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# Challenges in Quantifying 5G Benefits and SEP Value

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The first article in this three-article series addressing legal issues surrounding 5G discussed the nature and scope of 5G and why this emerging technology is so important to a wide variety of industries. This second article focuses on some of the challenges in quantifying the benefits of 5G and, specifically, determining the value of 5G standards-essential patents, either in the context of licensing or for a damages analysis in a patent infringement action.

In evaluating licensing opportunities or determining patent damages, assessing and quantifying the value provided by patented technology is often difficult, but always important. In the context of SEPs, this process can be even more difficult. SEPs present unique challenges, which have led to extensive debate over exactly how best to fit them into established licensing and damages models.

The challenge of quantifying SEPs will likely be magnified in the 5G context, and increase as 5G technology becomes more widely deployed. That is in part because 5G is much more than simply a faster and more capable communications network than its predecessors. Rather, 5G is transformative technology that will change the ways in which people interact with technology and each other in daily life (and even with the way technology interacts with itself).

Connectivity technology is becoming so intertwined with the functionality and value of end products that it is increasingly difficult to tell exactly what value in products is attributable to 5G technology and what value would exist without the connectivity 5G provides. And the vast improvements in 5G over its predecessors (4G, and earlier 3G) allows for entirely new use cases (for example, seamless virtual reality or edge computing) that too will change how technology functions in society—providing for value that licensors and litigants will undoubtedly debate.

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SEPs present special problems for valuation because they are typically subject to "fair, reasonable, and non-discriminatory," or FRAND restrictions that impact how much patent owners can charge for licensing royalties. While there is no single way to "best" quantify the benefits or value of individual SEPs (or SEP portfolios), experience with existing technology standards, including 3G and 4G, provide some accepted tools, including the so-called "bottom-up," "top-down," and "modified *Georgia-Pacific*" methodological approaches, that have proven useful. These tools will certainly be relevant to 5G SEPs as well, but, as discussed below, 5G presents some specific challenges that will require those employing these tools to consider how best to adapt them for this new technology.

## Quantifying Value and Benefits

Those engaged in patent valuation have generally settled upon these three major methodological approaches. All three of these methodologies are expected to have applicability to 5G.

The first is a "bottom-up" approach, in which the value of particular SEPs is assessed in isolation, sometimes with respect to comparable licenses, without reference to other patents covering the same standard, including by evaluating ex ante alternatives to the patented technology that could have been incorporated into the standard.

The second is a "modified *Georgia-Pacific*" approach. This approach uses a modified form of the standard patent damages framework first laid out in *Georgia-Pacific v. US Plywood Corp* (1970), in which some of those factors are modified (or not used) to account for the SEP context. As one example, in a modified *Georgia-Pacific* approach, the licensor's policy of maintaining a monopoly—one of the standard *Georgia-Pacific* factors—is irrelevant, because an SEP-holder cannot refuse to license its patents provided the licensee is willing to take a FRAND license. Ultimately, this methodology is designed to reflect what two parties, engaged in good-faith licensing discussions, would agree to after negotiation.

 

And the third—which has become more common in 4G/LTE litigation, both in the U.S. and internationally—is a "top-down" approach, which starts from an aggregate royalty attributable to the standard as a whole, with the appropriate royalty then being allocated to the SEP owner based on the SEP's proportional contributions to the standard. Under this approach, for example, if one concludes that the 4G standard as a whole contributes 30% of the value of the modern smartphone, a patent owner controlling 10% of all 4G SEPs would be entitled to 3% of the value of each smartphone (i.e., 30% x 10% of a smartphone's average sales price).

The top-down approach is a fairly recent methodology, and was first embraced by courts and governmental patent bodies in the U.K., Japan, China, and the U.S. in the last decade. While it is certainly not the only methodology that can be used, it was endorsed in the European Commission's FRAND guidelines in Nov. 2017 and the Japan Patent Office's *Guide to Licensing Negotiations Involving Standard Essential Patents*.

Regardless of which methodology is applied in a particular case, 5G "value" will be a critical aspect to any valuation analysis.

## Challenges with Quantifying Benefits

As explained in the first article in this series, 5G is expected to change the way people use connected devices by providing faster, more reliable, more responsive, and more extensive capacity than 4G. According to reports, 5G will be at least 10 times faster than 4G, and will support approximately one-hundred times the traffic capacity of LTE. This means that 5G will enable a vast array of new, diverse applications and uses that were not possible with 4G, including enhanced virtual and augmented reality, machine-to-machine communications, and edge computing. In turn, these applications will likely become pervasive in nearly all aspects of ordinary daily life, impacting everything from managing a household to driving a car to working for an employer.

