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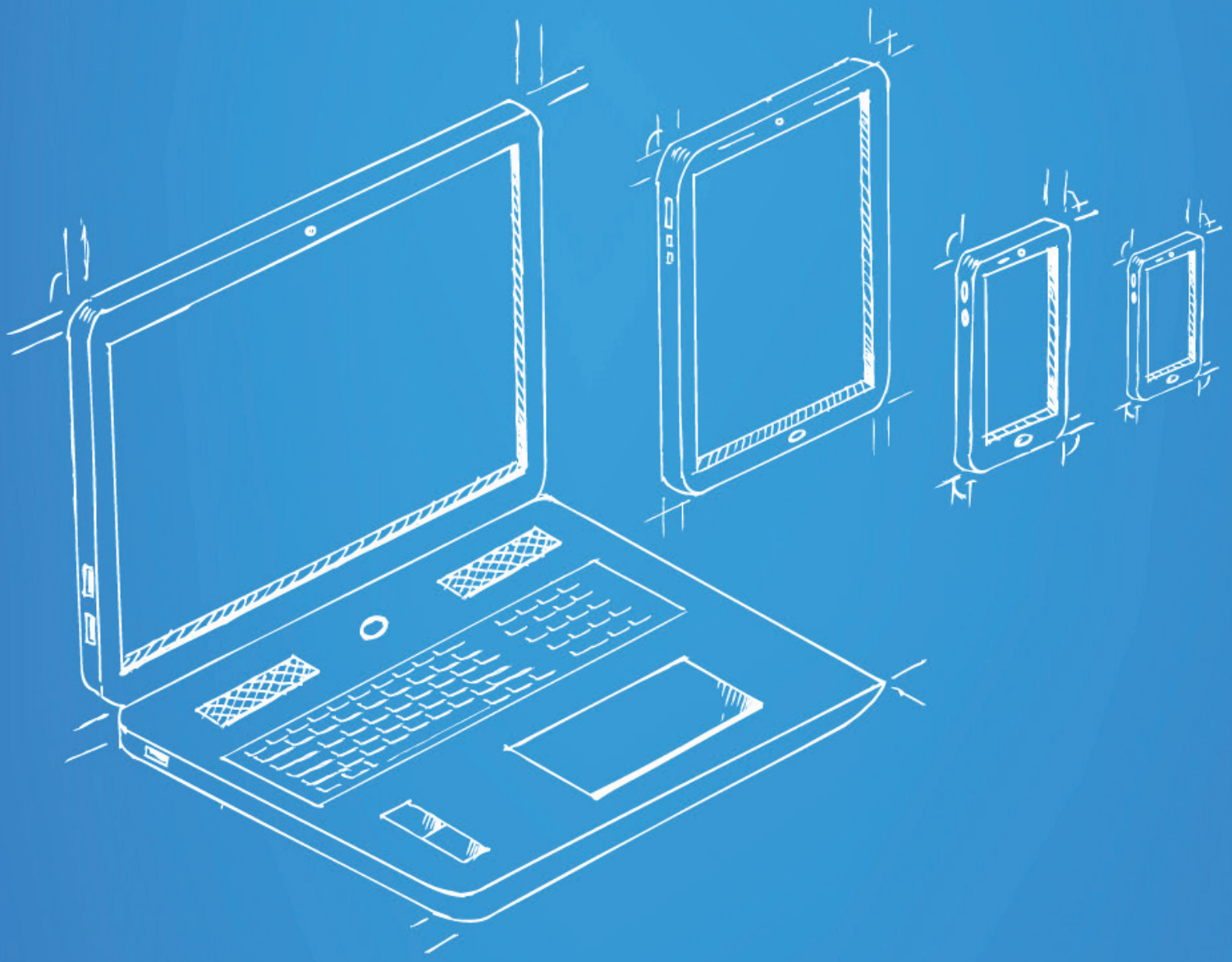

PATENTS AND STANDARDS SETTINGS

CPI COMPETITION POLICY INTERNATIONAL

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LETTER FROM THE EDITOR

Dear Readers,

This month, the Antitrust Chronicle (AC) brings you an interesting and complex issue at the crossroads of antitrust and intellectual property rights, the analysis of standard settings.

Fair, Reasonable and Non-Discriminatory…the infamous "FRAND." We see this term time and time again in antitrust policy.None more so than when linked to the issue of standard setting.

Standard-setting activities aim to achieve device interoperability and product compatibility and play an important role in fostering innovation and competition in many markets, most notably the IT sector.We are truly lucky in this month's AC to have contributions from the leading voices in the field and we appreciate the input from Kirti Gupta and Mark Snyder for suggesting this topic for our September issue.

What role do Standard Essential Patents play in these markets? What should the "F" in FRAND stand for: "fair" or "free"? Is innovation under threat? How can the original developer of a technology use a unilateral de facto standard?How does the FRAND concept intersect with the Smallest Saleable Unit rule? Is Patent Holdup a failed theory and if so, should it be used in antitrust policy? These questions and more will be addressed in this month's AC.

We are also very pleased to bring you our "CPI Talks." On this occasion, we include the transcript of our debate about the "Role of Antitrust in Licensing Disputes in the ICT Sector" that CPI held in Singapore back in April. You can enjoy reading the content of this seminar here or you can go online to the CPI website and watch the videos we have made available for you.

We sincerely hope you enjoy reading this special issue of our AC magazine focusing on Patents and Standard Settings.

Thank you, Sincerely,
CPI Team

SUMMARIES

Standards Setting, Standards Development and Division of the Gains from Standardization

By David J. Teece & Edward F. Sherry

According to this article, standards development frequently involves significant R&D and related investments by technology contributors. These contributions benefit the standard setting process and therefore the implementers that use the standards, and consumers that buy the product. It is important that technology contributors are rewarded for their inventions. What should the F in FRAND stand for: "fair" or "free"?

FRAND Licensing In Theory And In Practice: Proposal For A Common Framework

By Justus A. Baron, Chryssoula Pentheroudakis & Nikolaus Thumm

This article addresses how FRAND licensing terms have been determined in theory and practice in multiple jurisdictions worldwide. In the study referred in this article, the authors review the evolving case law on FRAND from both a legal and economic perspective, and perform a comparative legal analysis while testing the economic soundness of the concepts and methodologies applied by courts and antitrust authorities in the specific cases. Bearing in mind the idiosyncrasies of SEP litigation in the respective national legal systems, the authors achieve a comprehensive overview of SEP licensing terms and carve out a common framework for the definition of FRAND based on the findings the authors have distilled from a case study analysis and literature review.

FRAND Arbitration: The Determination of Fair, Reasonable and Non-Discriminatory Rates for SEPs by Arbitral Tribunals

By Damien Geradin

This paper addresses an important policy question, which is whether SEP-related disputes should be subject to mandatory arbitration (as a requirement imposed by SSOs) or whether arbitration should remain one of the possible options open to the parties to settle such disputes. Parties should be free to opt for arbitration, as well as to select the key procedural features of the arbitration. The paper goes on to discuss the various initial steps that parties wishing to have FRAND licensing terms determined by arbitration need to take, the various methodologies that can be used by the parties and the arbitrators to calculate FRAND licensing rates and finally turns to the enforcement of the award.

On the Practical Irrelevance and Theoretical Inadequacy of the Royalty-Stacking Benchmark in Standard-Essential Patent Negotiations

By Gerard Llobet & Jorge Padilla

Royalty stacking is the focus of this article. The licensing of SEPs has become a controversial issue. Some companies, IP practitioners and scholars argue that SEP holders are over-rewarded as a result of what they call "patent hold-up" and "royalty stacking." The proponents of the idea of royalty stacking claim that patent holders licensing different and complementary SEPs will set royalties that are too high. Because SEPs are perfectly complementary, a monopolist would choose the same royalty regardless of the number of technologies. However, the more fragmented patent ownership is, the higher the total or aggregate royalty burden will be faced by manufacturers implementing that standard.

CPI TALKS

Transcript of our seminar "The Role of Antitrust in Licensing Disputes in the ICT Sector"

In this transcript our readers will find an enriching debate among our four outstanding speakers, David Evans, Christopher Yoo, Dina Kallay and Judge Douglas Ginsburg, on topics such as hold up and hold out, the role of SSO and SDO in developing standards or when seeking an injunction may be anticompetitive. To find out more, click below on our CPI Talks section.

CPI SPOTLIGHT

In this issue CPI includes a special feature on the SmithKline Beecham Corp. v. King Drug Co. of Florence ("King Drug")case to be decided by the SCOTUS this fall.

In its 2013 decision in FTC v. Actavis, the U.S. Supreme Court held that agreements by which brand-name drug companies pay generic firms to settle patent litigation and delay entering the market could have "significant adverse effects on competition" and violate antitrust laws. Since the decision, courts have wrestled with various issues. The question that has received the most attention is whether "payment" is limited to cash or encompasses non-cash forms of consideration.

In this article, Michael A. Carrier examines the reasons why the SCOTUS should grant or should deny certiorari to the petitioners

To read the full article please visit the Antitrust Chronicle section in our website

WHAT IS NEXT?

This section is dedicated to those who want to know what CPI is preparing for the next month. Spoiler alert!

The October edition of the AC will address antitrust developments in the Asia-Pacific region.With contributions from top-notch academics and practitioners, our magazine will have contributions from China, Japan, Singapore, New Zealand, India, South Korea and Hong Kong

CPI TALKS. SEMINAR: THE ROLE OF ANTITRUST IN LICENSING DISPUTES IN ICT SECTOR, SINGAPORE - APRIL 2016.

David Evans:

Hello everyone. My name is David Evans with Competition Policy International, at least for this session here. The topic today is 'Antitrust and IP' and we have a great group assembled here today, so let me introduce the panel. We have Doug Ginsburg, Senior Judge on the DC Circuit Court of Appeals and Professor of the - Professor Doug, should I say the Scalia School of law?

Douglas Ginsburg: On July 1st.

David Evans: So right now it's the George Mason Law School.

We have Dina Kallay, director of Competition & Intellectual Property at Ericsson, based in D.C; and up the road we have Christopher Yoo, professor of Law at the University of Pennsylvania. Thanks a lot for joining me today.

I'm going to serve mainly as the moderator today, but as I told a few of you I may chime in every now and then, though this is mainly for you.

We're going to be talking about antitrust and patents, not generally, but in information, communication and technology industries. We're going to get to standards, essential patents, FRAND and a lot of other fun stuff that people are talking about these days - It's going to be great.

Nowadays, in terms of ICT, mobile is really the biggest and fastest-growing part - there is actually a lot of Intellectual Property behind the mobile devices we carry around with us and the cell networks we all use in order to be online all the time. In fact, we really owe it to the standards adopted cooperatively by industry players like Ericsson and many other companies and the intellectual property incorporated in those standards for the mobile revolution we are living through these days.

But, a question for you guys - This is all very interesting, ICT is great, patents are great - but in terms of Antitrust and IP: Why are we talking about that topic now? What are your concerns when it comes to that topic?

Doug, why don't we start with you...

DG: There was a long, dark, age that ended in 1981, prior to which (in the US and probably elsewhere), antitrust laws were used or administered in a way that reflected great hostility to a lot of practices involving patents. The assumption was by the Supreme Court that well, if you have a patent you must have market power. That was evidently not true, but at the time people's thinking until 1981 was that these practices, patent packs, patent pools and so on, all of which were regarded as having market power. That went away, and by 1995 the US competition agencies issued joint guidelines on Intellectual Property in which they basically said: Intellectual Property is like any other property for antitrust purposes, except in certain special circumstances that have to be shown - otherwise we should treat intellectual property just as we would real property or personal property. And my concern is that now, 20 years later, there's a little slippage: agencies are departing from that in ways that I find a bit alarming, and I think unjustified…

DE: Talking specifically of the US agencies or…?

DG: Yes, US agencies, but in a way they're doing so less than a few others that were never committed to practice symmetry. So the Chinese agencies were never committed to symmetry, they didn't exist at that time.

So now we're seeing things such as the Department of Justice antitrust division suggesting that it may be an antitrust violation for a patent holder who's subject to a FRAND commitment to seek an injunction against an alleged infringement, and that they might have to prove to exonerate itself that the counter party was an unwilling licensee. That it was unreasonable, breached an impasse, wouldn't sign a licensing agreement. And that really undermines to a great degree not just the bargaining position of a patentee but the value of the patent. And as you start to diminish the rewards from holding the patents the investment in development is going to diminish.

DE: Let's bring Christopher to the conversation. Christopher, your reaction to this?

Christopher Yoo: So if you want to know why we're talking about this right now, I mean the easiest way to say it is that 'The Chinese antitrust authorities dropped a billion dollar fine on Qualcomm'. And a billion dollar has a remarkable ability to focus the mind, it has a way of making everything very clear, but it's not just that. We have whole dimensions to this fight spanning out…

DE: But just on that point, Christopher. Would you agree that the NDRC was building on an awful lot of momentum that is being created by a lot of other agencies. It's not like they woke up one day and decided to do this. There was the European Commission and a lot of other things going on that kind of laid

the foundation.

CY: Absolutely, and I would say that because the antimonopoly law agency in China knew (I'm doing some comparative ways of looking at them) they very much take cues from what happens in other parts of the world. They're watching it very closely. And the fact that they see another agency, whether US or EU enforcement agency taking action they take that as license or courage to take similar actions. It's not just though the major cases. What we're seeing, particularly in this case, in some of the situations we're going to talk about- There's the Huawei vs. ETE case which is happening in the lower level Chinese courts. We're seeing Apple and Motorola literally fighting it in the EU. We're seeing a great deal of litigation across the entire world over these issues, and we saw an exclusion order put in by the US International Trade Commission that was overturned by the President of the United States. I mean, this is the highest levels of issues and we're finding new fronts coming out in the design patent wars, which is - we're not even talking about conventional utility patents. We're now having things that protect the way things look! We used to not care about that, said it's very easy to get but it doesn't matter it, it doesn't protect very much. If you look at the Apple-Samsung war, they're fighting over a patent dimension we've never had before.

