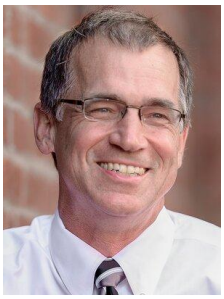
Assessing Litigation Uses Of USPTO 5G Development Study

By **Jonathan Putnam** (May 6, 2022)



Jonathan Putnam

Recently, the Office of Policy and International Affairs and the Office of the Chief Economist at the U.S. Patent and Trademark Office issued a report called "Patent Activities by Companies Developing 5G."[1]

The report characterizes patenting activity in four subfields of 5G technology, and presents certain purported indicators of patent portfolio value. The subtext of the report appears to be the perceived need to respond to "many studies [that] have attempted to identify a single global leader in 5G technologies."

The results show that, depending on the metric, all of the top six firms — Telefonaktiebolaget LM Ericsson, Huawei Technologies Co. Ltd., LG Corp., Nokia Corp., Qualcomm Inc. and Samsung Group — might be considered a leader in 5G. This result "call[s] into question claims that any single firm or country is 'winning' the 5G technology race," according to the report.

It is easy to see why an individual firm might advertise studies that support its claim to technology leadership, though the policy or national security justifications for employing firm-level indicators are somewhat less clear.[2] In any event, it is worth asking whether the 5G report, and the similar studies to which it responds, convey accurate information about firm-level portfolios of essential patents.

That question generates much more than academic interest, because licensors commit to offer their portfolios on fair and reasonable terms. Thus, methods like the USPTO's, which characterize 5G portfolio size and strength, inevitably will be employed to justify or attack actual or offered license terms. Readers are left to ask: Are such indicators reliable enough for litigation?

The economic literature is not encouraging. More than 30 years ago, in the epigraph to his classic review of patent count studies, Harvard University economist Zvi Griliches quoted a conversation:

> Overheard at a Catskills resort:
> "The food here is so terrible."
> "Yes. And the portions are so small."[3]

While the 5G report examines some new indicators, the economist's response to them is largely the same: The market price of technology is set by buyers and sellers bargaining adversely — not by economists analyzing value indicators.

But that truism begs the question: Can buyers and sellers rely on studies like the USPTO's to assess patent quantity and quality?[4]

Below, I evaluate the arguments for and against such reliance.

Patent Quantity

Essentiality

As a threshold matter, the 5G report references "the requirement that technology contributors identify or 'declare' any patents or applications that might be relevant to 5G standards to essential patents." This usage is legally erroneous and empirically misleading.

Patentees disclose patents that — they subjectively believe — may be essential. They declare their commitment, if such patents are found — by a competent tribunal — to be essential, to license them on "fair, reasonable and non-discriminatory" terms.[5] In other words, the disclosure is a form of notice; the declaration is an enforceable — albeit contingent — promise.[6]

For present purposes, this distinction matters for two reasons. First, although the term is widely used, there is no such thing as overdeclaration of essential patents, there is only disclosure of patents believed to be potentially essential.

But second, because not all patents disclosed as, subjectively, potentially essential are, objectively, actually essential — and therefore subject to fair, reasonable and nondiscriminatory, or FRAND, commitment. And counts of the former are poor proxies for counts of the latter.

Yet the 5G report only studies counts of potentially essential patents. Those disclosures cannot reflect actual essentiality — which, of course, has not been determined for most patents. But more practically, these counts cannot reflect the private opinions of bargaining parties as to the likelihood that licensed patents will be found actually essential.

While we cannot know these private opinions, we can know the public opinions of independent technical experts. Various entities have conducted studies of the essentiality rate for owners of large essential patent portfolios, including the six firms in the 5G report. The consistency of the essentiality rate for these firms can be compared across studies.[7]

The evidence is that even independent technical experts disagree about the essentiality rate, at a statistically significant level, two-thirds of the time.[8] There is therefore no consensus about each firm's true number of essential patents. That lack of consensus means that even licensing parties themselves do not know which or how many patents are in an essential patent license.