These sorts of substantial differences between 5G and its predecessors highlight the first challenge in quantifying the technology benefits of 5G or the value of 5G SEPs: while it is always useful to use past valuations (for example, for 4G over 3G) as a guide to valuation, the technology of 5G appears to be so much better and have such broader applicability than its predecessors that the benefits and value of 5G may simply be different in kind than 3G and 4G, making 3G and 4G valuations potentially less applicable to 5G valuations.

Put another way, like 5G over 4G, 4G derived a significant part of its value over 3G from faster speed, reliability, responsiveness, and capacity. But in the context of 4G, what this actually meant in the real world was that users benefit from faster and more reliable mobile communications. They were able to have higher-quality voice calls and experience better, faster data connections. While this was a noticeable improvement, and a valuable one, it was still incremental to 3G. Because of this, 3G valuations were often used in valuing 4G SEPs.

5G, however, will substantially expand the very nature of connected devices and how such products are used in daily life. Thus, the improved speed, reliability, and capacity of 5G will not simply allow people to do what they already do (though faster and more reliably), but will allow them to do vastly different things as well. Valuation analyses will need to reflect the changed environment surrounding 5G.

Any quantification of the benefits of 5G, and the concomitant value of 5G SEPs, must capture that change in the nature of technology benefits as well. And given the new capabilities 5G will enable, doing so will be particularly challenging. For example, imagine a driving-hazard system, enabled by 5G, in which two cars can communicate in real-time hazardous road conditions (such as black ice or an object in the roadway) in a way that was never possible in 4G.

In this example, the lead car can instantaneously communicate that condition—and possibly all of the very nuanced maneuvers and commands needed to navigate it successfully—to the trailing car, this can prevent an accident and possibly save the driver's life. *Georgia-Pacific* factor 9 addresses the "utility and advantages" of the product at issue (here, the 5G standard) over older products (such as 4G). It would seem that any quantification of the "utility and advantages" of 5G in this situation would have to value the benefits of the standard as extraordinarily high.

But assessing those potential benefits too highly would run the risk of abuse of the standards-setting system, allow for patent hold-up, and potentially eclipse the very real value of the actual products (i.e., the cars themselves, which are valuable for reasons other than 5G connectivity). Conversely, valuing those benefits too low would risk devaluing important technology and reducing incentives for innovators to design new systems in the first place.

## Challenges with Existing Tools

The novelty, wide-ranging applicability, and importance of 5G, and the differences-in-kind between 5G and its predecessors, also present new potential challenges for using the standard tools and methodologies for quantifying the value of SEPs.

For example, both the bottom-up approach and the modified *Georgia-Pacific* approach rely on the use of comparable licenses, which are often viewed as the best guides for patent value. But, if 5G is truly a transformative technology, it becomes much harder to say exactly what a "comparable" license actually is. Put another way: a license for 4G patents is arguably not necessarily comparable to a license for 5G patents, because that license may not capture the novel and unprecedented benefits and use cases of 5G technology over 4G technology. This is especially the case if the 5G license is directed to end-products and applications that are different than the products and applications in putatively "comparable" 4G licenses.

The bottom-up and modified *Georgia-Pacific* approaches have also been criticized more generally for ignoring other patents relating to the same standard, and so running a risk of "royalty stacking," in which the cumulative royalty for all SEPs in a particular standard is much larger than the true aggregate value of the standard to the product. Sometimes, that cumulative royalty is more even than the value of the product itself—such as when each SEP in a standard is putatively worth 1% of the product value, but there are more than 100 SEPs in the standard. These criticisms may be magnified in the case of 5G because, given the novel nature of the technology, it might be possible to overestimate the value of individual patents without fully accounting for the aggregate value of the standard.

In turn, the "top-down" approach here requires the determination of multiple facts, including that aggregate value of 5G to a final product and the total number of SEPs that are essential to the 5G standard. Again, given the difference-in-kind between 5G and its predecessors, trying to determine the aggregate value of the entire 5G standard to a particular device (or class of devices) could prove difficult. As but one example, while it might be easier to estimate the value and benefits of the 5G standard to a smartphone, it is much more difficult to estimate the value and benefits of the 5G standard as a whole to a self-driving, hazard-avoiding car—which may rely on the benefits of the standard to avoid harming passengers or bystanders.