You ask what are my concerns. I would say two major ones. One is: there are certain aspects of this fight that threaten to turn routine disagreements over price between two parties into Antitrust wars. I mean there's always someone who wants to pay more, there's someone who wishes they'd been paid more, someone who wishes they had paid less. Unfortunately the way things are unfolding is, we're now dressing these up in different fights and we're not going to get through seeing that reality that I'm worried about.

The second problem is a much more fundamental one, which I think has an implication for the future. We always struggle in antitrust law with how to deal with dynamic efficiency. Static efficiency we get. We understand how can anything be exist within the existing practical possibility frontiers quite easily. The problem is that patents are the area where we actually focus on the Dynamic efficiency. The framing of these issues through FRAND and through ICT licensing has a way of accepting that focus on static efficiency at a time when we're seeing not only the developed countries understand the importance of innovation, but Chinese authorities in their latest five-year plan, just late last year, emphasized the importance of innovation. They see in their world that they can't compete on costs anymore, or they will rapidly reach that world where, as the Chinese economy keeps rising they're already facing low-cost competitors from cheaper labor sources like Indonesia and other sources. And they're starting to realize, as a lot of other countries have, that the way to maintain economic growth is by climbing up the ladder of value-added contributions- that means innovation and investing in better products as against cheaper products. And I think that the current FRAND limits really put a drag on that, and actually threatens to distract us from focusing on why there is an interaction between IP and antitrust, which is to drive forward innovation.

DE: Dina?

Dina Kallay: So, I think I'll take more of an industry view…

DE: Industry view, but also as a company you're seeing - Christopher was looking more at China, you're seeing the whole world…

DK: Right, I think but also specifically to a region.

I think that the technology that goes into these [devices] has become very, very valuable. And it's valuable not because it's in a standard, but because it adds a lot of value for the end consumers. For various reasons, the world's largest multinationals right now have an interest in devaluing that technology, each for their own specific reasons (and there are different flavors of that). For that reason, they have a well-coordinated and well-funded effort to devalue it. So this is why you're hearing about it: there's a lot of money that goes into advocacy (mostly towards antitrust agencies and elsewhere) to convince everybody that patents that are essential are somehow overpriced, and we need to deflate the price significantly. So that's the reason why we're hearing about it - simply strong advocacy from the strongest market players who are trying to use competition agencies to make that point and change the regulatory landscape in their favor.

In terms of what is my concern as a result of this blitz or attack on the FRAND ecosystem- the concern is that this encouraging wide-range infringement. Infringement is already a problem in many parts of the world without us harboring them and making infringement easier.

DE: Why does it make infringement easier?

DK: It's making it easier because it allows people to infringe long term strategically, and makes it more difficult to stop that infringement.

DG: If the Patentee can't go get an injunction against the infringement without risking an antitrust liability, they're going to have to pursue other relief for… years.

DE: And even if that hasn't been decided, what you're saying that because this is such a hot-button item with the antitrust authorities, there is a suspicion that if you infringe that the patent-holder may be reluctant to pursue you because of the antitrust risk?

DK: I would say that is correct.

DG: If they pursue it could take years…

DK: And just so they can fine you 10% of your worldwide turnover for attempting to protect your right! The concern is a slow-down

of standard setting, and we are seeing some breakdown of standard-setting, and hopefully we'll get to that.

DE: So, the thing I find most confusing about this topic as an economist - really two things - One thing I find confusing is: A lot of the attacks on FRAND-related issues seem to suggest that there's a systemic problem in this industry. That doesn't seem to make sense, because if you look at the particular industry we're talking about: it has just an incredibly rapid rate of innovation. We have half of the adult people in the world now using mobile phones; their growth is extraordinary; we have this enormous mobile app ecosystem that surrounds the phones and which is then supporting companies such as Uber and so forth. You look at this ecosystem and, of all the things going on in the world it seems to be the thing that is working really really well. I could say 'anything is possible' and it would seem counterintuitive, that this is the industry around the world that is subject to a sort of systemic problem with a lot of friction. This is the problem that I find confusing.

DG: It's the industry that is the most patent-intensive and standard-intensive. It's probably the industry that has had the greatest year-over-year drop in cost for two decades. Capacity and performance increases at a greater rate than any other sector. But of course, the people who are fomenting these problems are saying "Just imagine how much better it would do if there weren't all of these anticompetitive measures out there."

DE: We're going to come back to this later, but right now I want to give Dina a challenge. I'm not sure that everyone who is going to be listening to this knows this topic as deeply as all of us do. So these acronyms - SEP's and SSO's and SDO's and FRAND and so forth - could you give us a one-minute or two-minute short course on the role of Standard Development Organizations (sometimes referred to as SSO's), tell us a little bit of what we're talking about when we're referring to FRAND agreements, just to help us put it in context.

DK: Sure. So, in the ICT industry, you have Standard Development Organizations that develop some very sophisticated standards- they're not like "the shapes of plugs on a wall", they're the type of things that allow you to stream a movie on your phone while on a train. And because these standards are sophisticated, it's useful for companies to get together and try to develop these together through synergies, and they do that through SDO's. Initially, to make sure that this collaborative technology is available (first of all to the founders who created it), the way to solve the problem has been to include commitments to give all the players access to this technology, and this is called a FRAND assurance or FRAND commitment. Initially it was not only for the future implementers of this standard, but also for the companies who created this together, to make sure there is no exclusion and that they can all access it.

So we're talking about patents that relied on a technology developed in a collaborative manner, and therefore companies choose voluntarily to give a commitment of accessing them on terms that are Fair, Reasonable and Non Discriminatory. But they don't have to, and I think that's something I wasn't quite clear about…

DE: But if they want to get their technology incorporated into the standard they usually do right?

DK: You usually have a form, and you can tick the box 'no' and sometimes your technology will still be taken. But typically yeah…

DG: Some standards organizations require it, and some do not. So maybe debated it and decided not to adopt a reasonable access…

DE: The role of the SDO's as institutions in this is something I want to touch on later, because I think that's a really interesting topic, but Doug- I want to hit you with a question:

Suppose I had a patent - maybe it's a Standard Essential Patent, maybe it isn't. I seek an injunction or an exclusion order against an alleged infringement. When if ever should that be an antitrust violation? Does the answer depend on whether it is an SEP? Does it matter that I entered into a FRAND agreement?

DG: There's a lot in there…

First of all let's distinguish between an injunction and an exclusion order. Someone goes into court seeking an injunction against the infringement of their patent, as opposed to an exclusion order, where you go to the International Trade Commission (at least in the US) and say 'this is an infringing product, it shouldn't be allowed to be imported.'

In each case, the decision maker (the court or the ITC) has certain criteria used to make a decision whether to grant an injunction or to grant an exclusion. To take the case of the injunction which is a little simpler: The courts want to consider, whether if you don't have the injunction you'd be irreparably harmed. (If you don't get the injunction, couldn't you just get damages later?) If you do get the injunction, will the other party be irreparably harmed? And so on. So where is the public interest in all of this?

Well, there are four criteria. Since the decision is going to be filtered through this process in which a court makes that analysis, it's ludicrous to think there should ever be an antitrust violation for going to court and asking… ever. It doesn't make any sense whatsoever. The ITC has a slightly different set of criteria, but they also have a public interest element in it, it's one their four also I think. So there's really no occasion except as with any other litigation where it's a sham - where you're using the process as your weapon, rather than looking for the outcome of the process.

DE: Christopher, your thoughts on this?

CY: I think that making the seeking of an injunction the basis

of antitrust liability is going to put an enormous drag on innovation. Injunctions are extraordinary remedies. The traditional remedies at large is money - if you've got damages they make you whole with money. We've created some extraordinary remedies which only kick in if remedies at law are inadequate - that is just paying you additional money is not going to make you whole. If you've agreed to license to everybody on reasonable terms, the vast majority of the time all you're fighting about is money!

DE: Could I just ask you an empirical question? I would think that for the debate about antitrust and injunctions - regardless of whether it's ludicrous or not - I would think that an interesting empirical piece of information would be what fraction of the time do courts adopt an injunction as opposed to saying 'well, you can get damages later on.'? Are they common?

CY: In FRAND cases or infringement cases?

DE: Infringement cases

CY: They used to be quite generally granted, until a Supreme Court case called **E-bay vs. MercExchange**, which made clear that the conventional rules governing all injunctions applied to patents specifically. In fact, that created a bit of a sea-change in the behavior of lower courts. When we talk about actual FRAND, staying with essential patterns something with FRAND obligations, the injunctions almost never granted, for the simple reason that you already committed to licensing that money, you're only fighting over how many zeroes in the check and what the number is going to be, and remedies are more adequate.

DE: So you're saying that, with regards to FRAND patents a lot of this debate is over. Courts typically don't grant injunctions

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DG: Unless you've got an insolvent counter-party or someone who otherwise isn't going to be able to pay for damages later on, there's no reason to do so. Now, let me just point out that what we've described is the US scenario, and that is true in many other places, but not everywhere. In Germany it's almost routine to get the injunction and then to have to get it lifted if they decide it has to. So the institutional setting makes a difference.

CY: Judge Posner, in one of the first big FRAND cases limiting at these judgments in the US essentially said "we should create a Bright-Line rule that you never get injunctions in these FRAND cases". On appeal the Federal Circuit said that's probably too strong for the reasons that Judge Ginsburg just said: If the infringer is judgment-proof - they have no money- then remedies of law are inadequate, that's a well-recognized basis for actually giving someone an injunction and the Federal Circuit takes the, in my opinion reasonable position, that we should apply the normal rules that we apply to all forms of injunction to antitrust. We don't need to re-make the law for so many things. The old law we developed for very similar cases holds up very well.

DG: Bear in mind that everybody here is in contractual relationships. The patentee, if there's an SEP with a FRAND commitment, has agreed - as Dina has said - to license to all comers on Fair and Reasonable and Non Discriminatory terms. Courts have decided that if that is a requirement in the SSO, participation in the SSO by-laws, then the implementer and the third-party beneficiaries of that - who's the player, who's the developer - that is a contractual relationship and there's nothing anti-competitive about that.

DE: Let's turn to a different topic. One of the theories that is sometimes used in this area is 'excessive pricing'. We all know that some jurisdictions -not the US- but China, the EC, lots of other places - charging excessive prices could be a violation of the antitrust laws under some circumstances. Dina, let me start with you on this one. Are there circumstances where you think it would make sense to use these laws to force patent-holders to lower their prices?

DK: I'm afraid not. I think that competition law should focus on exclusionary conduct in the area of unilateral conduct. Even in Europe, where they technically have Excessive Pricing on the books, they're really quite reluctant to use it. I know it's technically on the books, but the focus is on exclusion. I think competition agencies are not well placed to decide when one price is acceptable, especially when their National Champions think any price above zero is accepted, so I think it's a very bad idea.

DE: Chris, you started to mention the NDRC case in China as an excessive pricing decision. Your view on this?

CY: I agree with Dina. You don't even need fancy modern FRAND and patent law to do this. Antitrust courts going back a century acknowledge that setting prices is just not a function to which they're well suited. It's not just US law that says that - national laws all over the place say this, it's very typical. Think about this in the patent case - If you're an innovator, what really are you entitled to? You're really entitled to the difference between the value of your invention and the next best alternative- that is what you contributed to society and you have to get into some return on that.

First, a court determining what's reasonable in this circumstance has to make that scientific assessment based on hypothetical businesses based on those two differences and how they would play out.

Second, the other part we talk about conventionally in terms of understanding where prices are set, is not just the difference in reservation prices but bargaining power, traditionally understood as 'who has more round delaying this or dragging out the negotiations'. So you have to look at the gap of the reservation price which determines the value, trying to figure out how within their hypothetical global bargain how you set those prices. And even if by some miracle you get that right today, you're going to get revisions requesting 'oh, my factory costs have changed, we have to revise it.' 'The structure

of demand has changed.' 'The level of competition has changed.' And the idea that you would have a court in an ongoing basis monitoring this, would be problematic.

The other thing that's quite interesting is, I keep thinking back to for example US law: If there's recourse to another legal mechanism that can give you largely the same results, your ability to bring a monopolization case to the courts watching goes right down. And as Doug has pointed out very nicely, what we have here is mechanisms under which other conventional forms of law resolve disputes over price. What do we benefit by overlaying antitrust liability on top of that? The question to ask isn't should there be liability, but should there be antitrust liability in addition to relief from a system that is already set to granted? And if that's the case first you get trouble damages, you get all these other problems associated with it. My guess is that, the fact that you already have a loop through for some other ways, that are better suited - whether its through arbitration of prices or other things to get at factual prices in antitrust reports make that a much better option.

DE: Of course, this is interesting because these are countries that actually have excessive pricing laws, exploitative abuse laws, in their books. And what you're saying is 'well that's fine, just don't apply them'. And in the case of China - just to push back on your comments Christopher- the courts have difficulty doing this. In the case of NDRC you actually have an agency that is primarily a price-regulatory body, so there may be a question on whether they're well-suited to do this, but at least they've been in the business of trying to for a number years.

CY: What is fascinating is, when you talk to European regulators about their excessive pricing laws they always say 'Oh, don't worry. We never enforce that.' And this is where I think Europe has to take its obligation seriously as a new emerging leader, setting an example in antitrust. Other countries are looking towards Europe's model of law, not just at the application, and actually taking guidance from it. So I think that the wink-and-a-nod 'don't worry we won't ever do it' isn't entirely responsible.

When you talk about the NRDC is actually really something fascinating. We complain in the US that we have two antitrust enforcement agencies left. They have three. And the three agencies they have, have built into their DNA a legacy of different things. So the one specific topic was the industrial policy. And still is - it believes in its ability to do that. What will happen you talk to Chinese judges, they are at a complete loss. They're the front line in trying to tackle these disputes, they're saying 'I understand what they're trying to do and I understand how they're trying to disagree with the government', but they freely admit that they really don't have standards for delivery. They're trying to make them up as they go along.

DG: Everything that Chris said about the difficulties of litigation, whether its an agency or a court trying to set a fair price, is true. But even if the agencies weren't there, even if there's no antitrust element, the same difficulties are encountered in a contract case. We have a FRAND contract, basically, we come to an impasse, somebody gets sued, and a court's going to have to make a decision. It's something nobody wants, basically. There are only two reported decisions in the US, which the court has set the rate - and so the patentee came in with this claim for a huge amount, billions of dollars, and came away with $14 million. But the opinion is 207 pages long, as the court struggled to calculate this. The other case is protected so I don't know how big it was, but that's it.

