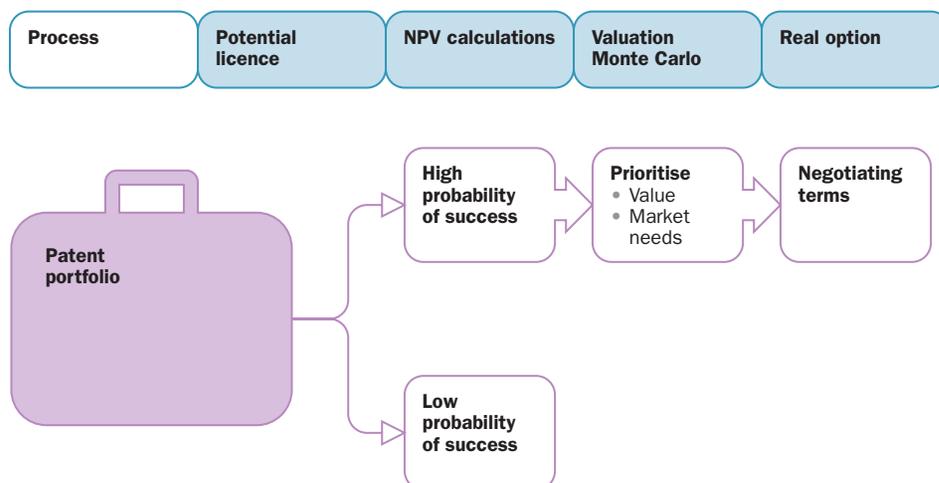


Table 1: Parameters of the exclusive auto sensor licence

Licensee revenue: 2006: US\$40,000 2007: US\$80,000 2008: US\$120,000 2009: US\$140,000 2010: US\$160,000	Assumptions: Forecasted product revenue from the exclusive sale of the auto sensor
Royalty rate 5%	The royalty rate increases from 3.5% to 5% because of exclusivity

list of potential needs in the market place for the technology.

The devil is in the detail

In licensing negotiations, most parties can agree on the major elements of the deal. However negotiations break down when one or both parties drift into the details. The licensee wants some additional qualitative terms included in the licence that the licensor is not willing to give up for free; yet the licensor cannot seem to be able to quantify. So, no deal occurs.

A patent portfolio for a medium or large company can be overwhelming at times. The manager of the portfolio perceives patents as discrete and separate entities that can be sold independently, but in most industries it is actually very rare to be able to sell one patent which describes a whole product. So the first job of the licensing executive is to bundle the patent portfolio in terms of group of patents that will enable the licensee to produce a final product that can generate revenue for the licensee and allow the licensor to assess a royalty rate payment schedule. This bundling process is slow and time consuming, and it needs to be done properly so that the licensor does not overlook a specific market application – something that can lead to missed licensing opportunities.

After the bundling process a screening, assessment and valuation will narrow the list of potential licensing opportunities to a select few. Screening is designed to remove the bad technology. Usually a licensing executive can determine the weaknesses of a technology by asking a few qualitative questions. The technology bundles that survive the screening process will go through an assessment process that delves into the detailed business attributes of the technology so as to highlight and fine-tune the analysis from a commercial point of view. After that, a valuation approach is chosen to assign a quantitative measure to the technology.

Valuation approaches

The three valuation approaches that could be used are the market, income and cost approaches. The market approach is based on the economic principle that in a free market system supply and demand factors will drive the price of any goods to a point of equilibrium. The intangible assets are valued by reference to transactions involving similar assets that have occurred recently in similar markets. The income approach is based upon the economic principle of anticipation. The investor expects a certain income stream to be earned from the ownership of the intangible asset. This future income stream is converted to a present net worth after analysis of all the risk factors that could have an impact on the generation of this future income. The cost approach is based on the economic principle of substitution. That is, an investor will pay no more for an asset than the cost to develop or obtain another asset of similar utility. Of these three approaches, the income approach is the one used most frequently.

