On the Incomparability of 'Comparables': An Economic Interpretation of 'Infringer's Royalties'

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Recent Federal Circuit rulings have "affirmed 'reasonable royalty' awards that are obviously well in excess of what the parties would have actually agreed to as a result of licensing negotiations prior to infringement."[1] Such rulings make reference to the need for reasonable royalties to compensate for infringement. For example, in *Panduit* the Court made it clear that:

> "The setting of a reasonable royalty after infringement *cannot* be treated . . . as the equivalent of ordinary royalty negotiations among truly 'willing' patent owners and licensees. That view would constitute a pretense that the infringement never happened. It would also make an election to infringe a handy means for competitors to impose a 'compulsory license' policy upon every patent owner."[2]

Accordingly, reasonable royalties awarded for patent infringement are sometimes referred to as royalties for an infringer or an "infringer's royalty" to distinguish them from the royalties agreed to in arm's-length license negotiations between a willing patentee and a willing licensee.

This article provides an economic rationale for why "arm's length" royalties agreed to in the course of licensing negotiations are often insufficient to compensate for infringement. As economists, we view a principal difference between an "arm's length royalty" and an "infringer's royalty" to be the degree of uncertainty concerning the probability that the patent in question is valid and infringed. Whereas royalties agreed to as the result of actual licensing negotiations are generally discounted for uncertainty regarding whether the patent is valid and infringed, reasonable royalties are determined given knowledge of the fact of validity and infringement. It is this assumption of validity and infringement, made in determining reasonable royalties, that allows a reasonable royalty damage measure to compensate for infringement. The article also identifies some circumstances in which existing "arm's length" royalties are sufficient to compensate the patentee for infringement.

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Assumptions

We make a number of assumptions. First, we assume that reasonable royalties are determined as the outcome of a hypothetical licensing negotiation that takes place on the eve of infringement.[3] We assume that the purpose of awarding reasonable royalties as damages is to compensate the patentee or to make them whole for the infringement.[4] In economic terms, a compensatory royalty rate is one that makes the rational patentee indifferent between a reasonable royalty damage award and having never been infringed. This is the lowest royalty rate at which the rational patentee is a willing licensor in the hypothetical licensing negotiations. As a matter of economics, in order to compensate the patentee for the infringement, a reasonable royalty must make the patentee a willing seller even if a rational infringer is not a willing buyer at that price.[5] We also assume that the award of compensatory damages is meant to compensate for the infringement only and, in particular, is not intended to recover litigation costs.