DK: Maybe I should mention the Ericsson case, where the court found that an offer of 50 cents per device was FRAND, the infringers claimed that it had to be fractions of a penny, but the court found that no, 50 cents is FRAND. And the infringer eventually failed to negotiate the reduction.

DG: So both these cases come out with a small fraction of what the claim had been. Which fuels the fire of people saying "You see, the patent holders are demanding excessive amounts".

DK: Well, Ericsson had the opposite, it was the infringers who said that it should be fractions of a penny and the court said no. So that is actually an example of hold-out.

CY: This is the irony here, which is- this sort of disputes we're familiar with in any number of contexts, whether it's labor negotiations when you have a new union contract. You get these people with adversarial interests, and what we usually see is some forms of institutional design, a mechanism designed to try to solve this. In fact, what is frustrating to many of us is that these standard-setting organizations who create these FRAND obligations have not really been that aggressive about creating these. They are trying to compete to become The standard-setting organization. They have been intentionally vague about what these standards and mechanisms mean.

DE: I think Dina wants to push back, but before she does let me see if I can push back a little bit on it. Is it one reason why the SDO's may not have put a lot of effort into dealing with this problem is because it's not a problem? That by and large the patent-holders and the licensees, under the framework they have do work it out, and therefore spending effort developing a governance regime for this particular problem isn't worth their effort and might cause unintended consequences?

CY: I think that's definitely true. What the problem is, is that if you look at the litigation, the names of the parties - The disputes tend to be highly concentrated in a small number of parties. There is a very - I don't know how much I want to out this, but there's a very well-known, very large company.

DE: Out it, go with it.

CY: Apple takes the position that it won't pay a penny to anybody.

And if you systematically take that as a position, you are going to see - even in a world where most parties resolve disputes amicably, and because they understand that in order to keep playing the game they have to work things out somehow - they have things to design, they have real work to do. If a single company would like to take the position that Nothing is FRAND - that Zero is FRAND in all cases - you're going to get litigation. And notwithstanding the fact that you don't need a law for a good resolution in all cases, you're going to need it in those cases.

DG: But that's really an outlier. There's very little litigation. Except for the Smartphone Wars, because of Apple, there's very little litigation around the world. You said repeat players - cross-licensing is a very common resolution of this, because if each company has big portfolios, and the safe thing is to cross-license those portfolios and not get in a war or anything. This is a situation that we see with physical goods and real property all the time when someone is contemplating an asset-specific investment. In fact everyone in the room has encounters of, well - once you rent an apartment, you're going to move in and maybe make some improvements, and how do you know at the end of the year your landlord isn't going to triple the rent? Well there are reputational constraints for one thing; there are provisions you can put in your index. There are institutions that have been developed to prevent just that kind of opportunistic behavior, and it's no different from this in my view.

DK: I don't subscribe to the notion that SDO's have not been working on this or thinking about it. Since the 1990's N-theory has had an IT policy and IPR working group, and I've been active in the NC IPR working group after 2001-2002. There's a lot of thinking that goes into it.

What we see in the patent policies that are in place is the consensus position of all the parties, and there's a little bit of wiggle-room or leeway in there, because you need to leave flexibility. Every licensing deal is different. For example, there are terms and conditions, it's not just monetary, and the length changes. The variables are endless, so you cannot tightly define it, because it won't work. It needs to be flexible to fix everything.

DG: So people enter FRAND agreements without knowing what they're going to pay, because you just know it's arranged. You're going to have to work out later on the particulars.

DK: I think people in the industry know pretty well what they're going to pay. It's not that big, people have an idea of how much they would pay.

DG: Within a range.

DK: Yes, within a range of course.

DE: I've been spending some time studying Standard Setting Organizations recently because I've ultimately concluded they're multi-sided platforms, and that's something that I like to look at. But one of the things that has struck me in this area is that these are very sophisticated organizations. They develop complex governance structures; they're obviously solving very complicated collective action problems; they've spontaneously arisen; they solve very difficult economic problems and have developed institutions to do that. So I would think that if, hypothetically, FRAND negotiations was a problem and there were a lot of breakdowns, that they would come up with a solution for that. Maybe that would be independent arbitration, or maybe they would do something, if there was a big problem. Am I wrong about this?

DK: People sometimes don't understand that SDO's are just a collection of the companies acting in them, they don't exist as free-standing entities.

DG: Well they have bylaws, many of them even have buildings…

DK: The industry practice in Europe forever, in most cases, has been arbitration when there are disputes. That's what parties use, it's efficient and it solves these issues.

CY: But David, I think that you hit the point right on the head, which is that they solve collective action problems, but only inasmuch as there is an underlying agreement among the people constituting the standard and participating in developing the standard actually have a basis for agreement. And sometimes you can agree not to agree, or agree to disagree, or agree to leave some things out. And I think that you don't always solve a dispute up front, you kick some things down the road, and especially I don't think that every planner is always worried about how to resolve this. I think some things get kicked down the road a little bit farther, and we're encountering them now, and now's the right time.

DE: Let's turn to a little elevated topic. We hear the terms 'Hold-up' and 'Hold-out' or the reverse patent hold-up quite a bit in this area. Doug, what is 'patent holdup'? Any real or imagined examples that come to mind?

DG: You've got the patentee and the implementer and they negotiate a royalty. If the patentee is insisting - It's a derogatory term. Your request is a Hold-up, or your refusal to pay is a Hold-out. It's just a disagreement about where we come out.

DE: So in terms of 'Hold-up' in the derogatory sense - in terms of being a problem that policy should deal with - your view is that this is simply…

DG: It's a hypothetical negotiation which does not originate from patent licensing, it originates with contracts in general and the institutions that we've discussed that have grown up around sovereign contract laws. There's nothing special about this.

CY: I agree. There's a temptation any time people have a disagree-

ment on price to talk about hold-up. That simply is not a hold-up. Doug alluded to it earlier - Hold-up is a form of opportunism. If you're locked into a particular person then, ex-ante to the decision you had total latitude to do whatever you wanted, but there's some change in position you have after the fact that makes you locked-in, and it has to be a change in policy by another person that you didn't know about when you made that decision up front. Those are the only times where we're really talking about a hold-up. It's used loosely to talk about any time when somebody has a patent.

If a patent actually gives you value because you created an invention that is superior to what you had before, that is not hold-up. That's just negotiation over the real value of your gun. Now what is fascinating is that the kind of opportunism we're talking about is usually reciprocal, and that's where we talk of reversal - it's the Apple problem. It's not only one side saying 'You have to pay me 'way too much'. The other side is in a position, because it's usually a bilateral situation, where they can actually hold-out the other way. And without understanding the frequency with which it has happened and the relative parity it gives you on both sides, I don't see how people can make a general claim that one is inherently a bigger problem than the other, particularly in a repeat-play game where things get settled. What's fascinating to me is the recent announcement between Microsoft and Google to actually shelve all the patent litigation. And to me that's a sign that they understand that in the long-term they'll win some, lose some (spend a lot of money on lawyers), but it's going to be a wash anyway, so why play that game? Because the only people you'll make rich are the economists and lawyers.

DE: I want to go to Dina next and then to Doug, but before I do that I'm going to give the opportunity to people on the floor to ask questions, particularly if you have contrary views to this panel, just so we can get a little bit of contrariness going on.

DK: I want to draw a distinction between 'Hold-out' and 'Reverse Hold-out'. There is a narrow distinction and people are not always aware of that.

A Hold-out is unilateral, generally. It's a party that tries to unnecessarily and unduly delay negotiations, including refusing to enter into a mechanism that will solve the dispute, that's unilateral. Reverse Hold-out I think more correctly refers to a collusive effort, and we see a lot of that too, where a group of technology users or infringers get together and collaborate in a kind of cartel or group, not to take a license. And you see that in several associations in the world at large.

DE: Any Questions?

Q1: Just now Judge Ginsburg mentioned that injunctions should not lead to any antitrust liability because everything is governed by FRAND contracts, which is it's own network of contracts. But what if they transfer the CPR of this network of FRAND contracts, there's this cool term I've heard coming up, 'FRAND wandering' - So you transfer it to an entity that's not bound by FRAND commitments, and then you use a minimum payment term that basically sets out a rate that is higher than what you would have in both the charge and the original FRAND commitment. Would this not be of concern in competition law?

DG: The principal reason why giving an injunction should not be considered even potentially an antitrust violation, is that you're asking the appropriate forum to give you an injunction and it's just seeking redress from a branch of government, and you're not necessarily going to get it. If there's no merit to it you won't get it.

Now you've raised a 'sham' type of a problem, where somebody is avoiding a FRAND sham by transferring the obligations, and I think there's been a case like that… They did not get away with it.

CY: The Volcomm vs. Qualcomm case to some extent is also similar. But you've actually identified a good example: That is hold-up. You have a situation where you made a representation that other people get access to this technology in FRAND. You then do something after that commitment has been made so that you don't have to honor that commitment anymore. Now that is an example of, well, fraudulent behavior. But you could also make the claim for hold-up as well.

DK: Right, but I think there's a growing consensus today that when you transfer FRANDs the commitments should transfer with it. In fact, ETSI has updated its policy to make it clear that it transfers with the FRAND. So I think that issue is taken care of, because there is a broader understanding today, that it could make an impact.

DG: If a corporation has got assets and liabilities and sells all the assets and leaves the liabilities, you don't really think they're going to get away with it.

DE: That's another FRAND issue. Dina, does the FRAND access commitment dictate the level of licensing in the value chain? In other words, whether a license should be granted to component makers for example, chip-makers in the case of mobile phones vs. final-piece makers, vs other levels? And before you answer that maybe just highlight why this turns out to be an important issue in this area.

DK: Sure. So, as part of this effort to devalue this technology there is some argument that there is a sort of 'compulsory license' where you Must license to component makers. Now of course components typically cost less, they're something small. The idea is that, psychologically, people will think "the technology can't be worth very much when the whole thing costs 10 cents" or even closer to zero. So that's where the argument comes from, and it's been made around the world.

However, first of all you pointed out correctly that the FRAND commitment is committed to grant access to this patent. If you look at DG Comp or the US agencies documents, they always speak about

assuring FRAND access. Access and License are not the same thing - a lot of antitrust people don't know that because they don't engage with licensing - but when you license something, after you license it, it gets exhausted. You can only license it once. So you have to decide where you license it, after that you're done - you don't double-dip.

There has been an attempt to argue that you must exhaust it at a certain level. Now of course it depends on the language of the specific SDO you're in, how it defines FRAND. Until recently, no SDO in the world had set a compulsory license on a specific level. In fact the ETSI language makes it quite clear that it has to be fully compliant devices, end devices. In the Aerosil litigation in Texas there was an attempt to argue that you must license at a specific level, and the court rejected it. So no, I think that there are no Antitrust implications and there is no obligation under most SDO patent policies to do so. There certainly have been several well-funded attempts to argue that, but the fact that in Europe or in the US it went nowhere is good testament that there is no basis for it.

DG: Business practice on this varies, and there are good reasons why, more often than not, the end-user device is the metric that's used. It's administratively easier, easier to monitor, and simply the path of choice for parties - there's an exhaustion problem if they do it by components. So practice varies, but I think Dina is quite correct that it's rarely required. You hear these arguments for, was it SSPU they called it? Special payment…

DK: There is one kind of outlier SDO which has changed its policy recently to require it. And in that specific one we're seeing a breakdown.

DG: Is that EEE? I think I got some information on that today. There are 9 organizations now that, in light of the new policy, are not going forward - either explicitly stating that they will not make commitments under the new policy or simply declining to comment on whether they will. And who are the ones who specifically said they will not do it? Qualcomm, Ericsson, InterDigital, Nokia… four of the biggest patent portfolios in the world.

DE: So there is competition between SSO's, which is interesting…

DG: Well, I don't know whether that means there's competition or not. Each one has an area of coverage.

DE: But there's ability of the organizations to pull on other members.

DG: Well, and the others who have refused to say - Blackberry, Microsoft, HP, Texas A&M and Universities are major patent check-writers, major patent holders.

Q2: Two Questions- one quickly: Some discussion on global patenting, someone mentioned, it seems that would deal with a lot of these issues. I think it played the role David suggested, some controversy.

I generally tend to agree with what Dina was saying and what Chris was saying, about repeatable games solving a lot of these issues, in that you have to go back to the Standards table with the same entities again. If you're unreasonable once, then you're going to have less room at the negotiating table the next time around. But what about players who aren't susceptible to repeatable game scenario? That ambiguity of FRANDS could then create a problem. One would be where you transfer -and you already mentioned these- to a non-committed entity, which then It transfers, but then you still have the ambiguity of FRAND commitments.

And the second would be say, software companies that don't have, in the style of Apple, -if you write individual software patents that don't necessarily have to meet on standards, you're not part of the standards bodies, but hardware companies have to keep stepping up to the plate with antitrust as a possibility.

DE: Who wants to take that?

DG: The simple one, the Noerr-Pennington one, as I alluded without getting into the case, I said 'You're just seeking redress from your government', where you seek an injunction. It's a 1st Amendment right. It's your right to write a petition. So it was pretty clear that making that into an antitrust violation would run into a Noerr-Pennington defense that would probably succeed in the US.

DK: There was the District of Wisconsin case, which said that they were immune from antitrust liability.

Q2: So you think the FTC Settlement then would have been susceptible for that court? Or what about the Motorola Settlement?

CY: The unfortunate thing about the Motorola Settlement is - The press release announcement to me speaks volumes. It's the same announcement that settled the Google Search case by the FTC. And it's unfortunately… the suggestion is that in the FTC's mind these two issues are tied together, and we see this with antitrust enforcement agencies and merger courts or other national agencies, where they'll use the fact that they've got a party in front of them that needs something in order to extract something of value from them. And you'll see many conditions acceded to that do not pertain to the merger- they're not merger specific - and in fact those enforcers, are often cashed and presented as voluntary commitments, which is - The government didn't order you to do that, but during the negotiation process the party says 'we'll do x' or 'We'll do y' and they accept those as being in the public interest but let them stand.