That said, there are different methods for employing the income approach in order to determine value. These include: the pure income approach; the direct capitalisation income approach; the technology factor; the probability decision tree; royalty income; the Monte Carlo analysis; and real options. They differ by accounting for risks in different ways. An experienced appraiser can utilise any of these methods to find indications of value that are very similar. These values can be determined so long as the appraiser does not exclude a risk element. If this were done, it would result in a higher value or in the double penalising of a technology by taking the same risk in two different valuation variables.

The rest of the paper will focus on three approaches that companies should be using in their licensing negotiations: royalty income; Monte Carlo; and real options. When used together, these approaches present a complete picture to the potential licensee of the price of the technology.

The royalty income method values technology by reference to the amount of royalty income the intangible asset would generate if it were licensed in an arm's length transaction. This method can be utilised if the appraiser can derive with some confidence four variables: product revenue for the life of the technology; the royalty rate that is negotiated between both parties; the tax rate that the company is subjected to; and the discount rate that measures the

Table 2: Auto sensor NPV calculations

(US\$ thousands)		2006	2007	2008	2009	2010
Company revenues		40,000	80,000	120,000	140,000	160,000
Royalty	5.00%	2,000	4,000	6,000	7,000	8,000
	Tax rate					
After-tax income	38.00%	1,240	2,480	3,720	4,340	4,960
Discount rate	15.00%					
Present value		1,156	2,011	2,623	2,661	2,644
PV at 1st January 2006		11,096				

required return based on the incurred risk of the investor. The best way to explain the interaction of those four variables is through an example.

The auto sensor technology example

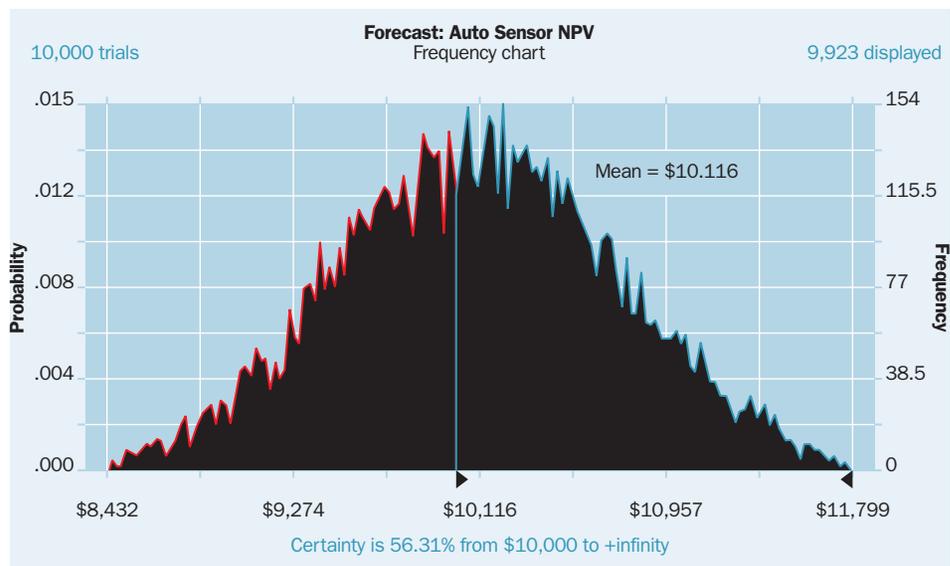
This example relates to a technology bundle that would allow a licensor to produce an auto sensor. The licensing executive is quite certain that the auto sensor technology is worth at least US\$10 million given a non-exclusive royalty rate of 3.5%. However, the licensing executive is approached by a company that wants to enter into a five-year exclusive agreement and is willing to pay a 5% royalty rate. The licensing executive is faced with two options and is not sure what is the best action to take. The four variables for determining the net present value for the auto sensor technology are presented in Table 1.