The Role of Uncertainty in Actual Licensing Negotiations

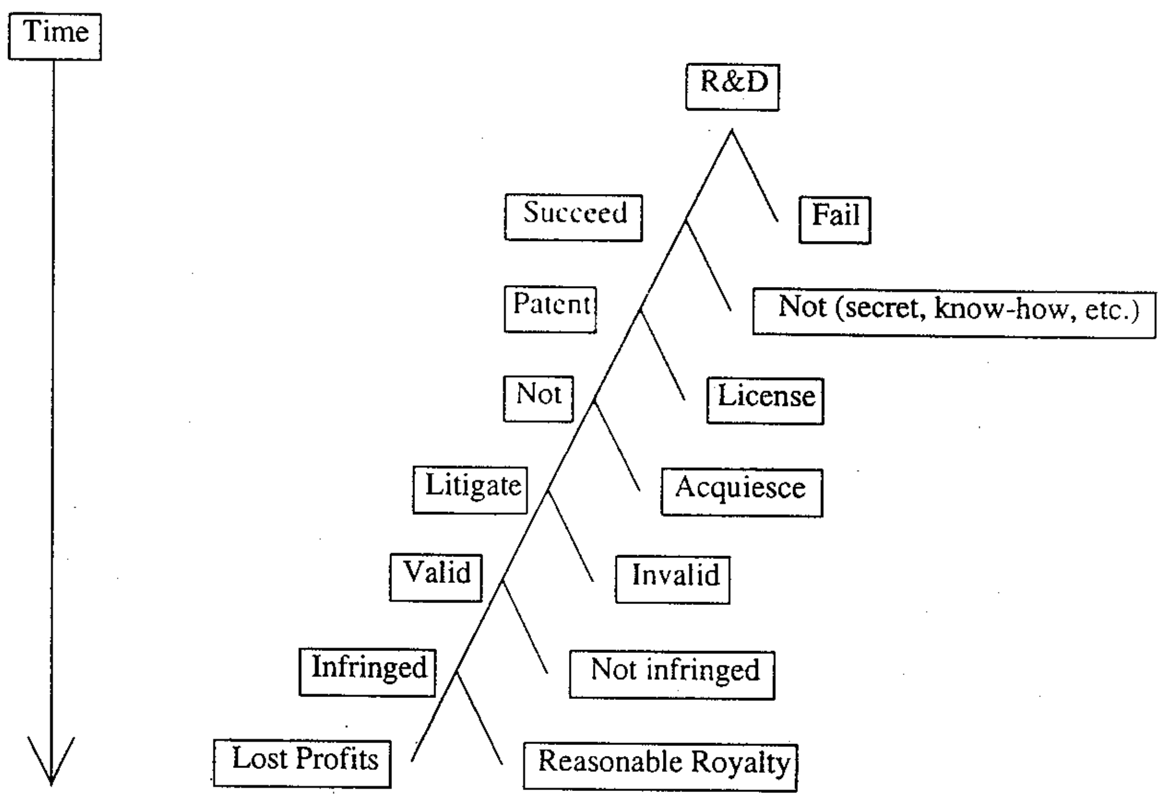
Figure 1 (*see page 3*) is a graphic depiction of the progression from research and development (R&D) to the ultimate use of the resulting innovations. As the figure indicates, technology developed through successful R&D may or may not be patented. Patented technology may or may not be licensed. Even where no license is negotiated, others may appropriate the technology. This may result in litigation or the patentee may simply acquiesce to unlicensed use of the technology. Patent infringement litigation, if not settled, may result in a finding of validity and infringement or it may result in a finding of either invalidity or non-infringement. Finally, damages are awarded only in the case of a finding of validity and infringement.

As a new technology moves through this process it yields new information about its economic value. At the beginning of the R&D stage there is uncertainty, often considerable, about whether a technological advance that is economically viable will result. At the patenting stage much of the technological uncertainty regarding the innovation may be resolved but uncertainty frequently remains with regard to the economic feasibility of the advance. At the licensing stage there is uncertainty, often considerable, regarding whether the patent is valid and, if valid, whether the proposed use infringes. By the time a judge or jury awards damages uncertainty regarding validity and infringement have been resolved.

The level of information will play a role in determining the royalties that are paid at different stages in this process. When two parties willingly negotiate a license and royalty they (implicitly or explicitly) take into account the economic value of the technology as well as the probability that the patent is valid and, if valid, would be infringed by the licensee's unauthorized use. Because of uncertainty, no potential licensee would be willing to pay the full economic value of the patented technology in the form of a royalty. Rather, the potential licensee would be willing to pay up to the "expected value" of the license, where the expected value is the full economic value of the license discounted for the probability that the patent is invalid and/or not infringed. For the same reason, no rational patentee will refuse to accept a royalty that pays it at least the expected value.

Consider the hypothetical example of Mom & Pop Inventions, Inc. and Allied Gadgets. Mom & Pop has developed a new, very much improved, process for manufacturing widgets. Mom & Pop does not currently manufacture widgets and has no plans to enter the widget business. Allied Gadgets wants to license the new process to manufacture widgets. Assume first that the two parties willingly negotiate a license. Assume further that both parties agree that the patented process has an expected value of $1,000,000, that the probability the patent is valid is 0.8, and that the probability that the patent, if valid, would be infringed by Allied's unlicensed use is 0.7.[6,7] In this case, the two parties would agree to a royalty rate that has an expected value of $560,000.[8] This is simply the product of multiplying the value of $1,000,000 times the probability of validity (0.8) times the probability of infringement, given validity (0.7). That is, the royalty actually negotiated in an arm's-length transaction between a willing buyer and a willing seller will be discounted for the parties'

