

A grand unifying theory for determining infringement remedies

A common framework for evaluating damages and injunctive relief could reduce uncertainty in patent infringement remedies. The footprint analysis is one such approach

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Systems for determining patent infringement remedies – such as reasonable royalties, lost profits and injunctions – each have their own independent standards, although approaches can vary greatly within each category. The result is uncertainty about available remedies, increased costs for litigants and increased complexity for courts. There is thus an opportunity for a standard approach to evaluating patent remedies, which could increase certainty in litigation and thus reduce friction in out-of-court patent transactions.

This article proposes a solution – a common framework for evaluating all forms of damages and injunctive relief for patent infringement. This approach would be known as the ‘footprint’ method, after the Federal Circuit’s guidance in *ResQNet.com v Lansa* that “the trial court must carefully tie proof of damages to the claimed invention’s footprint in the market place”.

The footprint method relies on rigorous economic and evidentiary principles. It not only provides a defensible path to satisfy the requirements for a reasonable royalty award, but can also accommodate various factual scenarios, including those unique to standard-essential patents. It also extends to lost profits and harmonises the analyses for lost profits and reasonable royalty damages.

Methodology

Patent infringement remedies depend on the economic impact caused by the invention to either the patentee or the infringer. The footprint methodology begins with an economic principle and then incorporates a practical causation analysis to deliver a consistent approach for all infringement remedies.

The approach originated as a repeatable and reproducible method for determining an appropriate range for reasonable royalty damages. It relies on three practical steps:

- alternatives – identifying alternatives to the claimed invention;
- technical quantification – quantifying the additional technical benefits achieved by the invention compared to the alternatives; and
- economic quantification – translating the invention’s additional technical benefits to resulting additional profit versus using a non-infringing alternative.

The results of these steps can inform the analysis not only for reasonable royalty damages, but also for lost profits damages and injunctive relief. Here we briefly

describe the three basic steps of the analysis and then turn to its application to causation of economic harm and whether to award injunctive relief.

Step 1 – identifying alternatives

The first step is to define possible alternatives to practising the claimed invention. What could the infringer have done instead of practising the claimed invention? An alternative is any feature that falls outside the scope of the patent claim or is authorised to practise the patent claim. Alternatives may come from the prior art, from later developed non-infringing features, from hypothetical non-infringing features which could have been developed or from business alternatives, such as discontinuing the infringing product.

Step 2 – quantifying additional technical benefits

The second step is to determine the technical benefits achieved by using the invention instead of an alternative. What difference does the invention make compared to the alternative? If the invention relates to a manufacturing process, then the technical benefits might include the difference in yield achieved by the patented process over the alternative. If the invention relates to a component, such as a computer chip, then the technical benefits might be the difference in speed or power consumption achieved by the patented component compared to an alternative design. If the invention is a component used within a multi-feature consumer product, then the technical benefit might be the effect on consumer-facing features such as screen resolution or battery life compared to an alternative. The goal of this step is to determine the ability to produce a numerical value isolating and quantifying the invention’s technical benefit.

Step 3 – translating additional technical benefits

The third step is to translate the technical benefits to the economic benefit attributable to the invention. How much additional money did the patentee or infringer make during the infringement as opposed to the amount that would have been achieved without infringement? This can be expressed using basic accounting principles – profit (P) equals revenue (R) minus costs (C):

$$P = R - C$$

The footprint methodology introduces causation into this equation by evaluating the equation under

two scenarios informed by the alternatives analysis described above:

- actual – what occurred during the period of infringement; and
- hypothetical – what would have occurred if the infringer had used a non-infringing alternative instead of the invention.

For the actual scenario, we use the designation ‘with the invention’ (INV). For the hypothetical scenario, we use the designation ‘with an alternative’ (ALT).

The profit achieved in the actual scenario in which the infringer used the invention is:

$$P_{INV} = R_{INV} - C_{INV}$$

The profit achieved in the hypothetical scenario in which the infringer could have used a non-infringing alternative is:

$$P_{ALT} = R_{ALT} - C_{ALT}$$

To incorporate causation, the footprint methodology evaluates the difference (ΔP) between:

- the profit achieved during the infringer’s use of the invention (P_{INV}); and
- the profit that could have been achieved had the infringer used a non-infringing alternative instead (P_{ALT}).