Not only is this potentially abusive of the fact that you have a person there who needs something from you - to take advantage of this to get them to do things you couldn't do directly through a regular process. The fact that these are often characterized as voluntary

commitments immunizes them from judicial review, because they are not full-on agency actions, they're voluntary actions by one of the parties. So this has been a longstanding problem, and I actually find that the FTC settlement telling Motorola mobility NOT to seek injunctive relief as a remedy, I find it incredibly problematic and I do think that it's something that China and other enforcement agencies are taking as guidance from us. 'Well if the EU is doing it and the US is doing it then this must be the accepted practice.'

DG: On the 20th of April, the European Commission cleared under its Merger Control rules the acquisition of Equenz and Paysquare by Worldline, subject to amongst others, a commitment to license technology interested in FRAND conditions.

It's exactly what Christopher was describing. These people are trying to do a merger, and they're being 'Held up' by the commission.

[pause]

The key question is - is this relief they could have gotten in court? And the answer is usually no. Because it's outside the margins of the merger. There was no intention (at least in the ones I'm familiar with) no contention that the merger was going to create an antitrust problem.

DE: As much as I'd love to continue with a conversation on competition authorities engaging in extortion, let's move on to something else. Let's finish up with a follow up question, and let me say a few things as part of the 'editorial'.

How do trade law issues touch upon competition law issues in this area? If you think about the dynamics of these cases in different countries going forward, you expect that some of these issues are going to move out of the mundane world of antitrust authorities and get kind of 'booted-up' higher, on to the White House in the US, or to the higher, executive level in other countries.

DK: I'm not sure if the world of antitrust is mundane. These issues are obviously fertile ground for National Champions to convince their governments and competition agencies to act and take protectionist measures to help them in ways that have nothing to do with competition analysis, although you can dress it up as competition analysis. So I think this is a classic subject matter for trade issues. So we're talking about intellectual property…

DE: But as a practical matter, are you seeing these issues being debated and addressed at higher levels of government?

DK: I don't know, I don't work at a higher level of government. We're dealing with Intellectual property and with Standards. There are two big treaties that govern this area. There's the WTO TRIPS agreement, which sets minimum standards for protection of patents and other intellectual property right; and then there's the standards treaty, the TBT (Technical Barriers to Trade), which sets certain rules that govern standards. I do know that in the context of the new EEE policy, there are some valid arguments about it taking place in a manner inconsistent with TRIPS or TBT obligations, and I'm not sure if all the governments involved were fully compliant with these obligations, so I think we were seeing this argued in the context of re-accreditation of a group in ENIC, so I do think we're going to keep seeing these issues permeating in, and I think it's time for competition agencies to understand that these issues are involved, because it's really an intersection…

CY: Dina points to GATT and the major multilateral treaties as developing in favor for trade. A lot of people say that 'GATT is dead', it's been taken over -TPP and TTIP is being taken over by regionalism, and in fact what we're seeing is, in addition to the questions being dealt with at the multilateral level, we have not only regional agreements but also bilaterals, and there's a wonderful set of problems you run into very quickly which is: If you want relief where do you seek the relief? Who do you seek it against? And what trade mechanism or regime are you going to invoke as a basis for doing that? In fact, what you're going to see is a lot of flexibility. The other problem you start to see is essentially how remedies imposed in one country can have implications elsewhere. If you argue that there's a FRAND obligation within your national borders for one actor that will have multilateral tendential effects. Because if you then charge the same two entities a different price in another jurisdiction, you have to ask yourself what is the extra-territorial factor once that have been bound by that. And the risk is that - we usually think about the commonest way of working this out, you can end up with a situation where the least-common-denominator enforcer ends up de facto making laws for other countries. And they are really struggling with ways to try to figure out how to handle that, and that is an example of the old-world principles of problem resolution stratagems.

DG: You say the least stringent regulator?

CY: The Most stringent, the least-common-denominator.

DE: Let me ask you all a final question, to get you guys to make a prediction.

Here are some of the things you've said over the last hour: That the whole debate really should be tamped down. That antitrust really shouldn't be involved in a lot of these issues. If we actually think about the dynamics and what's going to happen in the next few years - Is your view that in, let's say three to five years time we will be sitting here Not talking about this topic because it will have been put to rest, or do we think that competition authorities are going to be becoming increasingly more aggressive in this area?

DG: I think in the US at least, it's going to peter out. It's going to end back where we remember. There's going to be a few court cases,

and right now we have the agencies occasionally sending something that suggests that there might be an antitrust problem, so they'll stop doing that.

DE: Dina, how about the rest of the world?

DK: I think younger agencies might see this as an easy opportunity to use their excessive pricing laws in ways that will not be pro-competitive. More generally, I think we will see a chilling of Standard Setting - the standards will be less robust because there's a lot of pressure not to invest so much on these open standards. And that's too bad, because it will be detrimental to competition.

CY: A few years ago, the FTC initiated a study called a 'Section 6B Study' which got a lot of attention. They're in the process of starting FRAND and other antitrust contents - In the process of getting close to a resolution, it's generating much less interest than I think people thought, just because the issue seems to, not quite have run its course, but the idea of using antitrust laws to get at this doesn't seem to hold much traction. And probably it's also informed some of the informal conversations being held in Silicon Valley. Apparently a bunch of Silicon Valley firms actually hired some attorneys to actually study whether antitrust laws would be applied here, and their conclusion was No. So I don't think the industry is convinced that it's going to be that generative, and they think that that's not going to be the case. Hopefully, I would like to think three or five years ago we won't be having this conversation, but those kind of predictions which we make at our own hazard- I've made them before and we're still talking about some of those things.

DE: Good rule as an Economist is - Never make a prediction that can be tested within your own lifetime. I think we're going to bring this to a close. We apologize if in our enthusiasm to make this interesting we have insulted any countries, competition authority or anyone in the antitrust world. But thank you all for a wonderful conversation.

END

STANDARDS SETTING, STANDARDS DEVELOPMENT AND DIVISION OF THE GAINS FROM STANDARDIZATION

BY DAVID J. TEECE[1] & EDWARD F. SHERRY[2]

Consider the degree of technology incorporated into various compatibility/interoperability standards.It can run a wide range, from little-to-none to cutting-edge.

At the former extreme are the standards for electrical plugs and sockets, where the physical layout of the plug/socket is key, and the value to society of having a standardized design is high (imagine the chaos that would ensue if different appliances from different manufacturers used different and mutually-incompatible plug designs and wall sockets were nonstandard too).However, there is little or nothing in the way of new technology involved in the choice of which standard to adopt for electrical plugs and sockets since many proposed designs are capable of handling the required degree of voltage and current without adverse effects, such as electrical arcing if different plugs are located too close together, or inadequate power handling capability.

At the latter extreme, consider the standards for next-generation cellular communications. Here the technology is often cutting-edge and being developed simultaneously with the standard-development process.Hundreds of millions of dollars get spent on R&D to come up with improved technology which can help advance the technology which ultimately gets embedded in the standard.

Obviously, other standards span the range, between these extremes.At both the low end and the high end of the technology spectrum, there clearly is a need for standardization, if only to ensure that products made by one firm are compatible/interoperable with products made by other firms.But the need to develop technology and coordinate in order to choose the best technology varies significantly, from very low at the low end of the spectrum to very high at the high end of the spectrum

The terms “standard setting organization” (“SSO”) and “standard development organization” (“SDO”) have often been used interchangeably.But from an economics and resource allocation perspective, there are differences between “setting standards” and “developing standards.” In particular, the extent to which R&D investment is needed to advance the performance of the technology that is being standardized is sometimes significant and sometimes not.

We propose using the term “standards setting” for activities at the lower end of the spectrum, and “standards development” for activities at the higher end of the spectrum.The key difference is the extent to which it is necessary to develop new technology as one goes along (instead of merely selecting one alternative from a pre-existing menu of technological choices).In the latter case, technological choices are needed and coordination of divergent viewpoints is required, especially at the cutting edge.At the low end, though some coordinated choice of standard is required, it rarely makes a difference which standard is adopted so long as some alternative is chosen for standardization and coordination.One example is the pin assignment for semiconductors.Standardization of pin assignment is clearly important; it simply would not work if chips from firm A used pin 5 to send/receive signal X and chips from firm B used pin 6 to send/receive the same signal X.But with the possible exception of avoiding cross-talk between different signals, the choice of which pin assignment schema to use appears largely arbitrary.At the high end, the choice between the best technological alternative and the next-best can have a significant impact on industry performance. For example, the choice between Time Division Multiple Access (“TDMA”) and Code Division Multiple Access (“CDMA”) for cellular communications has significant implications.

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When there is new technology being developed contemporaneously with the standardization process, it is important that the SSO/SDO work with its members to choose the best technology to be incorporated into the pending standard.In many standardization fields, such as telecommunications or semiconductors, it is rarely the case that different standards are technologically identical/equivalent, unlike the situation with electrical plugs/sockets, where the choice of which plug/socket standard to adopt has very little effect on technological performance and may be driven by ergonomic, backwards-compatibility or manufacturing cost considerations.Instead, much of the technology proposed for incorporation into many standards is often being developed at or about the time that the standardization process is being conducted, as revealed by a comparison between the dates at which standardization proposals are being made and the dates at which patent applications covering the technology are being filed(such "just-in-time" patenting is common). In many fields, it is rarely the case that the standards development-process simply uses existing "off the shelf" technology.That is not surprising, as many technological standards are intentionally being developed for next-generation products (such as the next generation of telecommunications products), and those involved in the standardization process want to obtain the longest life possible for new standards (to reduce the risk that they will become obsolete quickly).

The standards-development process is often a collaborative process, typically taking inputs from both rival and complementary technology developers and from those who anticipate making products complying with the standard.There are clearly gains from standardization; those gains accrue to various interested parties, including consumers, implementers and technology developers whose technology is incorporated into the standard.As with most collaborative processes, one would anticipate that the gains would be divided among those contributing and those impacted by the process (including end-users, who typically do not participate in the process). This raises two questions:(1) how are the gains from standardization divided among end-users, implementers and technology developers?And (2) how should the gains be divided?

Most SSOs/SDOs require that holders of patents covering technology incorporated into standards (so-called "standards-essential patents" or "SEPs") commit to making patent licenses available to an "unlimited" number of potential licensees on licensing terms and conditions that are "reasonable and non-discriminatory" ("RAND") or "fair, reasonable and non-discriminatory" ("FRAND").[3] Such requirements, typically set forth in the intellectual property rights ("IPR") policies of the SSO/SDO, rarely provide much in the way of detailed guidance as to what RAND/FRAND licensing terms are.Some have deplored the lack of specificity as to what RAND/FRAND requires, but others acknowledge that it is unrealistic to expect much in the way of additional clarification.

A number of recent U.S. court decisions have tried to cast light on what RAND/FRAND licensing terms are.We have discussed those decisions in a separate paper,[4] and will not repeat that discussion here.Most of those decisions start with (and then modify in various ways) the Georgia-Pacific factors, a list of fifteen court-developed factors that are traditionally used to help to assess what a "reasonable" royalty is under 35 USC 284, which provides that the patent holder is entitled to "damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer."

We have seen language in several court cases suggesting that a FRAND royalty should be limited to the "inherent value" of the patented technology.That argument makes no sense from an economic perspective.Value is context-dependent; there is no such thing as the "inherent value" of patented technology. Consider a book.A book can be read, but it can also be used as a doorstop, paperweight, source of fuel or decorative object (e.g. displayed on a shelf in a furniture store or home for sale).If the book is in a language I cannot read, the book has little value to me other than in the paperweight/doorstop/fuel/decoration uses, but it may be much more valuable to you if you can read the language in which the book is printed.If "the same" book is translated into a language I can read, I can obtain benefits from reading it too.

Some courts have suggested (in what appears to us to be dicta) that a FRAND royalty should not include any of the value arising from the fact that the technology was incorporated into the standard.We have never seen any articulation of the (supposed) justification for such a position, and it makes no economic sense.As noted above, the standardization process is a collaborative activity, dependent on the inputs not only of potential implementers but on the inputs of those who contribute their technology into the standard. In our view, it would be perfectly appropriate for a patent holder to obtain a "fair share" of the gains from standardization.(The only alternative is that all of the gains from standardization are split (in the first instance) as between implementers and end-users; we see no economic or public policy justification for allowing them to reap the gains from standardization, but denying any share of those gains to innovators whose technology is incorporated into standards.)

We would fully agree that it is inappropriate for a patent holder to seek to "hold up" implementers by demanding more than a "fair share" of the gains from standardization.We would also agree that there is a potential "slippery slope" problem in drawing the line between acceptable and non-acceptable royalties.It is much easier to implement a bright- line policy (along the lines of "patent holders should capture none of the gains from standardization") than it is to implement a more nuanced policy (along the lines of "patent holders should capture a 'fair share' of the gains from standardization").But

3 In our experience, U.S.-based SSOs/SDOs are more likely to use the term RAND, while European SSOs/SDOs are more likely to use the term FRAND. We are not aware of any analysts that believe that there is any substantive distinction between RAND and FRAND.Like others, we will use the terms interchangeably.

4 Teece and Sherry, "A Public Policy Analysis of RAND Decisions in US Courts," forthcoming in Criterion Journal on Innovation (2016).

in our view, the simplistic "none" approach has nothing to recommend it over the more nuanced "fair share" approach. In fact, the opposite is more likely correct inasmuch as there needs to be a strong incentives to invest in enabling technology which is generally under rewarded.[5]

In theory, patent holders can benefit in two separate ways when their technology is incorporated into a standard.The first is what we term the "volume effect," an increase in the number of units incorporating the technology on which royalties will have to be paid, compared to the situation in which no standard is adopted and different firms may (or may not) make non-standardized products some of which may use the technology in question), resulting in a fragmented (and typically much smaller) market.We are not aware of anyone that suggests that patent holders whose technology is incorporated into a standard "should not" be able to benefit from the "volume effect."