Figure 1: A Simple Model of R&D, Patenting, Licensing, and Litigation



evaluations of the probabilities that the patent cannot withstand a challenge to its validity and/or infringement. Assume further that the two parties agree that Allied's sales of widgets (in present value) are expected to be $10,000,000. In this case, the parties will agree to a royalty rate of 5.6 percent.

The Role of Uncertainty in Determining Reasonable Royalties

However, reasonable royalty calculations based on hypothetical negotiations on the eve of infringement are different. Validity and infringement will have been established at trial prior to the determination of damages. Uncertainty has been resolved. In order to compensate the patentee for infringement it is necessary to assume that the fact of validity and infringement are known with certainty at the time of the hypothetical negotiations used to determine reasonable royalties.

To see this, consider our hypothetical example of Mom & Pop Inventions, Inc. and Allied Gadgets. Suppose that instead of taking a license for 5.6 percent, Allied Gadgets begins producing a potentially infringing widget, Mom & Pop sues for patent infringement and the case goes to trial. Had the two parties negotiated a license with knowledge of the fact of validity and infringement, they would have agreed on a royalty of 10.0 percent. This would yield an expected value for the license of $1,000,000 or the full value of the technology. Assuming that the parties' assessments of the probabilities of validity and infringement are correct, the patent will be found valid and infringed with probability 0.56 and damages will be awarded. However, there is also a probability of 0.44 that the patent will be found either invalid or not infringed and no damages will be awarded. Therefore, Mom & Pop's expected compensation for the infringement, prior to trial, is $560,000 ($1,000,000 in damages given validity and infringement multiplied by 0.56, the probability of validity and infringement). Recall that this is the same expected value that Mom & Pop would have received had it licensed Allied. Therefore, Mom & Pop is precisely compensated for the infringement. In economic terms, before the infringement, Mom & Pop is indifferent between negotiating a license and being infringed.

To award a reasonable royalty at trial of $560,000 on the basis that Mom & Pop would have been willing to settle for this amount in actual arm's-length royalty negotiations, under uncertainty regarding the patent's validity and infringement, is wrong. This amounts to a "compulsory license" and actually makes Mom & Pop worse off than if it had licensed Allied. Consider the following example. Mom & Pop has a portfolio of 100 patented inventions. Assume for sake of simplicity that each patent has a value of $1,000,000, a probability of validity of 0.8, and a probability of infringement (given validity) of 0.7. Assume further that Mom & Pop is rational and therefore willing to license at $560,000 per patent.

If Mom & Pop licenses all 100 patents at $560,000, it will receive a total of $56,000,000. This is 56 percent of the $100,000,000 value of the entire portfolio where 0.56 represents the probability that the patents are valid and infringed. Suppose instead that the patents are not licensed, are potentially infringed, and Mom & Pop sues. In this case, Mom & Pop can expect to get damages in 56 percent of the cases. If it receives $1,000,000 in each case it wins then it can expect to receive $56,000,000, the same as if it licenses. Such royalties compensate exactly for the infringement. However, if Mom & Pop receives only $560,000 as a reasonable royalty in each case it wins (*i.e.*, the expected value of an actual arm's-length license) then it will receive a total of only $31,360,000 or 56 percent of what it expects to get by licensing. Mom & Pop has been made worse off by the infringement in expected value terms. In essence, if actual arm's length royalties are awarded as damages there is a double counting of the discount for uncertainty.