Yet despite not knowing that key contractual input, they often find a way to agree on the output — i.e., payment. Economic analysis in litigation recognizes the primacy of these private, unobservable orderings over the public, but inconsistent, data on which they are based.

National Systems

The collection of all countries in which an inventor files an application constitutes the patent family. Most analysts count patent families rather than individual patents, because that count reflects the number of distinct inventions, and the 5G report follows this practice.

Yet the characteristics of individual national systems may distort patent family counts. Most notably, China heavily subsidizes the filing of domestic applications, with the result that the large majority of Chinese-origin families have only Chinese members.

In the essential patent context, patents that are filed in only a single country are less likely

to be found essential to a global technical standard. A recent study estimates that China's subsidies overstate the true count of domestic patent applications by a factor of more than six.[9]

This study also identifies the reduction in average patent quality in China implied by the artificial increase in quantity, a reduction found among China's 5G patent families, in particular.

Even ordinary differences among national systems may influence patent counts. For example, the U.S. system permits liberal use of continuation applications; these applications may, or may not, be counted as part of the same patent family, depending on the definition of family.

Continuation applications are particularly common among disclosed essential patent families, as applicants attempt to match their claim language to evolving definitions of the technical standard. From a counting perspective, a smaller number of evolving patent families may be more likely to be found essential than a larger number of static families.

International Coverage

One commonly proposed solution for the problem of national idiosyncrasies is to focus on patent families having patents filed in a common set of countries. The most common formulation of this approach is to count so-called triadic families, with family members in the U.S., Europe — via the European Patent Office — and Japan. The 5G report follows this practice.

Yet the rules of the international patent system frustrate this approach. Applicants can wait up to one year before filing additional applications beyond their priority application.

Whether they do depends on multiple factors, including:

- Target market size;
- The likelihood of infringement;
- Patent enforceability; and
- Post-filing news about the viability of the application.

Because filing abroad is generally more expensive than filing at home, applicants generally file at home first, then file abroad on or about the one-year anniversary of their home application.[10]

From a pure counting perspective, this incentive structure advantages firms that file their priority application in one of the three triadic jurisdictions; Qualcomm, Nokia and Ericsson are headquartered in one of the three triadic jurisdictions, and thus need to file only two more applications to create a triadic family, while Huawei, LG and Samsung must file in all three triadic jurisdictions, in addition to their home country.

But the larger point is that efforts to create more accurate counts only obscure the more fundamental problem: patent counts almost never capture patent value. For example, one study found that patent families with applications filed in 15 countries were expected to be worth about 150 times more than applications filed in a single country.[11]

For present purposes, the point is that licensing parties can account for such important

differences; simple patent counts cannot.

Patent Quality

The 5G report attempts to address patent quality through the further use of patent indicators. These also are fraught.

For example, one proposed method counts the number of words in the patent's principal independent claim as an indicator of its breadth: Fewer words means fewer claim limitations that must be met.

Yet, leaving aside the many linguistic issues it raises, this method suffers from the more fundamental conceptual weakness that a broader patent is not necessarily a better patent.

For example, other things being equal, a broader claim is more vulnerable to an invalidity challenge — a probability for which there is no good indicator — to say nothing of anticipation or the probability of infringement,[12] all of which licensing parties analyze extensively, but which the 5G report necessarily ignores.

Moreover, the most valuable claim in a potentially essential patent may be the one from a continuation application that tracks the standard most closely — but is unlikely to contain the fewest words.

Similar conceptual problems arise with other quality metrics proposed in the 5G report: the number of cooperative patent classifications classes in which a patent family is classified, and the "radicalness" of the application — i.e. "the lower the number of prior art citations, the higher the degree of radicalness."

While broadly classified — and thus broadly applicable — technologies may be more valuable, other things being equal, there is no reason to follow that logic in the standard-setting context, where applicability outside the standard is generally irrelevant.

And because applicants operate under no duty to search the prior art, the thoroughness of their citations to the prior art is unlikely to be a good proxy for whether or not their invention is a technological breakthrough.[13]

Two other proposed metrics bear further mention. Economists have long found that citations from subsequent applications are correlated with patent value.[14] Yet, absent further analysis, this conclusion cannot be aggregated to the firm level.