But there is also the possibility of what we will term a "price effect," the idea that the royalty rate for a given technology associated with being incorporated into a standard can be higher than the royalty rate appropriate for the same technology in non-standardized contexts.The suggestion we have seen in certain cases is that there "should" be no price effect – the FRAND royalty rate "should not" include any of the value associated with the technology being incorporated into the standard—but only a volume effect.Again, we have never seen any clear articulation for the rationale behind this suggestion, other than as a reaction to the prospect of hold-up.In our view, there is no economic or public policy justification for such a rule.

In conclusion, standards development frequently involves significant R&D and related investments by technology contributors. These contributions benefit the standardization process and therefore the implementers that use the standards, and consumers that buy the product.It is important that technology contributors are rewarded for their inventions.The F in FRAND should stand for "fair," not "free" or de minimus.

5 See David J. Teece"Profiting from Innovation in the Digital Economy: Standards, Complementary Assets, and Business Models in the Wireless World," (forthcoming), Research Policy

FRAND LICENSING IN THEORY AND IN PRACTICE: PROPOSAL FOR A COMMON FRAMEWORK

BY JUSTUS A. BARON,[1] CHRYSSOULA PENTHEROUDAKIS[2] & NIKOLAUS THUMM[3]



I. INTRODUCTION

Recent United States ("U.S.") decisions on damages for patent infringement, the evolving European jurisprudence in the aftermath of the Huawei v. ZTE judgment by the Court of Justice of the European Union (CJEU) as well as prominent patent litigation and antitrust cases in China, India, Korea and Japan have considerably clarified the meaning of a patent holder's commitment to offer licenses on fair, reasonable and non-discriminatory (FRAND) terms. A comparative review of the international case law on disputes involving standard-essential patents (SEPs) reveals two significant trends: a convergence regarding the theoretical definition of FRAND, on one hand, and diverging approaches to the implementation of its core principles in specific cases, on the other – mainly reflected in the U.S. case law as opposed to the European one. Clearly, the controversy and legal uncertainty around FRAND emerge from the fact that the widely accepted principles of FRAND do not provide sufficient guidance to courts to determine royalty rates for specific products and SEPs.

The above lies at the heart of a forthcoming study commissioned by the Joint Research Centre of the European Commission.[4] The study addresses how FRAND licensing terms have been determined in theory and practice in multiple jurisdictions worldwide. In the study, we review the evolving case law on FRAND from both a legal and economic perspective, and perform a comparative legal analysis while testing the economic soundness of the concepts and methodologies applied by courts and antitrust authorities in the specific cases. Bearing in mind the idiosyncrasies of SEP litigation in the respective national legal systems, we achieve a comprehensive overview of SEP licensing terms and carve out a common framework for the definition of FRAND based on the findings we have distilled from a case study analysis and literature review.

The following considerations reflect some of the central outcomes of our research in a considerably consolidated manner.

II. FRAND IS A POTENTIALLY LARGE RANGE

Despite scholarly disagreement, courts have quite consistently referred to the same theoretical concepts in order to define the characteristics of a FRAND rate. As a general rule, a FRAND rate must reflect the value of a patented feature for a standard-compliant product. Specifically, the judicial analysis of FRAND refers to three different concepts of value: first, the ex-ante value of the patented feature, i.e. a value determined before the implementer is irreversibly committed to a standard including the feature; second, the feature's incremental value over the next-best alternativethat was available at the time the standard was set; and third, the feature's stand-alone orintrinsic value, i.e. the value resulting only from its technological superiority, and not from its adoption as part of the standard. It is important to understand that these different concepts are not just variations of the same value, but refer to different benchmarks of the value of a patent. In our study, we show that these different concepts can be combined to form a consistent analytical framework for FRAND. Nevertheless, this framework does not and cannot define a single FRAND rate for a specific product and SEP.

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4 To be published under: http://is.jrc.ec.europa.eu/pages/ISG/EURIPIDIS/EURIPIDIS.index.html.

Especially in the U.S. context, the ex-ante value of the patented feature is often determined by analyzing the amount thepatent holder and implementer would have agreed upon in a hypothetical ex-ante negotiation. The concept of the hypothetical ex-ante negotiation is a very useful analytical tool, able to accommodate the different concepts of value relevant for the FRAND determination. The outcome of a hypothetical negotiation falls within a potentially large bargaining range. This is the range of acceptable agreements, i.e. the rates that would make both sides better off than not having an agreement at all.

The other cornerstones of the FRAND analysis are the patented feature's incremental value over the next-best alternative, and its intrinsic value excluding any value resulting from standardization. These values define the upper and lower boundaries of the bargaining range. The incremental value is determined by comparing the standard including the patented feature with the best possible standard that could have been set without using the patented feature. The intrinsic value is determined by considering the best possible use of the patented feature outside of the standard.[5]

Specifically, the implementer would not have agreed to pay more for the license than the value that the patented feature adds to his profits derived from sales of the standard-compliant product. If the rate exceeds this value, the implementer would prefer using a standard excluding the patented feature.[6] The incremental value that the patented feature adds to the product – in particular compared to the next best alternative standard that could have been developed without the patented feature – is thus an upper bound of the bargaining range. On the other end, the patent owner would not have accepted an agreement that leaves him with less profit than he could have achieved by refusing to license. Because the inclusion of the patent into the standard is conditioned on the patent owner's commitment to license, the patent owner's alternative to the agreement is to refuse to make its patent available for inclusion into the standard. The SEP owner would thus refuse a royalty rate whereby it receives less than the stand-alone commercial value of the patent, i.e. the value of the patented feature if it is not part of the standard. The intrinsic, stand-alone value of the patent thus defines the lower bound of the bargaining range.

5 In earlier case law and literature, the concepts of intrinsic and incremental value were often misleadingly conflated. These address, however, two different values. A patented feature can add significant value to a standard and the products that implement it. At the same time, the same feature may be of little or no use outside of the standard, so that the value of the feature is fully or to a large extent determined by the feature's inclusion into the standard. This is a common scenario, especially in the case of functionalities developed specifically for a particular standard. Subsequently, the wedge between the stand-alone value of the patented feature and the incremental value that it adds to standard-compliant products tends to be a large one. This large wedge defines the bargaining range of a hypothetical negotiation, i.e. the range of acceptable royalty rates, which make both patent owner and implementer better off than in the absence of an agreement.

6 In order to shield the implementer from hold-up, it must be assumed that this standard exists and provides the same compatibility benefits.

III. DETERMINATION OF A FRAND RATE IS CHALLENGING AND OFTEN ERROR-PRONE

Whereas the overarching principles of FRAND (ex-ante negotiation benchmark, incremental value, intrinsic value of the patented feature, incentive compatibility, account for royalty stacking and concerns of patent hold-up) have been widely acknowledged across various jurisdictions, the application of the FRAND principles in court practice for the calculation of royalty rates has proven highly challenging. The difficulties are summarized below.

First, the determination of a FRAND rate involves a complex analysis of counterfactual outcomes. For instance, it is necessary to consider the next-best alternative standard that the relevant Standard Setting Organization ("SSO") could have set without using the patented feature. In re Innovatio,[7] the court had to determine what price implementers would have had to pay to access the proprietary technology included in the hypothetical alternative standard. While the court recognized that competition between different patented features would drive down this cost, it refused to follow the highly simplifying model of perfect competition, which drives down the prices of equivalent features to zero. It is clear that this analysis of a hypothetical price competition between patented features requires assumptions regarding the nature of the competitive process. The economic literature abounds with examples in which equally plausible assumptions regarding the competitive process lead to very different equilibrium outcomes.

Second, available empirical data provide only limited and partial information on the FRAND range. Courts use mainly two sources of empirical data to implement FRAND: product prices and the prices of comparable licenses. On the one hand, product prices, including the prices of end products and the prices of product components, may reveal information on the value added by the patented feature to the product or its components. Specifically, they may provide information on the contribution of the patented feature to the implementer's profits, determining the upper bound of the FRAND range. However, the prices of standard-compliant products (end products or components) provide no information on the other side of the FRAND range, which is determined by the patent holder's outside options and the cost of developing the patented feature. On the other hand, comparable licenses may signal an agreement that was acceptable to similarly situated parties, revealing one draw from the range of reasonable licenses: the negotiating parties found this to be an acceptable agreement, but there may have been many other potentially acceptable agreements. In short, neither product prices nor comparable licenses can reveal the entire FRAND range. In Microsoft v Motorola,[8] the court explicitly recognized the difficulty to infer the lower

7 In re Innovatio IP Ventures, LLC , 921 F. Supp. 2d 903 (N.D. Ill. 2013).

8 Microsoft Corp. v. Motorola, Inc., 854 F. Supp. 2d 993 (W.D. Wash. 2012); see the relevant order of Findings of Fact and Conclusions of Law by Judge James L. Robart, April 25, 2013, No. 10-cv-1823 (W.D. Wash.).

bound of the FRAND range from the available empirical information.

Third, even if there is reliable and conclusive information on the FRAND range, there is no commonly accepted methodology to single out a unique rate from this potentially very large range. For the purpose of theoretical research, economists often find it plausible (or at least convenient) to assume that the parties of an agreement equally split the surplus created by the agreement. According to this concept, the so-called Nash bargaining, the FRAND rate would be defined as the midpoint of the bargaining range of the hypothetical negotiation. In VirnetX v. Cisco Systems,[9] the Federal Circuit was however very clear that choosing the middle of the range is not an acceptable approximation unless parties can demonstrate that the assumptions underpinning the Nash bargaining are valid for the particular case at hand. In its earlier decision in Uniloc v. Microsoft,[10] the Federal Circuit had already vacated a similar simplifying rule, which asked to allocate 25 percentof the surplus created by the implementer's use of the patented feature to patent holders. Unfortunately, economics does not hold a commonly accepted alternative to Nash bargaining. Indeed, each rate within the bargaining range is an equilibrium outcome, i.e. a plausible outcome of the hypothetical negotiation.

IV. DIVERGENT APPROACHES IN THE IMPLEMENTATION OF FRAND

A. U.S.Approach – Emphasis on Royalty Rates

In light of the above-mentioned difficulties, it becomes increasingly clear that,despite an emerging consistent approach to the definition of FRAND, this definition does not often provide sufficient guidance for the determination of actual royalty rates in specific disputes. The U.S. courts have therefore developed additional methodologies and evidentiary rules for the determination of single FRAND rates. In particular, the outcome of FRAND disputes in the U.S. has been significantly determined by rules restricting both the choice of the royalty base and the selection criteria for comparable licenses. Rules or concepts such as the Entire Market Value Rule ("EMVR") or the Smallest Saleable Patent Practicing Unit ("SSPPU") have neither been specifically developed for FRAND cases nor do they have a clear link to the theoretical analysis of FRAND. The application of such restrictive evidentiary rules in the context of FRAND litigation is used to limit the number of accepted criteria for the determination of a FRAND rate, thereby significantly shrinking the FRAND range and – with it – the scope for disagreement on a rate. Our research, however, demonstrates that their application may be at odds with an economically consistent implementation of FRAND.

In particular, the concept of SSPPU commonly excludes references to end product prices in the determination of a royalty rate. Furthermore, references to comparable licenses are often excluded if these licenses were negotiated in the settlement of a legal dispute or under the threat of a prohibitive order. The judicially defined rates are therefore generally based on (1) the prices of infringing components, and (2) comparable licenses that were negotiated without a threat of prohibitive order. Both types of data are questionable indicators of the value of the patented feature.

Component prices can be a good indicator of the value of an end product maker's willingness to pay for a patent license; but only if the component is sold with significant market power. A component supplier with market power is able to extract from the end product maker a part of the surplus generated by using the patented technology. The rent extracted by the component maker is thus proportional to the contribution of the patented feature to the profit of the end product maker, which determines his willingness to pay to legally access the patented feature. If this condition is not met, and the component is manufactured by an unlicensed supplier in a competitive industry, the price of the component reflects the cost of producing the physical component, not the value of the patented feature that it implements (e.g. the price of a wireless communication chip reflects the cost of silicon instead of the value of a patented wireless technology).

Equally, comparable licenses can be a good indicator of a patented feature's value if they provide information on a standard user's willingness to pay to access the patented feature. However, a practice that excludes licenses negotiated under an implicit or explicit threat of prohibitive order undermines the usefulness of comparable licenses. The willingness to pay of an implementer who is already using the technology and faces no risk of a prohibitive order that would stop him from doing so does not reflect this implementer's valuation for the use of the technology. Rather, it reflects the implementer's belief about the infringement damages he may be obliged to pay. The implementer's willingness to pay in a licensing negotiation is thus determined by the expected amount of damages awarded by courts. Since these damages are themselves conditioned on the prevailing prices of licenses, there is a strict circularity, and comparable licenses lose their capacity to provide useful information about the value of the technology.

These evidentiary rules can thus enhance clarity to a certain degree, in the sense that they can increase the predictability of the outcome of litigation. This, however, comes at a significant cost. First, systematically applying evidentiary rules that are orthogonal to the well-founded theoretical principles of FRAND leads to royalty awards that are decoupled from the value of the technology, and fail to provide appropriate economic incentives to the parties. Second, by developing specific methodologies for calculating narrowly defined FRAND royalties, courts risk crowding out other means of settling dispute. It is unclear why an implementer would be willing to voluntarily enter into a licensing agreement on FRAND terms if the failure to do so can only result in a court order to pay the very same FRAND royalty rates.

9 VirnetX, Inc.v. Cisco Systems, Inc., 767 F.3d 1308 (Fed. Cir. 2014).

10 Uniloc USA, Inc. and Uniloc Singapore Private Limited v. Microsoft Corp., 632 F. 3d 1295 (Fed. Cir. 2011).

B. European Approach – Evaluation of Conduct

By contrast, courts in Europe and other jurisdictions have refrained from adopting the methodological view of their U.S. counterparts, leaving the actual determination of FRAND rates to the parties. Instead, they have taken on a different approach to the implementation of FRAND by examining the conduct of the parties during the bilateral negotiations and in the light of the specific FRAND commitments.