The traditional analysis using the royalty income method gives one data point: the net present value using the parameters given results in a value over US\$11 million. Based on this analysis, the licensing executive should have no problem giving the licensee an exclusive license at 5% for the next five years because it exceeds his expectation of US\$10 million on a non-exclusive basis. Table 2 presents the net present value (NPV) calculations using the parameters listed in Table 1. However, the question becomes how reliable is the information used to determine the independent variables used in the net present value calculations.

Monte Carlo analysis is designed to highlight the range of values, as the independent variables are represented in terms of ranges of value. Monte Carlo analysis provides an insight into uncertainty and avoids the flaws inherent in averages. If we revisit the variables in the auto sensor example we realise that company revenue, discount rate and growth rates are the independent variables. The NPV is the output of this calculation. The second step in Monte Carlo analysis is to decide the best distribution to explain the variations of the specific variable. There are four different distributions that all variables follow: normal distribution; lognormal distribution; triangular; and uniform.

Let us pick two variables in our example. The revenue for each year has variability distribution that is uniform between +10%/-25%. In our example, the revenue for 2006 is most probably going to be US\$40,000 with equal probability that if good things happen the revenue could rise to US\$44,000 (+10%) and if bad things happen the revenue could

Figure 1: Auto sensor Monte Carlo analysis



drop to US\$30,000 (-25%). The discount rate has a most probable value of 15%, but the triangular distribution has probable variability of +5% on high risk and -3% on lower risk. So the discount rate varies between 12% and 20%, with the most probable value being 15%. Using Monte Carlo simulation software and conducting over 10,000 net present value calculations, the value of the auto sensor technology can be ascertained. Figure 1 shows a range of US\$8.43 million to US\$11.79 million, with a median of US\$10.11 million. There is a certainty of only 56.3% that the licensor will get licensing revenue of over US\$10 million. All of a sudden this picture paints different outcome than the most probable outcome obtained from the net present value of US\$11.096 million (Table 2). With the Monte Carlo analysis the licensor is now nervous of the outcome and might choose to walk away from the deal.

Creating a win-win

To save the situation, an experienced and knowledgeable licensing executive has to be creative and structure the deal in such a way as to make it a win-win situation. So the licensing executive weighs up the options. He is quite certain that the auto sensor technology will generate at least US\$10 million on a non-exclusive basis. So the licensing executive, instead of rejecting the exclusive licence deal, suggests that there should be a trigger option clause in the licence deal: if the present value of the royalty income drops below US\$9 million due

Table 3: Comparison of financial options and real options

Financial option	Real option
Shorter maturity, usually in months	Longer maturity, usually in years
Underlying asset is the price of a financial asset	Underlying asset is free cash flows, which are driven by competition, demand and management
	Major million/billion dollar decisions

to weaker than expected demand, the licensing executive has the option to change the agreement to a non-exclusive licence. If the licensee wants to maintain the exclusivity then they have to pay a million dollar to the licensor. So how much is this option worth?

Real option has many definitions and those definitions are usually paragraphs long. But a simple definition has been published by professors from University of Pennsylvania: "Real options analysis is the valuation of flexibility in response to uncertain events."

Using real options

Most people are familiar with financial options but might not be familiar with real options. The following comparison, Table 3, highlights the differences between the two. PL-X tried to modify the Black-Scholes Model to adopt it to calculate the value of patents. But the Black Scholes model describes European options, which cannot be exercised except at the end of a specific period. So the Black Scholes model has limited application in licensing transactions because most of

the options in a licence deal follow the American option model and can be exercised at any time once a licensee/licensor gives notice to the other party. The real options analysis discussed here, therefore, is the use of binomial lattices to calculate the outcome of events as time progresses.

The real option valuation using binomial lattices mathematical equations considers the volatility of the option and how the value would go up or down based on specific uncertain events happening in the future. This paper is not designed to go into the details of real options but to explain how to use them in decision making in licensing transactions.

Real options can mathematically model any option or option combinations that could be included in a negotiated licensing deal. Those options include combinations such as: abandon; contract; expand; expand-abandon; contract- abandon; contract – expand; contract – expand – abandon; switching option; sequential options; and trigger option.