As a simple example, suppose that patent value is equal to the square of the number of citations.

Thus, if Firm A has two patents each having three citations, its average citations per patent is three and the total value of its portfolio is 9 + 9 = 18, averaging nine per patent.

Firm B has two patents having one and five citations; its average citations per patent is also three, but the total value of its portfolio is 1 + 25 = 26, averaging 13 per patent. Thus, the value of the average number of citations per patent is not equal to the average of the value of the number of citations per patent.[15]

As for the value of international patent protection, the 5G report relies on gross domestic product among patent family target countries. Yet it is easy to see why this is, once again, a

poor proxy for the issues at hand.

India and France have approximately the same GDP — about $2.6 trillion in 2020.[16] Yet India's population is about 20 times that of France,[17] which means that France's GDP per capita is about 20 times that of India.

It is easy to predict that Indian consumers will purchase many more, but much less expensive, cellular devices than will French consumers. Knowledgeable parties will take such obvious differences into account when licensing patents in these markets.

Is There A Way Up From Indicators?

Patent indicators don't work reliably because they generally ignore economic behavior. That behavior derives from:

- Personal optimization; and
- Trade with others — who are also optimizing.

Two examples illustrate ways to free patent analyses from patent indicators.

Quality

Two personal optimizing decisions made by patent applicants are:

1. Where to file for protection, and
2. For how long to renew their patents.

Structural models take advantage of the economic structure of these decisions to infer the distribution of patent quality.[18] While noting the vastly different technologies, countries and time periods these studies encompass, one can under certain conditions draw consistent conclusions from them and use them reliably, even in litigation.[19]

Licenses

Of course, patent quality, essentiality, geographic coverage and many other indicator-like variables all form the basis of actual licenses, i.e., trades between parties. Why not start with licenses?

In the recent In Re: Qualcomm Litigation, the Federal Trade Commission, Apple and Qualcomm subpoenaed every material essential patent license — running, fixed, cross-license or one-way — in the cellular industry. A structural econometric model of these licenses — taking account of contract structure, patent quality, the industry quality distribution, the average opinion of essentiality,[20] the inter temporal and international sales mix, and other contract- and party-specific terms — explained 95% of the observed variation in payments across licenses.[21]

Just as importantly, the model was able to test and reject a number of simple, indicators-based hypotheses employed by the FTC and Apple experts in their analysis — which was restricted to Apple licenses: Among other factors, the patent essentiality rate doesn't matter to the royalty payment; patent quality doesn't matter; the location of sales doesn't matter;

volume discounts don't matter; and monopsony power doesn't matter. The court accepted this structural model over Apple's objections.

In short, patent indicators routinely fail to indicate the value of patents, and often disguise it. On the other hand, when employed structurally, patent-related data often help to explain patent-related outcomes, like license payments. But there is no such thing as a free lunch: Analysts cannot pretend to predict economic outputs — like patent value — by citing economic inputs — like patent counts.

In other words, patent indicators are, by themselves, a generally inadequate substitute for the value economic actors themselves place on patent portfolios.

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Disclosure: In public proceedings involving standardized cellular technologies, the author has consulted for** InterDigital**, Ericsson, Evolved Wireless and Qualcomm.

[1] https://www.uspto.gov/sites/default/files/documents/USPTO-5G-PatentActivityReport-Feb2022.pdf.

[2] At least as a formal policy position, the U.S. has disfavored reliance on "national champions" to effect systemic goals like innovation or to motivate policies underlying international trade.

[3] "Patent Statistics as Economic Indicators: A Survey." Journal of Economic Literature 28 (December 1990): 1661-1707.

[4] Many of the quantity/quality issues are laid out in Jean O. Lanjouw, Ariel Pakes and Jonathan D. Putnam, "How to Count Patents and Value Intellectual Property: Uses of Patent Renewal and Application Data." Journal of Industrial Economics 46(4) (December 1998): 405–32.