In 2015, the CJEU in Huawei v. ZTE[11] provided significant guidance to licensing parties and the courts regarding the meaning of FRAND in the context of preliminary injunctions. The national courts, predominantly the German courts in Düsseldorf, Mannheim and Karlsruhe, have followed through and tied the grant of injunctive relief to the conditions specified in the CJEU's proposed framework.[12] According to this interpretation, the FRAND obligation imposes certain limitations on the availability of injunctive relief against a willing licensee. Courts must thus determine on a case-by-case basis whether the conduct of the parties in the bilateral negotiation is conducive to the conclusion of an agreement. If this is the case, there is no need for courts to participate in the determination of a royalty rate; otherwise, courts may grant injunctive relief in order to bring an unwilling licensee back to the negotiation table.

Instead of developing tools that allow courts to specify royalty rates, the European case law opts for a set of conditions that assess the FRAND-compliance of the licensing parties during the conduct of negotiations. In particular, courts evaluate whether an SEP owner made a specific, written offer for a royalty rate, whether the alleged infringer's counteroffer took place in a timely manner, or whether an implementer who refused a patent holder's licensing offer demonstrated that he would readily enter into an acceptable licensing agreement (e.g. by paying accruing royalties into escrow), etc. Courts in Korea and Japan follow a similar approach.[13]

11 CJEU, Case C-170/13. Decision of July 16, 2015, Huawei v. ZTE.

12 Mannheim District Court, 2 O 103/14, Decision of March 10, 2015 - St Lawrence Communication v. Deutsche Telekom; Karlsruhe Court of Appeal, 6 U 44/15, April 23, 2015 - St Lawrence Communication v. Deutsche Telekom; Mannheim District Court, November 27, 2015, case nos. 2 O 106/14, 2 O 107/14, 2 O 108/14, St Lawrence Communication v. Deutsche Telekom; Düsseldorf District Court, Decisions of November 3, 2015 – 4a O 144/14 und 4a O 93/14 - Sisvel v. Haier; Düsseldorf Court of Appeal, Decisions of January 13, 2016 – 15 U 65/15 und 15 U 66/15 – Sisvel v. Haier; Mannheim District Court, January 29, 2016, 7 O 66/15 - NTT DoCoMo v. HTC; Düsseldorf District Court, March 31, 2016, 4a O 73/14 - St. Lawrence Communication v. Vodafone; Düsseldorf Court of Appeal, May 9, 2016, I-15 U35/16, 15 U35/16 – St Lawrence Communication v. Vodafone; Karlsruhe Court of Appeal, May 31, 2016, 6 U 55/16.

13 Seoul Central District Court, August 24, 2012, Case no. 2011 GaHap 39552, Samsung Electronics Co., Ltd. v. Apple Korea Ltd; Apple v. Samsung, IP High Court, Decision of May 16, 2014, Case No. 2013[Ne] 10043. This is an appeal case from a district court (Judgment of Tokyo District Court, February 28, 2013 [Case No. 2011 [Wa] 38969].

The converging practice to tie the grant of an injunctive relief to the conduct of both parties places emphasis on the good faith negotiations toward an actual result over the initial offer. Admittedly, the willingness of the parties and the conditions under which bilateral negotiations take place are subject to an evolving body of case law and it remains to be seen whether a unified framework will ultimately emerge. Nevertheless, this approach is flexible enough to allow for a wide span of licensing terms that pass the FRAND test, so that courts may shift focus more towards the FRAND-compliance of the parties' conduct during the negotiations rather than the actual outcome. In this respect, the fact that the implementation of FRAND does not lead to a unique royalty rate does not mean that it is void of legal content. On the contrary: the said approach recognizes that the idea of FRAND as a range also accommodates different interpretations regarding its economic function, allowing the parties to determine and substantiate the respectively proposed rates based on , objective criteria.

V. TOWARD A COMMON FRAMEWORK: IMPLEMENTING FRAND THROUGH BILATERAL NEGOTIATIONS

To sum up, our study reveals a growing consensus on the theoretical concepts that underpin the various FRAND licensing terms. Nevertheless, these concepts define a potentially large range of rates, and the practical implementation of the theoretical framework for FRAND is significantly constrained by the available empirical information. In light of these difficulties, we have observed two diverging approaches in the resolution of FRAND disputes by courts. In an attempt to fill in the gap between the royalty requests of SEP holders and the willingness to pay of potential licensees, the U.S. courts have responded by a number of additional rules, which narrowly circumscribe acceptable criteria for determining a single FRAND rate in the context of litigation. However, as discussed above, these rules fail to implement the theoretical principles of FRAND. By contrast, the European case law presents a promising alternative route by focusing on the conduct of the negotiating parties, thereby strengthening bilateral negotiations as the principal forum for determining royalty rates. Avoiding the manifold methodological problems of determining specific royalty rates, the European judges recognize that FRAND is a potentially large range that encompasses multiple FRAND-compliant rates, and sanction specific forms of conduct during negotiation.

In spite of the diverging approaches, our comprehensive review of the evolving case law reveals the importance of a clear definition of the theoretical concepts that delimitthe boundaries of a FRAND range. The U.S. courts have contributed to a clearer articulation of the theoretical meaning of the FRAND range through the analysis of a hypothetical ex-ante negotiation. Our analysis shows that the construct of a hypothetical ex-ante negotiation allows the integration ofthe various theoretical concepts defining FRAND. This is equally relevant for the European courts, which have focused on the conduct of the negotiating parties through the concept of "will-

ingness." In this ex-post context, the European judgemay still need a definition of the FRAND range to consider whether an SEP holder insisting on a specific royalty rate is complying with his obligation to offer licenses on FRAND terms, or whether an SEP holder is entitled to injunctive relief against a licensee refusing to pay more than a specific amount.

However, the implementation of the FRAND range in practice should not aim at the calculation of a single royalty – an effort that is proven to be at odds with economic considerations and the diversity of established legal traditions across the various jurisdictions. Against this background, the European approach, which ties the FRAND compliance to the conduct of the negotiating parties, is more likely to result in economically efficient royalty rates: it encourages parties to do their due diligence, and to negotiate licenses as early as possible by avoiding delaying tactics and opportunism. More clarity on FRAND is needed. Articulating a common set of criteria and guidelines for the practice– anchored in a clear definition of FRAND - has the potential to facilitate private negotiations and mitigate the need to seek a third-party determination of a FRAND rate. To that end, policy guidance pertaining to the various aspects of FRAND should focus on identifying behavior and rates that clearly fall outside the FRAND scope (i.e. define what is notFRAND), rather than supporting economic guideposts and evidentiary rules that isolate a single rate. As a range, FRAND has been able to accommodate various business models while facilitating worldwide access to standard-compliant products and services for millions of consumers and households. In this sense, FRAND is not "broken" or should be "fixed", but reflects the current market diversity and dynamics within an enlarged circle of stakeholders.

FRAND ARBITRATION: THE DETERMINATION OF FAIR, REASONABLE AND NON-DISCRIMINATORY RATES FOR SEPS BY ARBITRAL TRIBUNALS

BY DAMIEN GERADIN[1]

I. INTRODUCTION

Standard-setting activities, which aim to achieve device interoperability and product compatibility, play a fundamental role in fostering innovation and competition in a variety of markets.In the information technology ("IT") sector, standardization work is often carried out under the aegis of standard-setting organizations ("SSOs"),[2] such as ETSI[3] or IEEE.[4] Well known standards in the IT industry include mobile communication standards (such as 3G and 4G), Bluetooth, Ethernet, Wi-Fi, etc. Standards are implemented by manufacturers whose standard-compliant products compete with each other. There are, for instance, multiple manufacturers of smartphones and tablets that are compatible with the 3G and/or 4G standards.

Difficulties may, however, arise when the standard reads on multiple patents (standard-essential patents or ("SEPs")), which must therefore be licensed by companies manufacturing standard-compliant products ("standard implementers").[5] SSOs typically require that when one of its member firm active in the standardization process considers that it holds a patent that may be essential to the standard, it discloses it. Following disclosure, that firm will usually be requested to undertake in writing that it is prepared to grant irrevocable licenses on fair, reasonable and non-discriminatory ("FRAND") terms and conditions.[6]

At the core of most disputes concerning the licensing of SEPs lies the inability of the SEP holder and the standard implementer to agree on FRAND license terms. While the SEP holder typically seeks to obtain a license fee (generally a running royalty, although other forms of consideration may also be envisaged) that maximizes the value of its SEP portfolio, the standard implementer tries to pay a fee that is as low as possible as it represents a cost that will burden its products. In many instances, the parties are far apart in their negotiations and there is no magic formula that allows them to determine in a simple and objective manner what FRAND terms should be in the specific context of their relationship.

Traditionally, the SEP holder could break the deadlock by seeking an injunction against the standard implementer from a patent court.[7] As the injunction would generally have devastating effects

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2 See Mark Lemley, "Intellectual Property Rights and Standard-Setting Organizations," 90 (2002) California Law Review, 1889.

3 See http://www.etsi.org/.

4 See https://www.ieee.org/index.html.

5 For instance, smartphones can potentially violate thousands of SEPs. See Ann Armstrong, Joseph J. Mueller, and Timothy D. Syrett, The Smartphone Royalty Stack: Surveying Royalty Demands for the Components Within Modern Smartphones, available at: https://www.wilmerhale.com/uploadedFiles/Shared_Content/Editorial/Publications/Documents/The-Smartphone-Royalty-Stack-Armstrong-Mueller-Syrett.pdf.

6 See, e.g.Section 6.1 of ETSI's IPR Policy ETSI Intellectual Property Rights Policy, available at: www.etsi.org/images/files/ipr/etsi-ipr-policy.pdf. For a discussion of the FRAND commitment, see Damien Geradin, "Standardization and Technological Innovation: Some Reflections on Ex-ante Licensing, FRAND, and the Proper Means to Reward Innovators," 29 (2006) World Competition 511.

7 An injunction is a patent infringement remedy in the form of a court order that compels a party to stop infringing the patents. See Vincenzo Denicolo et al., Revisiting Injunctive Relief: Interpreting eBay in High-Tech Industries with Non-Practicing Patent Holders, (2008) 4 Journal of Competition Law and Economics 571. See also, James Ratliff and Daniel L. Rubinfeld, "The Use and Threat of Injunctions in the Rand Context,"9 (1) (2013) Journal of Competition Law & Economics, 2.

on the implementer's business (as the infringing products would have to be removed from the shelves), this could coerce the implementer into taking a license at terms that are acceptable to the SEP holder, but not necessarily to itself. Since the leverage created by the injunction triggers a risk of "hold-up,"[8] antitrust authorities,[9] courts[10] and SSOs,[11] have taken steps to strictly limit the circumstances in which SEP holders can validly seek an injunction to enforce its patents.[12] For instance, in its Huawei v. ZTE judgment, the Court of Justice of the European Union ("CJEU") developed a licensing framework that carefully circumscribes the circumstances in which an SEP holder can seek an injunction to enforce its patents without committing an abuse of a dominant position in breach of Article 102 of the Treaty on the Functioning of the European Union ("TFEU").[13]

When parties are unable to agree on FRAND terms and an injunction is unavailable to the SEP holder, an obvious way for the parties to break the deadlock is to have FRAND license terms determined by an independent third-party. Courts are obviously well placed to set FRAND terms and there are a growing number of judgments setting such terms.[14] But arbitral tribunals may represent an attractive alternative to court proceedings and a growing number of academics, agency officials and private practitioners have advocated arbitration of SEP-related disputes.[15] In my experience, parties to licensing disputes also increasingly resort to arbitration to set FRAND terms, although given the secrecy of arbitral proceedings this phenomenon is hard to quantify.

The growing interest in FRAND arbitration is unsurprising as this dispute settlement mechanism typically presents a number of advantages over court proceedings, including (i) discretion (arbitration proceedings and awards are not public); (ii) speed (it is generally possible to obtain an award in less than one year); (iii) expertise (parties can select experts in the relevant fields to serve as arbitrators), (iv) costs (although not cheap, arbitral proceedings can be less expensive that the multi-million trials before U.S. and UK courts),[16] and the (v) finality of the award (which avoids spending many years in court).[17]

Despite the growing enthusiasm for FRAND arbitration, there is hardly any literature discussing how arbitral proceedings to set FRAND terms work in practice, as well as the various challenges faced by arbitrators, parties and counsel involved in such proceedings. The purpose of this short paper is thus to discuss, based on my personal experience as counsel or expert in such proceedings, some of the main features of FRAND arbitration. This paper is not intended to be exhaustive. It is a modest attempt to bring some light on the ins and out of FRAND arbitration.

This paper is divided into five parts. Part II addresses an important policy question, which is whether SEP-related disputes should be subject to mandatory arbitration (as a requirement imposed by SSOs) or whether arbitration should remain one of the possible options open to the parties to settle such disputes. Parties

8 On "hold-up" see Mark Lemley and Carl Shapiro, "Patent Holdup and Royalty Stacking" (2007) 85 Texas Law Review, 1991; Mark R. Patterson, "Leveraging Information About Patents: Settlements, Portfolios, and Hold-ups," (2012) 50 Houston Law Review 483.

9 See, e.g.Case AT.39985, Motorola - Enforcement of Standard Essential Patents, 29 April 2014, C(2014) 2892 final; Case AT.39939, Samsung - Enforcement of UMTS Standard Essential Patents, 29 April 2014, C(2014) 2891 final.

10 See, e.g. C-170/13, Huawei v. ZTE, [2015] E.C.R-I 0000.

11 See IEEE - SA Standards Board Bylaws, Section 6, patents, available at: standards.ieee.org/develop/policies/bylaws/sect6-7.html.

12 There is considerable debate in the legal and economic literature over the prevalence of hold-up. While the majority of authors consider that hold-ups regularly occur, others consider that while hold-up is theoretically possible it rarely occurs in practice. Compare, for instance, Lemley and Shapiro, supra note 8with Kirti Gupta, "The Patent Policy Debate in the Real World," 9 (2013) Journal of Competition Law & Economics 827.

13 C-170/13, supra note 10. It is important to note that the judgment also places obligations on the standard implementer that need to be met it wants to avoid an injunction.

14 See, e.g.Microsoft v. Motorola, 2013 WL 2111217 at *12 (W.D. Wash. Apr. 25, 2013); In re Innovatio IP Ventures, LLC Patent Litig., 2013 WL 5593609 at *8-10 (N.D. Ill. Oct. 3, 2013).