By taking the difference between these profit scenarios, the footprint approach apportions out all value from non-patented features and isolates the difference in profit (ΔP) caused by the infringer’s use of the invention.

$$\Delta P = P_{INV} - P_{ALT}$$

Substituting in the equations for P_{INV} and P_{ALT} and rearranging the variables, the result is the basic footprint equation, synthesising tort causation and economic quantification:

$$\Delta P = (R_{INV} - R_{ALT}) + (C_{ALT} - C_{INV})$$

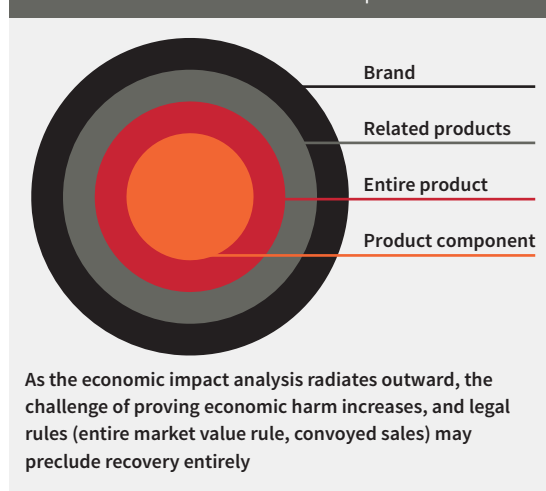
Below, we explain how the footprint method can address and simplify another form of relief: injunctions.

Royalty damages, lost profits and injunctions

We begin by observing that reasonable royalty damages, lost profits damages and injunctive relief inhabit different quadrants within a matrix defined by evidence of economic causation of harm to the patentee (eg, lost product revenues, market share and goodwill) and evidence quantifying that harm in monetary terms (see Table 1).

If a patentee proves that infringement caused it

FIGURE 1. Shockwaves of economic impact



economic harm and quantifies that harm, then an award of lost profits may be appropriate, as may an award of reasonable royalty damages (Option 1). If the patentee proves similar economic harm, but cannot quantify the past damages or future harm, then an injunction may be appropriate going forward because monetary damages may be too speculative to remedy the harm (Option 2). If the patentee cannot prove economic harm caused by the infringement, then it must attempt to quantify reasonable royalty damages (Option 3). If the patentee neither proves economic harm nor quantifies reasonable royalty damages, it may not be entitled to an award (Option 4).

Although damages remedy past harm and injunctive relief protects against future harm, the matrix set out in Table 1 provides a useful framework for considering the potential relief available based on the evidence. The evidence in any real-world case may fall at some point within the field among the boxes in the matrix; the form of relief identified in each box does not necessarily exclude other forms (eg, an award of lost profits for past damages and grant of injunctive relief going forward).

The footprint approach synthesises tort principles of causation with economic principles of quantification. By doing so, it applies a common framework to determine wherein the matrix relief properly lies. The output of the footprint methodology can guide litigants and the court as to whether lost profits damages, injunctive relief, royalty damages or nothing should be awarded.

When deciding what form of relief is appropriate, one can apply the footprint method from either the patentee’s perspective (evaluating its revenue and costs) or the infringer’s. That is, the revenue and cost variables can represent either of the following two options:

- the patentee’s difference in revenues and costs in the actual (with infringement) and hypothetical (without infringement) scenarios; or
- the infringer’s revenues and costs in the actual and hypothetical scenarios.

For reasonable royalty damages, Option 1 – the patentee’s revenue and cost difference – can become moot because the patentee’s only difference may be the lost licensing revenues it should have received from the infringer. That is, the patentee in that scenario may not

Table 1. Royalty damages, lost profits and injunctions

	Sufficient evidence to quantify damages	Insufficient evidence to quantify damages
Proof that infringement caused economic harm to the patentee	1. Lost profits damages or reasonable royalty damages	2. Injunctive relief (to prevent ongoing harm)
No proof that infringement caused economic harm to the patentee	3. Reasonable royalty damages	4. Likely no past damages or future injunctive relief

suffer any specific harm from the infringement other than lost royalties. This can occur, for example, if the patentee does not practise the claimed invention. The footprint approach in that situation can apply Option 2 instead to determine how much additional profit the infringer made by using the invention and translate that value into a reasonable royalty award.

Lost profits and injunctive relief require evidence that the infringement caused harm to the patentee. Thus, these become viable remedies if Option 1 demonstrates that the patentee suffered economic harm (other than lost royalties from the infringer) as a result of the infringement. To apply the equation in this manner, the variables are defined as:

- R_{INV} – the revenue obtained by the patentee while the infringer used the invention instead of a non-infringing alternative;
- R_{ALT} – the revenue that the patentee could have obtained had the infringer used a non-infringing alternative instead of the invention;
- C_{INV} – the costs that the patentee incurred while the infringer used the invention instead of a non-infringing alternative; and
- C_{ALT} – the costs that the patentee could have incurred had the infringer used a non-infringing alternative instead of the invention.