Making the assumption that the hypothetical negotiation to determine reasonable royalties takes place with full knowledge that the patent is valid and infringed makes sense from a public policy perspective as well. The purpose of the patent system is to provide incentives to potential inventors to engage in R&D activities. In order to preserve the incentives to engage in R&D that are provided by the patent system, damages awarded in patent litigation should compensate the patentee for the infringement. In economic terms, this means that a rational patentee should be indifferent between the damage award and the situation in which infringement never took place. A rational patentee will only be indifferent if the damage award compensates for the uncertainty of establishing the patent's validity and infringement.

We stress that reasonable royalties calculated given knowledge of validity and infringement compensate for infringement. Although such royalties exceed, sometimes by a considerable margin, royalties that actually would have been negotiated by a willing patentee and willing licensee under uncertainty, this is not a punitive measure of damages. It is necessary to award reasonable royalties in this fashion in order to make the rational patentee indifferent to having its patent infringed. Because a paten tee will collect damages only if its patent is found to be valid and infringed and because a finding of validity and infringement is uncertain, a patentee will be compensated for infringement only if the award is sufficiently great as to compensate for the uncertainty.

Where Actual Royalties Are Comparable

The foregoing analysis does not mean, however, that actual royalties should never be used as reasonable royalties in estimation of damages. For example, where a license has been negotiated after litigation in which a patent has been found to be valid, the agreed to royalty will not have been discounted for uncertainty over validity. In such cases, the use of an actual royalty rate as a reasonable royalty rate is sufficient to compensate for infringement.

Conclusion

Reasonable royalties awarded as damages in patent infringement litigation often exceed royalties actually negotiated on comparable patents. This makes sense from an economic perspective. Royalties negotiated prior to litigation naturally reflect discounting for uncertainties over validity and infringement of the patent. However, by time of the damages award, the fact of validity and infringement is known and no discounting for uncertainty is required, or desirable, when calculating reasonable royalties. By treating validity and infringement as certain in calculating reasonable royalties, patentees are compensated for the infringement. The expected value of the royalty payments based on a negotiated royalty will be the same as the expected value of the royalty payments resulting from litigation as evaluated before the litigation begins. This preserves the proper incentives to engage in R&D. It is, however, sometimes the case that established royalty rates are appropriate for use in determining reasonable royalties for litigation purposes. For example, royalties negotiated after a patent has been determined to be valid may serve as a reasonable royalty.

NOTES

1. Porcelli, Frank P., John M. Skenyon, and Laura A. Handley, "Patent Damages—Life in the 'But-for' World," presented at the American Bar Association, Section of Patent, Trademark and Copyright Law, 1991 Annual Meeting, August 12, 1991, p. 1.15. This paper cites a number of such cases.

2. *Panduit Corp. v. Stahlin Bros. Fibre Works, Inc.*, 575 F.2d at 1158.

3. The analysis presented in this article is economic, not legal, analysis. The authors are economists, not lawyers. Citations to case law and statutes are provided for illustrative purposes only. Hypothetical licensing negotiations on the eve of the infringement between the patentee and the infringer are consistent with the jury instructions in *Honeywell v. Minolta*, Civil No. 87-4847, 88-4847 (D.N.J. Jan. 28, 1992). The 17 factors listed by the court for the jury to consider in Honeywell are listed in Russell L. Parr, *Intellectual Property Infringement Damages: A Litigation Support Handbook*, (1994 Supplement), New York, John Wiley & Sons.

4. This is consistent with 35 U.S.C. Section 284.

5. A rational infringer will be a willing buyer at any rate up to that rate which appropriates all of the value of the patent to the infringer.

6. A complete discussion of how one determines the expected value of a patented innovation is beyond the scope of this paper. One simple example of expected value is that by using Mom & Pop's patented technology Allied expects to manufacture its expected number of widgets at a cost of $1,000,000 less (in present value terms) than it would cost using the next best technology.

7. We assume here that both parties can agree on the value of the patented technology and on the probabilities of validity and infringement in order to simplify the example and focus on the role of uncertainty. In actual licensing negotiations the two parties many not agree on these factors (*i.e.*, there maybe asymmetric information).

8. The expected value of the license is the royalty rate multiplied by the expected (present) value of Allied's sales.

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