15 See the references cited in Jorge L. Contreras and David L. Newman, "Developing a Framework for Arbitrating Standards-Essential Patent Disputes," 2014 Journal of Dispute Resolution 23, at 23.

16 That is the case when the parties mutually agree to limit production and depositions.

17 See, e.g.2015 EU Commission's Public Consultation on Patents and Standards - A Modern Framework for Standardisation Involving Intellectual Property Rights Summary Report, available at: file:///C:/Users/Utente/Downloads/Public%20consultation%20report%2027-10.pdf ("A large number of respondents (thirty eight) pointed out that ADR can provide benefits for both parties when deciding on FRAND rates. It is often faster and less costly than court litigation, although some pointed out that this was not always the case. A particular benefit mentioned was also that ADR can provide global portfolio and freedom-to operate arrangements between companies, while litigation is nearly always limited to one jurisdiction and to a small selection of patents. The confidential nature of arbitration was mentioned as an interesting feature that can lead to efficient dispute resolution. Others however argued that the outcome should be made public to facilitate benchmarking. Stakeholders noted the benefit of specialist arbitrators familiar with the complexity of SEP disputes.")

Arbitration is often considered to enjoy "seven advantages" over court litigation: speed, flexibility, confidentiality, cost, enforceability, expertise and informality. See Peter J. Rees, "Chapter II: The Arbitrator and the Arbitration Procedure, Does Arbitration Deliver?," in Christian Klausegger, Peter Klein et al. (eds), Austrian Yearbook on International Arbitration 2016, 51; Christian Bühring-Uhle et al., Arbitration and Mediation in International Business (Second Edition), International Arbitration Law Library, Volume 13 (Kluwer Law International 2006), 108;Julian J.D.M. Lew and Lukas A. Mistelis, Comparative International Commercial Arbitration, (Kluwer Law International 2003), 5; Gary B. Born, "Chapter 1: Introduction to International Arbitration" in Born G.B., International Arbitration: Law and Practice (Second Edition), (Kluwer Law International 2015), at para. 1.02.

should be free to opt for arbitration, as well as to select the key procedural features of the arbitration. Part III discusses the various initial steps that parties wishing to have FRAND licensing terms determined by arbitration need to take, i.e. the adoption of the arbitration agreement, the preparation of a draft licensing agreement and the setting up of the arbitral tribunal. Part IV exposes the various methodologies that can be used by the parties and the arbitrators to calculate FRAND licensing rates and discusses their respective pros and cons. Part V discusses the enforcement of the award. One of the advantages of arbitral proceedings is that the award is not subject to an appeal. Arbitral awards may nevertheless be declared invalid or unenforceable in a limited set of circumstances. Finally, Part VI contains a short conclusion.

II. SHOULD ARBITRATION OF SEP-RELATED DISPUTES BE MANDATORY?

In the past few years there has been a large amount of litigation involving SEPs, especially in the IT sector. Frequent high-stake disputes have arisen between SEP holders and manufacturers of mobile communications devices, such as smartphones and tablets.[18] These disputes usually revolve over what the FRAND commitment made by SEP holders to the relevant SSO means in concrete terms.

Most observers agree that FRAND commitments have a dual objective: (i) to ensure the ability of standard implementers to bring products to market without impediment as long as they are willing to pay fair and reasonable compensation to the SEP holders and, conversely, (ii) to ensure that companies which have developed the technologies that are included in the standard receive fair and reasonable rewards for their research and development efforts. But beyond this, what FRAND licensing terms mean in practice is subject to considerable disagreement and, as a result, protracted litigation.

It is against that background that Lemley and Shapiro argued, in a paper published in 2013,[19] that based on set of procedural rules to be developed, SSOs should subject their members to mandatory arbitration of their SEP-related disputes.[20] More specifically, when an SEP holder and a standard implementer are unable to agree on licensing terms, the SEP holder would be compelled to enter into so-called "final offer" arbitration (also known as "baseball-style" arbitration)[21] with any willing licensee to determine the FRAND rate. As, under this type of arbitration, the arbitrator has to pick exclusively one of the two final offers made by the parties to the disputes, Lemley and Shapiro reason that this would force the parties to make reasonable offers, hence narrowing the large gap that traditionally exists between the respective offers of the SEP holder and the implementer. This proposal has been harshly criticized in two academic papers, which consider that, despite its attractive simplicity, this proposal had multiple disadvantages, including in particular the risk that it would systematically undercompensate SEP holders, hence weakening the standardization process.[22]

Although a full discussion of the Lemley/Shapiro proposal goes beyond the scope of this paper, the imposition of mandatory "final offer" arbitration by SSOs is not desirable for the following reasons. First, the parties should have the freedom to select arbitration or court litigation. There may be instances where court litigation may be the preferred option, for instance because the parties also disagree on whether the patents at stake are valid and infringed in which case these issues may be better dealt with by a specialized patent court rather than arbitrators. Second, while final offer arbitration may be appropriate in certain circumstances, such as in salary disputes between baseball teams and their players,[23] it may not be well suited to SEP-related disputes. If the goal is to ensure that SEPs are licensed at FRAND terms, there is no reason to believe that the two final offers made by the parties, among which the arbitrators are bound to choose, will necessarily be FRAND. It is preferable to allow the arbitrators to decide, based on the evidence provided by the parties, the license terms they believe to be FRAND. Finally, as will be seen in Part III below, one of the merits of international arbitration is the great freedom it gives to the parties to select the arbitral institution, the seat of the arbitration, etc. and thus tailor the procedure to their needs. Imposing on the parties the procedural framework chosen by the SSO would largely eliminate this freedom without necessarily offering any countervailing efficiency.

18 The so-called smartphone patent war has triggered dozens of lawsuits across the world. See Marissa Oberlander, Martin Stabe and Steve Bernard, The Smartphone Patent Wars, Financial Times, October 17, 2011, available at: www.ft.com/cms/s/2/de24f970-f8d0-11e0-a5f7-00144feab49a.html#axzz4IQ9rTmoE.

19 See Mark Lemley and Carl Shapiro, "A Simple Approach to Setting Reasonable Royalties for Standard Essential Patents," 28 (2013) Berkeley Technology Law Journal 1138.

20 Note that several SSOs already provide for arbitration of SEP-related disputes. See, e.g.the Digital Video Broadcasting ("DVB") Project's Memorandum of Understanding requires its members to resolve all disputes related to the licensing of DVB Standards under the ICC arbitration rules. See Article 14(7) of the MOU, available at: https://www.dvb.org/resources/public/documents_site/dvb_mou.pdf. Similarly, the VMEbus International Trade Association ("VITA")'s IPR Policy provides for an arbitration procedure to resolve disputes among its members. See Section 10.5 of the VSO Policies and Procedures, available at: www.vita.com/resources/Documents/Policies/vso-pp-r2d8.pdf. It seems, however, that these procedures have, so far, not been used. See Contreras and Newman, supra note 15, at 30-31.

21 See Christian Borris, "Final Offer Arbitration from a Civil Law Perspective," 24 (2007) Journal of International Arbitration 307; Irene Welser and Alexandra Stoffl, "Chapter II: The Arbitrator and the Arbitration Procedure, Calderbank Letters and Baseball Arbitration – Effective Settlement Techniques?" in Christian Klausegger, Peter Klein et al. (eds), Austrian Yearbook on International Arbitration 2016, 87.

22 See, e.g.Pierre Larouche et al., "Settling FRAND Disputes: Is Mandatory Arbitration a Reasonable and Non-Discriminatory Alternative?," 10 (2014) Journal of Competition Law & Economics, 581; J. Gregory Sidak, "Mandating Final-Offer Arbitration of FRAND Royalties for Standard-Essential Patents," 18 (2015) Stanford Technology Law Review 1.

23 See Sidak, supra note 22, at 10.

III. ARBITRATION AGREEMENT, DRAFT LICENSE AGREEMENT AND THE TRIBUNAL CONSTITUTION

As already noted, one of the advantages of commercial arbitration is that the parties can agree on the modalities of the proceedings by concluding an "arbitration agreement," which will usually specify the key procedural aspects of the arbitration: ad hoc or institutional arbitration, the arbitral institution that will administer the proceeding (ICC, LCIA, etc.) if they elect institutional arbitration, the seat of the arbitration, the applicable law(s), the scope of the arbitration (i.e. the mission that is entrusted to the arbitrators), the rules on the taking of evidence, confidentiality measures, etc. In other words, arbitration is a "creature of contract," which can be negotiated by the parties.[24]

In addition to the arbitration agreement, the parties may also decide to conclude a draft license agreement, which spells out the elements of the license on which the parties are able to agree, leaving empty spaces for the elements on which they are unable to agree (usually the license fee) that will have to be completed by the arbitrators. The advantage of this approach is that it helps identify the elements of the license on which the parties agree and those for which they need the assistance of the arbitrators. It also makes the license executable once the arbitrators have ruled on the terms they were asked to settle without further negotiation needed. In addition, the parties may also provide some guidance to the arbitral tribunal by, for instance, writing some comments in the margin of the draft license agreement (which can clarify the aspects on which the parties disagree, as well as the respective positions of the parties on how the empty spaces should be filled).

Once the parties have the arbitration agreement on the draft license agreement in place, the arbitral tribunal has to be composed. In arbitral proceedings conducted under the 2012 ICC Arbitration Rules, where the arbitral tribunal is composed of three arbitrators (which is usually the case in high-stake proceedings, such as FRAND arbitration), each party will appoint one of the arbitrators and the ICC Court will appoint the third arbitrator that will serve as president of the arbitral tribunal, unless the parties have agreed upon another procedure for such appointment.[25]

Various elements are generally taken into consideration when the parties select "their" arbitrator: (i) whether it is better to appoint a generalist arbitrator or a specialist in IP matters; (ii) whom among the various candidates they have in mind is the most likely to be favorable to their position (for instance, when academics are considered, the parties will typically review their relevant writings); (iii) the overall reputation of these people and their ability to communicate effectively with the other arbitrators.[26] While the arbitrators chosen by the parties act independently,[27] the parties will usually try to identify an individual who is not only competent, but who will also give a fair hearing to their position.

The best arbitrators for FRAND proceedings are not necessarily those who have prior experience with SEP matters or even more generally IP-related matters. However, a skill that seriously helps in FRAND cases is for the arbitrators to be reasonably good with numbers as they will have to review fairly sophisticated expert witness statements describing manners in which parties have calculated their proposed FRAND rate. For instance, experience in rate-setting in other industries or in the setting of damages more generally is an asset. In this respect the advantage of having a tribunal with three arbitrators, as is generally the case in such proceedings, is they can effectively combine different skills.

In parallel with the formation of the arbitral tribunal or once the tribunal is in place, the parties will typically draw their list of experts, including technical experts (who will be asked to assess the strength of the SEP holder's portfolio), economic experts (who will advise on the economic meaning of FRAND),[28] forensic accountants (who will calculate the FRAND rate based on the methodologies selected by the parties they represent, although this work can also be done by economic experts) and in some cases standardization experts (opining, for instance, on the circumstances surrounding the adoption of a given standard). These experts will typically be asked to prepare statements expressing their views (with usually at least two rounds of statements so that the experts appointed by

24 See, Siegel v. Lewis, 40 N.Y.2d 687 (1976): "commercial arbitration is a creature of contract. Parties, by agreement, may substitute a different method for the adjudication of their disputes than those which would otherwise be available to them in public courts of law." See also Katz v. Feinberg, 290 F.3d 95 (2d Cir. 2002) and Edstrom Indus., Inc. v. Companion Life Ins. Co., 516 F.3d 546, 552 (7th Cir. 2008): "precisely because arbitration is a creature of contract, the arbitrator cannot disregard the lawful directions the parties have given them."

25 See, 2012 ICC Arbitration Rules, (2012), Arts. 11 to 15. Available at file:///C:/Users/Utente/Downloads/ICC%20865-2%20ENG%20Arbitration_Mediation%20Rules%20(4).pdf. See also, "Chapter 3: Arbitral Proceedings Under The ICC Rules of Arbitration of 2012," in Verbist H., Schäfer S., et al., ICC Arbitration in Practice (Second Edition), (Kluwer Law International 2015), pp. 23 et seq.

26 This list of factors is not exhaustive and parties may have different priorities in their appointment strategy.

27 See "Chapter 4: The Standard of Impartiality and Independence," in Alfonso Gomez-Acebo, Party-Appointed Arbitrators in International Commercial Arbitration (Kluwer Law International 2016), 69; Jacques Werner, "Editorial: The Independence of Party-Appointed Arbitrators: for a Rule of Reason," 7 (1990) Journal of International Arbitration 5.

28 Many leading economists have published on the economics of FRAND. See, e.g.Richard Gilbert, "Deal or No Deal? Licensing Negotiations in Standard-Setting Organizations," 77 (2011) Antitrust Law Journal 855; See Dennis W. Carlton and Allan L. Shampine, "An Economic Interpretation of FRAND," (2013) 9 Journal of Competition Law & Economics, 531; Daniel G. Swanson and William J. Baumol, "Reasonable and Nondiscriminatory (RAND) Royalties, Standards Selection, and Control of Market Power" (2005) 73 Antitrust Law Journal 1.

the parties can respond to each other's views), and testify at the arbitral hearings.[29] The challenge for the parties and their experts is that they need to explain in layman terms the various technical and economic considerations that support their proposed FRAND rates. In any event, issues that remain obscure can be clarified during the hearings.

Depending on the specific rules of evidence, parties will typically have to disclose a variety of documents, such as past licenses, statements made on the issues at stake in the arbitration, etc. Confidential documents will be subject to protective orders.

IV. THE DETERMINATION OF FRAND LICENSING TERMS

Unless the parties decide to go for "baseball-style arbitration," the arbitrators asked to set the license fee (in this case, let us assume a "royalty rate") have the freedom to adopt one of the rates proposed by the parties or a different rate provided it is FRAND. In their briefs and their expert witness statements, the parties typically rely on one or several calculation methodologies to support their proposed FRAND rate.[30] In my experience, excessively complex calculation methodologies will not go down well with arbitrators if only because they will not want to embrace a methodology that they fail to fully understand.