[5] "… it is the Declarant's … present belief that the IPR(s) disclosed in the attached IPR Information Statement Annex may be or may become ESSENTIAL …"; "… the Declarant … hereby irrevocably declares … [that t]o the extent that the IPR(s) disclosed … are or become, and remain ESSENTIAL …, the Declarant … [is] prepared to grant irrevocable licences under this/these IPR(s) on [FRAND] terms and conditions …". European Telecommunication Standards Institute, Annex 6: Intellectual Property Rights Policy, "IPR Information Statement and Licensing Declaration," Rules of Procedure, 1 December 2021. Available at: https://www.etsi.org/images/files/IPR/etsi-ipr-policy.pdf. Last accessed: April 15, 2022.

[6] The enforceability of the promise may depend on conduct by its third-party beneficiaries.

[7] Four such studies are: PA Consulting (2014); Cyber Creative (2013); iRunway (2013);

and Fairfield Resources (2010).

[8] Out of 30 comparisons between pairs of studies on these six firms, chi-square tests rejected the equality of the estimated essentiality rate in 20. I obtain similar results using more recent studies, such as that relied on by the court in TCL Commc'n Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson, SACV 14-341 JVS(DFMx) (C.D. Cal. Mar. 9, 2018).

[9] Jonathan D. Putnam, Hieu Luu and Ngoc Ngo, "Innovative Output in China" (2021), available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3760816; "Does China Really Dominate Global Innovation? The Impact of China's Subsidized Patent Application System," Hudson Institute, March 21, 2021, available at: https://www.hudson.org/research/16777-does-china-really-dominate-global-innovation-the-impact-of-china-s-subsidized-patent-application-system.

[10] Filing rules and incentives are further complicated by the option to file under the Patent Cooperation Treaty, which offers additional advantages as well as incentives for delay.

[11] Jonathan D. Putnam (1996), "The Value of International Patent Rights," unpublished Ph.D. dissertation, Yale University; Lanjouw et al., "How to Count Patents." Across all technologies, an increase of two countries in the size of the patent family implied approximately a doubling of the value of the patent family. This relationship depends on the (unobserved) quality of the claimed invention, which is constant across countries, after controlling for national market size, patent rules, etc.

[12] One might think that "infringement" is subsumed within "essentiality," but that is not necessarily true. For example, in Evolved Wireless, LLC v. Apple, Inc., No. 15-543-JFB-SRF (D. Del. 2019), Apple argued that the Qualcomm processor in its iPhone was "standard-compatible," not "standard-compliant," and thus did not infringe an allegedly standard-essential patent.

[13] On the contrary, thorough citations to the prior art may demonstrate a "long-felt need" for the invention, or "teaching away" from it, or other indicia of non-obviousness – the opposite of a "non-radical" application.

[14] A. B. Jaffe and M. Trajtenberg. 2002. Patents, Citations, and Innovations: A Window on the Knowledge Economy. MIT Press.

[15] Aggregation of citations also clouds the otherwise the 5G Report's understandable decision to omit 5G patents that have been disclosed previously to the 3G or 4G standards. Because the technologies they claim have been retained from standard to standard – hence the multiple disclosures to ETSI – these patents may be expected to have higher-than-average quality. In fact, they are much more highly cited than the average patent (even after controlling for their age). Since they have been retained in 5G, they contribute disproportionately to its total value.

[16] https://data.worldbank.org/indicator/NY.GDP.MKTP.CD.

[17] https://data.worldbank.org/indicator/SP.POP.TOTL.

[18] See the literature survey in Jonathan D. Putnam, "Value Shares of Technologically Complex Products," available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2461533; Lanjouw et al., "How to Count Patents."

[19] Id.

[20] Widespread disagreement need not imply economic ignorance; the price of a share of stock reflects all publicly available information, as well as disagreement about what that information means. Similarly, one can statistically aggregate all publicly available studies of essentiality into an "average opinion" of the essentiality of a given firm's patent portfolio.

[21] Rebuttal Expert Report of Jonathan D. Putnam, In Re Qualcomm Litigation, No. 3:17-cv-00108-GPC-MDD (S.D. Cal. 2017), October 2, 2018.