The patentee would expect to generate greater profits from its exploitation of the invention if the user did not appropriate the technology for its own use to compete with the patentee. Thus, from the patentee's perspective, the profit that it could have achieved had there been no infringement (P_{ALT}) should exceed the profit that it actually achieved during the infringement (P_{INF}). The patentee's potential lost profits (ΔP_{PAT}) can be expressed as:

$$\Delta P_{PAT} = P_{ALT} - P_{INF}$$

Inserting the revenue and cost variable results in:

$$\Delta P_{PAT} = (R_{ALT} - R_{INV}) + (C_{INV} - C_{ALT})$$

The patentee can establish actual economic harm from the infringement by showing, with sufficient evidence, that its potential lost profits (ΔP_{PAT}) exceeded or likely exceeded zero in the past. From that conclusion, the patentee has delivered a baseline comfort level that lost profits damages or injunctive relief may be appropriate.

The incorporation of the hypothetical scenario tests whether the patentee actually suffered harm to its business (other than lost licensing royalties). If, in the hypothetical scenario, the patentee would have made the same amount of profit, then it did not suffer economic harm from the infringement. In this case the reasonable royalty analysis – in which the first step is to apply the footprint equation from the infringer's perspective – is appropriate.

If the initial application of the equation demonstrates that the patentee potentially suffered economic harm as a result of the infringement, then additional examination of the equation's variables can indicate the propriety of awarding lost profits (Option 1) for past harm or injunctive relief (Option 2) for potential future harm.

Evaluating propriety of injunctive relief

Implicit in this analysis is that the variables accounting for the hypothetical revenue (R_{ALT}) and cost (C_{ALT})

scenarios can be determined. The ability to quantify these variables provides guidance on whether injunctive relief is appropriate. In short, if the magnitude of these variables is likely significant, but cannot be quantified, then it is likely that continuing infringement may cause the patentee irreparable harm for which monetary damages will be insufficient as a remedy. In such a situation, the court should consider injunctive relief to prohibit ongoing infringement.

The hypothetical revenue (R_{ALT}) and cost (C_{ALT}) variables ask what would have happened if the infringer had not infringed. Answers, which the patentee carries the burden of proving, might include, for the patentee:

- increased market share;
- improved reputation;
- improved brand value;
- improved goodwill;
- increased sales;
- increased future business opportunities (including staying in business);
- increased sales of other products; and
- lower marketing or other costs.

All of these affect either the patentee's hypothetical revenue or its hypothetical costs if infringement had not taken place, but many can be difficult to quantify precisely. In such a case, if the patentee has established, by a preponderance of the evidence, a likelihood that the hypothetical variables R_{ALT} and C_{ALT} would encompass such harms, but the precise magnitude cannot be quantified, then the first two factors of the *eBay* test for injunctive relief – irreparable harm and inadequate remedies at law – may be satisfied.

The footprint analysis can also evaluate the risk of ongoing irreparable injury by looking ahead. In this analysis, all of the variables (R_{INV} , R_{ALT} , C_{INV} and C_{ALT}) are hypothetical in the sense that they have not happened yet. However, the analysis provides an economic and causal framework to evaluate the likelihood that the patentee will suffer irreparable harm going forward. The patentee must establish both that it likely will suffer ongoing harm and that the variables cannot be quantified in such a way that will make future monetary compensation adequate to compensate for that harm.

The footprint analysis offers the benefit that the causal nexus requirement for injunctive relief is built into the equation. To justify an injunction, the patentee must establish that the irreparable harm it may suffer is tied to the infringer's use of the claimed invention, as the Federal Circuit explained in *Apple v Samsung*. The footprint methodology inherently evaluates the causal nexus by incorporating the causation requirement through the analysis of non-infringing alternatives. The infringer may support its argument against a causal nexus by introducing evidence, using the footprint analysis, that the patentee will not suffer harm because the same economic outcome would occur if the infringer used an alternative instead of the invention.

Injunctive relief despite quantification of all footprint variables

Injunctive relief may be appropriate even if the hypothetical variables R_{ALT} and C_{ALT} can be quantified. The availability of sufficient evidence to quantify past damages does not mean that monetary damages

Action plan



The footprint analysis provides one approach to calculating remedies for patent infringement that can be applied to damages assessments as well as to injunctive relief. Here are some best practices for those seeking to apply the footprint method:

- Identify non-infringing alternatives early. Hypothesise – and then confirm in discovery – what the infringer could have done instead of infringing. Contention interrogatories can help to pin down the presence or absence of potential non-infringing alternatives.
- Expand the alternatives analysis beyond close technical substitutes. Could the infringer have achieved a similar benefit using a different technology? Or by negotiating a licence to superior

technology from a third party? What would those options have cost?