Calculating the total number of SEPs that are essential to the 5G standard also presents particular challenges. It is widely believed that most standards suffer from over-declaration of SEPs, because most standards setting organizations (SSOs) require members to identify any patent that "might be" essential to the standard. While SEP holders seeking to license or assert their SEPs can analyze their own patents, or have experts do so, it is untenable for a single party to try to chart or analyze every single one of the potentially tens of thousands of patents that have ever been declared essential to the relevant standard.

Moreover, given the complexity of the 5G standard, and that companies are particularly eager to have their technology incorporated into this standard, there is a general expectation that there will be substantially more declared 5G SEPs than there are 3G or even 4G SEPs. It thus seems likely that 5G will also suffer from extensive over-declaration. Given how the math of the top-down approach works, this potentially dilutes general 5G SEP value and makes it hard to identify value in truly essential patents. As a simple example, if there are 10,000 declared 5G SEPs (and there may be many more), even if the value of the 5G standard to a smartphone was the entire value of the smartphone (and it is clearly less than that), the FRAND royalty for a single one of those SEPs would, on average, be only 1/10,000 of the value of the device.

## Potential Solutions

Despite difficulties and challenges in quantifying the benefits of 5G and assessing the value of 5G SEPs, doing so is not impossible. To the contrary, a number of creative strategies can be employed to reach at least a good estimate of appropriate value.

For example, with respect to the challenges represented by the bottom-up and modified *Georgia-Pacific* approaches, perhaps the most important thing to consider is that the benefits afforded by 5G are variable and the thing to understand is exactly how the novel and unusual benefits of 5G apply to particular sorts of products. Such an approach creates much needed flexibility in determining value given the diverse applications of 5G technology.

Clearly, there may be products in which the use of 5G does not provide a significant benefit over 4G. For example, a home speaker or automatic front door lock communicating through 5G likely would not benefit from the difference in 5G over 4G in the same way that would a smartphone, VR device, wireless medical device, or driverless car or airplane. Understanding these differences will allow for a more targeted, flexible approach and may allow for a closer comparison to 4G in determining the value of 5G for that particular product.

With respect to finding comparable licenses, while it may be more difficult to find such licenses given the nature of 5G, understanding exactly how products are made better or novel by 5G will allow the use of licenses as comparables, provided that the different sorts of benefits of 5G are explicitly taken into account as part of a licensing program or litigation. Moreover, parties should also consider the potential relevance of Wi-Fi licenses, given 5G's reliance on more traditional broadband networks.

The general criticism that the bottom-up and modified *Georgia-Pacific* approaches ignore the aggregate value of standards and potentially encourage royalty stacking can be addressed by carefully assessing the value of each particular patent in the context of the relevant standard, and not relying solely on the fact that a patent is an SEP.

With respect to the top-down approach, while there are challenges in determining the aggregate value of the 5G standard to final products and the total number of patents essential to the 5G standard, there are also established ways of estimating or arriving at these numbers. For example, various independent consulting groups seek to answer both of these questions. And as soon as 5G cases make their way through the courts, experts will be able to point to party agreements or judicial decisions about these numbers that will help set expectations and understandings going forward.

And while it is difficult to count the number of true SEPs, and that count might result in an exaggerated number, it is also possible to reach potentially useful estimates by looking to the count of unique SEP patent families or by eliminating continuations from the count. In assessing the value of particular 5G SEPs, it is also possible to use weighted counts for different countries, thus reflecting that, for example, U.S. or European patents may be seen by some as more valuable than patents from some other countries.

In any event, as is true in any quantification of technology benefits or patent valuation, regardless of the primary methodology employed, the best approach in developing a licensing program or working with a damages expert in an infringement action is likely to use multiple methodologies as checks. So, for example, an SEP holder might use a top-down approach, but then also use comparable licenses (or licenses adjusted to be comparable) to confirm the appropriate SEP value.

## Conclusion

Quantifying the benefits of a standard, or the value of particular SEPs, is always a difficult task. The unprecedented nature and promise of 5G, particularly with respect to how it will allow the further integration of technology products into daily life, complicate that analysis, and present challenges to using history as a guide or employing the standard quantification tools. That said, these challenges can certainly be overcome, and simply require a full understanding by those doing the quantification of what 5G actually promises and means in particular contexts.