The real option is conducted in three steps:

- Construct a forward analysis for the next five years considering the uncertainty of events and find the periods that the licensee might not be able to generate US\$10 million dollars.
- Apply the trigger option to adjust the forward analysis and create a reverse set of value starting from the last period or period five.
- Calculate the present value of that option by subtracting the NPV without the option and the NPV with the option value.

These three steps are outlined in Tables 4, 5 and 6. The final net present value is defined as the expanded net present value, which is the total sum of the original net present value in addition to the present value of the option. By conducting a Monte Carlo analysis on this option value and adding it to the original Monte Carlo analysis we find that the new agreement value ranges from US\$9.121 million to US\$12.386 million, with the mean being US\$10.739 million. However, the certainty of achieving a return higher than US\$10 million is 86.5% (Figure 2). This is a significant improvement over the original Monte Carlo analysis that showed the probability to be only 56.1%. With such a high probability using the trigger option, the licensing executive will approve the deal and a win – win situation is created between both parties.

A variety of perspectives

The auto sensor example shows that if you

Table 4: First step: Real option calculation – forward calculation

Underlying asset lattice	11,096	14,419	18,739	24,352	31,646	41,126
		8,538	11,096	14,419	18,739	24,352
			6,570	8,538	11,096	14,419
				5,056	6,570	8,538
					3,890	5,056
						2,994
	0	1	2	3	4	5

Table 5: Second/third steps: Real option calculation – backward calculation

Underlying asset lattice	11,096	14,419	18,739	24,352	31,646	41,126
		8,538	11,096	14,419	18,739	24,352
			6,570	8,538	11,096	14,419
				5,056	6,570	8,538
					3,890	5,056
						2,994
Threshold value penalty	9,000	9,000	9,000	9,000	9,000	9,000
	1,000	1,000	1,000	1,000	1,000	1,000
Option valuation lattice	11,687	14,707	18,827	24,352	31,646	41,126
		9,538	11,642	14,618	18,739	24,352
			7,570	9,538	11,541	14,419
				6,056	7,570	9,538
					4,890	6,056
						3,994
	0	1	2	3	4	5

apply only valuation techniques that generate a single number in a negotiated deal, both parties might not see the whole picture. Only after the implementation of Monte Carlo does the impact of the uncertainty of the independent variables show the strengths and expose the weaknesses of the deal. Once these become apparent, through the proposed win-win solutions emerge that allow the deal to proceed to fruition.

The creativity of the licensing executive is to identify the type of option the licensee is requesting and to create a win-win scenario that means the licensor is compensated for this additional benefit and the licensee gets the chance of securing the best deal for his organisation.

Other options that are typical in licensing agreement include an expansion option. An expansion option could be expressed in two areas: geography or in technology. For example, a licensee requests an agreement in a specific country and then drafts a clause in the agreement that if the company is successful in launching the product for this new licensed technology it would like to have a global licence (exclusive or non-exclusive); the licensor will be compensated for this option. Another expansion option includes a clause that the licensee gets the first right of refusal for all additional technologies that are created by the licensor's organisation. This could apply to a new market application, or extending the life of the old technology as the new developed technology is included in the bundle. All such

options can be calculated.

With licensing opportunities that could be in the millions of dollars, savvy executives should be able to recognise these qualitative options as ones that can be quantified, and they should conduct their due diligence to make sure that the licensor is compensated and the licensee gets the deal that fits its organisation. If the options described above are taken into consideration there is less scope for deals to break down – something that should be welcome to all parties in a negotiation.

The licensing executive still has the responsibility for creating a win-win situation between the two negotiating parties. Being able to quantify those winning options will result in higher deal closing opportunities. ■

Table 6: Difference forward and backward calculation – option value

Expanded net present value (ENPV)	\$ 11,687
Net present value (NPV)	\$ 11,096
Trigger option value	\$ 591

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Figure 2: Monte Carlo analysis of the trigger option