- Simplify the issues for internal risk evaluation and ask difficult business questions. Did the patentee really suffer economic harm from the infringement or did it just lose royalties? Did the infringer's success in the market arise from the use of the patentee's invention or superior business execution?
- Focus on admissible evidence. The footprint method offers discrete variables on which to focus in the remedies analysis. Ensure that each is supported by admissible evidence, not mere assumptions. Use it as a tool to spot the evidentiary gaps in the other party's methodology.

will fully compensate for future infringement. The footprint equation can be applied to evaluate the likely future circumstances which will arise if infringement continues. In that case, as discussed above, all four variables – R_{INV} , R_{ALT} , C_{INV} and C_{ALT} – are evaluated from a hypothetical perspective. If the likely impact on future profits ΔP cannot be predicted with reasonable certainty, even if past damages have been quantified precisely, then a permanent injunction may be appropriate to protect the patentee.

Injunctive relief may also be appropriate where the patentee can establish a magnitude of damages factually caused by the infringement, but for which legal rules preclude a full award. Lost profits damages require that the infringement be both the 'but-for' (ie, factual) and proximate (legal) cause of economic harm to the patentee. The footprint equation incorporates but-for causation, but the current legal test for proximate causation ('reasonably foreseeable') is non-economic. The footprint analysis therefore may reveal significant quantified economic harm, caused by the infringement, which is precluded from a damages award by the proximate cause requirement. In that situation, injunctive relief may be appropriate if the patentee establishes that the harm likely will continue going forward.

The hypothetical variables R_{ALT} and C_{ALT} in the footprint equation encompass any revenue and cost differentials affected by infringement that the patentee can prove by a preponderance of the evidence. The equation imposes no boundary on how far the causal impact of the infringement might radiate. A framework previously proposed by the author illustrates the radiating shockwaves of economic impact that the infringement might have on a component of the patentee's product, the patentee's product as a whole, related products sold by the patentee that do not themselves infringe or even the patentee's brand (see Figure 1).

The rule of proximate cause for lost profits damages restricts the degree to which these categories might be compensable if harmed by infringement. Proximate cause requires that the harm be reasonably foreseeable to an

infringing competitor. The Federal Circuit's foundational 1995 opinion in *Rite-Hite v Kelley Co* describes this and other lost profits requirements. The proximate cause limitation might prohibit compensation for economic harm to the patentee's brand caused by the infringement, for example. Other manifestations of proximate cause include the entire market value rule, which allows lost profits damages for non-patented components only if the invention is the basis for consumer demand for the product as a whole.

This analysis may require proof that that patented and unpatented components or products are "analogous to a single functioning unit" as discussed in *Rite-Hite*. Lost profits damages may not extend to "items that have essentially no functional relationship to the patented invention and that may have been sold with an infringing device only as a matter of convenience or business advantage", also as explained in *Rite-Hite*. These non-patented products are referred to as 'convoyed sales', and "[a] functional relationship does not exist when independently operating patented and unpatented products are purchased as a package solely because of customer demand", as the Federal Circuit explained in *American Seating v USSC Group*.

The footprint equation may reveal that the infringement was a but-for actual cause of economic harm if the patentee suffered harm to its brand that caused fewer sales of non-patented products, but this could be characterised as mere business advantage. Or, as illustrated in the Federal Circuit's recent opinion in *WesternGeco v ION Geophysical*, allegedly extraterritorial activity may break the chain of causation that otherwise could justify a lost profits award. To that end, the district court in *M-I LLC v FPUSA, LLC*, as quoted by the Federal Circuit, recently observed that "courts often find that money damages are insufficient in cases involving foreign infringers".

Quantifying R_{ALT} and C_{ALT} with appropriate factual and economic proof may reveal that this harm – potentially barred by substantive lost profits damages rules – is significant. If the patentee also establishes that similar harm is likely to continue after the judgment, the court should consider injunctive relief to remedy the likely ongoing irreparable harm to the patentee from the infringement that cannot be compensated through monetary damages.

The footprint methodology provides a uniform approach for all forms of relief available for patent infringement. Its adoption would simplify patent transactions, streamline litigation, bring value to patent rights and promote transparency in technology markets. Litigants and the courts have the power to take a step forward into an improved paradigm of determining value for patent rights. By considering injunctive relief within the footprint methodology, all forms of relief are addressed in a single, unified causal and economic approach. **iam**

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