There is a fairly wide consensus among economists that FRAND rates should correspond to the rates that would result from ex-ante (before the adoption of the standard) competition between the selected technology (which is covered by the SEPs in question) and alternative technological solutions. In other words, economists consider that a FRAND rate should not exceed the price of the next best alternative plus the incremental value contributed by the patented technology.[31] Such a rate would be capped to the inherent economic value of the patented technology and thus deprive the SEP holder from the rents created by the lock-in effect that is created by the insertion of a patent in the standard in question (also often referred to as "hold up" value).[32] Because it is extremely difficult, if at all possible, to determine what ex-ante rate would have prevailed from technological competition at the time of standardization, this approach – although perhaps a useful theoretical benchmark – is not a convenient method to determine a FRAND rate.[33]

A more practical method to determine a FRAND rate is to infer that rate from the rates or other forms of consideration included in "comparable" licenses. It is, for instance, regularly the case that the SEP holder has already concluded one or several license agreements with other standard implementers covering part or the whole of its portfolio of SEPs.[34] The challenge, however, in this case is to ensure that the licenses that are used as a benchmark to calculate the FRAND rate in the proceedings in question are sufficiently comparable to the license that the parties are seeking to conclude. This is important for at least two reasons.

First, it stands to reason that past licenses that are too different from the license that the parties are seeking to conclude (because of the scope of the past licenses is different, the legal and market circumstances in which they were concluded differ, etc.) will not represent credible benchmarks for FRAND rate determination purposes. Differences between licensing agreements can, however, often be addressed through the calculation of their "effective rate," i.e. the rate that is – all things being equal – effectively paid by the implementer to the SEP holder. For instance, a license agreement whereby the implementer agrees to pay to the SEP holder a lump sum fee of $100 million combined with a $0.1 per unit fee can, through economic adjustments, be boiled down to a given royalty rate (e.g., 0.2 percentof average sales price). Differences in the scope of the license, the presence or absence of a cross-license, etc., can also be factored in the calculation of the effective rates that are comprised in the licenses that are used as benchmarks. In this sense, past licenses may be useful benchmarks when economic adjustments accounting for such differences can reasonably be made.

Second, the principle of non-discrimination is an integral part of the FRAND commitment.[35] The "ND" of FRAND is necessary to

29 The so-called "hot tubbing" technique, also known as "witness conferencing" or "concurrent evidence," is nowadays often used by arbitral tribunals to trigger a discussion between party appointed experts. See, e.g.GordonBlanke and Thomas Eilmansberger, "Chapter 9: The Role of the Expert Witness in Antitrust Arbitrations," in G. Blanke and P. Landolt (eds), EU and US Antitrust Arbitration: A Handbook for Practitioners, (Kluwer Law International 2011), 288.

30 There is an abundant legal and economic literature on such methodologies. See, e.g.J. Gregory Sidak, The meaning of FRAND, Part I: Royalties, 9 (2015) Journal of Competition Law & Economics 931; Gregory K. Leonard and Mario A. Lopez, "Determining RAND Royalty Rates for Standard Essential Patents," (29) 2014 Antitrust 86.

31 See, e.g.Joseph Farrell et al., "Standard Setting, Patents, and Hold-Up" (2007) 74 Antitrust Law Journal 603. For a different view, see Richard A. Epstein et al., "The FTC, IP, and SSOs: Government Hold-up Replacing Private Coordination, 8 (2012) Journal of Competition Law & Economics 1, 3.

32 Norman Siebrasse and Thomas F. Cotter, "The Value of the Standard," July 2015, available at: papers.ssrn.com/sol3/papers.cfm?abstract_id=2636445.

33 See Microsoft v. Motorola, supra note 14, at *79 ("In practice, approaches linking the value of a patent to its incremental contribution to a standard are hard to implement. Calculating incremental value for multipatent standards 'gets very complicated, because when you take one patent out of a standard and put another one in you may make other changes, the performance of the standard is multidimensional, different people value different aspects.'")

34 That is the case because, at least in theory, all standard implementers need to take a license from the SEP holder. SEP holders seeking to monetize their patents will thus usually license them to multiple implementers.

35 Generally, on non-discrimination, see Dennis W. Carlton and Allan L. Shampine, "Identifying Benchmarks for Applying Non-Discrimination in FRAND,"CPI Antitrust Chronicle, August 2014 (1), available at: https://

ensure that a standard implementer is not commercially penalized by having to pay a higher license fee to an SEP holder than other similarly-situated standard implementers with which it competes on downstream product markets (e.g. computers, tablets, smartphones, etc.). The principle of non-discrimination does not require that similarly-situated standard implementers to pay exactly the same rate (as it could amount to discrimination in the presence of differences between the licenses that are considered), but the same "effective rate."

In addition to looking at comparable licenses, the parties may also look at patent pools.[36] In certain circumstances, SEP holders, which are not interested in developing an individual licensing program, may decide to place their patents into a pool, which will be collectively licensed against a fee. Although the licensing fee charged by the pool may be a helpful element of information, pools may not always form reliable benchmarks.[37] That is, for instance, the case when most of the key SEP holders are not part of the pool, which only comprise a small number of patents. In some cases, the pool may also be formed by SEP holders with major manufacturing operations, which may be mainly interested in holding royalty expenses as low as possible. In that case, the pool rate may be too low.[38]

In the absence of comparable licenses or relevant patent pools, other methodologies can be used to calculate the FRAND rate. One such method, generally referred to as "top down,"[39] consists in determining the cumulative royalty burden associated with the licensing of the total number of SEPs that should apply to the products in question[40] and then allocating this cumulative royalty burden among the different SEP holders based on one or several criteria. The logic of this approach is that a FRAND rate must at the same time consider (i) the large number of patent holders and patents typically incorporated into the standard and (ii) the specific contribution to the standard of the patented technology developed by the SEP holder in question. While this methodology or some of its variations are regularly used by parties involved in FRAND proceedings, they nevertheless raise a series of challenges.

First, it is not necessarily easy to determine on what basis the cumulative royalty rates should be set.[41] Should it be set at 5 percent, 10 percentor more of the value (the average sales price) of the relevant product(s)? From an ex-ante perspective, the maximum possible royalty burden should be limited to the total economic profits the manufacturers expected from the standard-compliant products.[42] The calculation of these economic profits would take into account the other factors of production needed to bring these products to markets (design, manufacturing, transport, marketing, etc.).[43] In some circumstances, the maximum royalty burden can be informed by statements from the SEP holder in question or the industry generally as to what a reasonable cumulative rate should be.[44] The SEP holder may, for instance, have declared at the time of standardization that the cumulative royalty rate should be set at 5 percent.[45] Short of a better method, that statement may be used to set the cumulative royalty rate.

Second, assuming a cumulative royalty rate set at 5 percent, one needs to "allocate" it between the various SEP holders. The simplest, but also the least accurate, allocation method is to assume that all SEPs have the same value ("numerical proportionality"). To take a simple example, if there are 1,000 SEPs to the relevant standard and the SEP holder involved in the proceedings holds 100 SEPs, that SEP holder should be allowed to charge a 0.5 percent royalty rate to the licensing. The reality, however, is that not all SEPs have the same

www.competitionpolicyinternational.com/assets/Uploads/CarltonShampineAUG-141.pdf.

36 A patent pool is an agreement between two or more patent owners to license one or more of their patents to one another or to third parties. For an example of a patent pool comprising SEPs, see Via Licensing's LTE patent pool, available at: http://www.via-corp.com/licensing/lte/index.html.

37 See Microsoft v. Motorola, supra note 14, at *80.

38 Anne Layne-Farrar and Koren W. Wong-Ervin, Methodologies for Calculating FRAND Royalty Rates and Damages: An Analysis of Existing Case Law, Law 360, October 2014, papers.ssrn.com/sol3/papers.cfm?abstract_id=2668623.

39 For a discussion of this approach, see Leonard and Lopez, supra note 30.

40 This first apportionment step separates the value associated with all SEPs to the standard at issue and distinguishes that value from the value attributable to other factors.

41 Another important issue relates to where in the manufacturing chain (the end product or a component of the end product) the aggregate royalty burden should be applied. In other words, what should be the royalty base on which the royalty rate would apply. While some argue that the end user device (e.g. the smartphone) should form the royalty base, others consider that the royalty should be applied on the smallest patent practicing unit ("SSPPU"), i.e. the smallest product sold in the marketplace that applies the substantive aspects of the patent-protected invention.On this issue, see Damien Geradin and Anne Layne-Farrar, "Patent Value Apportionment Rules for Complex, Multi-Patent Products," 27 (2012) Santa Clara High Technology Law Journal, 763 (2012).

42 See Leonard and Lopez, supra note 30, at 89.

43 Id.

44 For instance, when 3G was first being commercialized, Nokia, NTT DoCoMo, Siemens, and Ericsson expressed a "mutual understanding" to license SEPs such that the cumulative royalty rate for WCDMA technology would be "at a modest single digit level." See "Industry leaders NTT DoCoMo, Ericsson, Nokia and Siemens, and Japanese manufacturers reach a mutual understanding to support modest royalty rates for the WCDMA technology worldwide," Nokia Press Release, November 6, 2002, available at: http://company.nokia.com/en/news/press-releases/2002/11/06/industry-leaders-ntt-docomo-ericsson-nokia-and-siemens-and-japanese-manufacturers-reach-a-mutual-understanding-to-support-modest-royalty-rates-for-the-w-cdma-technology-worldwide.

45 See, e.g."Nokia advocates industry-wide commitment to 5% cumulative IPR royalty for WCDMA,"Press Release,May 8,2002,available at: http://company.nokia.com/en/news/press-releases/2002/05/08/nokia-advocates-industry-wide-commitment-to-5-cumulative-ipr-royalty-for-wcdma.

value and that independently of their numerical size some portfolios may be more valuable than others due to the technical strength of the patents they comprehend.[46]

Various methods can be used by the parties to the proceedings in order to account for differences in value between SEPs. The parties can, for instance, hire technical experts and ask them to determine based on a technical assessment of the SEPs in question whether they are on average stronger/weaker than the other SEPs than need to be licensed and, if so, by which factor. The issue is that determining the strengths of the set of SEPs is often a matter of perspective and the experts hired by the parties will often have different views.

In that context, the parties may decide to rely on various proxies to determine the strength of the SEPs in question. For instance, economists regularly use "forward citations" as an indication of a patent's value.[47] Forward citation analysis is a method used to assess relative patent value by examining the number of times a patent is cited as "prior art" by a later patent.[48] The economic logic behind this method is that a patent that is more important should be expected to be at the source of a greater number of future innovations that then cite back to the patent in question. Another proxy that can be used to assess the value of an SEP portfolio is to look at the number of "approved contributions" by the holder of the SEPs in question.[49] The rationale for using this proxy is that there is a correlative relationship between the number of approved contributions obtained by a patent holder and the number of truly essential patents contained in its patent portfolio. Looking at the number of "approved contributions" may thus help determining the percentage of truly-essential patents in a portfolio.

Of course, the list of FRAND rates calculation methodologies discussed above is not intended to be exhaustive, and new methods – or variations of existing methods – will certainly emerge given the creativity of economic experts.

46 Economic research has shown that in the IT industry the distribution of value among patents is highly skewed, i.e. most of the value is concentrated in a small number of patents (i.e.the top 1-5 percent). On this issue, see Mark Shankerman, "How Valuable is Patent Protection? Estimates by Technology Field," 29 (1998) Rand Journal of Economics, 77.

47 See, e.g.Nathan Falk and Kenneth Train, "Patent Valuation with Forecasts of Forward Citations," February 2016, available at: eml.berkeley.edu/~train/patents.pdf.

48 On citation analysis, see, e.g.Dietmar Harhoff, et al., "Citation Frequency and the Value of Patented Inventions," 81 (1999) Review of Economics and Statistics 511; Mark Schankerman, "How valuable is patent protection? Estimates by technology field," 29 (1998) RAND Journal of Economics, 77.

49 A "contribution" consists of a technological invention, submitted to a working group in a standards-setting organization ("SDO"), aiming to address a technical problem within a particular standard. The contribution is "approved"when the SDO votes (by consensus) to incorporate the comments or suggestions contained within the contribution in the standard.

V. ENFORCING THE AWARD

A significant advantage of arbitration over court proceedings when it comes to settling licensing disputes once and for all is that arbitral awards cannot be appealed (i.e. the review of the decision on the merits of the case is not, in most cases, permitted). Arbitral awards are indeed final.[50] That being said, it remains possible for the party aggrieved by the award to have it set aside (annulled) by the courts of the seat of arbitration or declared unenforceable by the courts of the place where the enforcement is sought on the basis of a narrow set of grounds.

National arbitration laws based on the UNCITRAL Model Law[51] (as well as the vast majority of arbitration laws not based on the Model Law) contain a provision on the basis of which arbitral awards can be set aside by national courts of the place where the arbitral tribunal was seated on the ground of lack of a fair and due process, the non-arbitrability of the subject-matter of the dispute or for the incompatibility of the award with public policy rules.[52] Similarly, Article V of the "Convention on the Recognition and Enforcement of Foreign Arbitral Awards" (the "New York Convention")[53] provides for a set of procedural and substantive grounds on which international arbitral awards may be refused enforcement. In particular, under Article V(2)(b), an award whose enforcement is contrary to the public policy rules of the country where the enforcement is sought may be declared unenforceable by the courts of such country.

In Eco-Swiss v. Benetton,[54] the CJEU established that the provisions of Article 101 TFEU must be regarded as rules of public policy within the meaning of Article V of the New York Convention and that "where its domestic rules of procedure require a national court to grant an application for annulment of an arbitration award where such an application is founded on failure to observe national rules of public policy, it must also grant such an application where it is founded on failure to comply with the prohibition laid down in

50 On the finality of arbitral awards see, Jean Thieffry, "The Finality of Awards in International Arbitration," 2 (1985) Journal of International Arbitration, 27; Alexis Mourre and Luca G. Radicati di Brozolo, "Towards Finality of Arbitral Awards: Two Steps Forward and One Step Back," 23 (2006), Journal of International Arbitration, 171.

51 United Nations Commission on International Trade Law, "UNCITRAL Model Law on International Commercial Arbitration 1985 with amendments as adopted in 2006."

52 See Article 34 of the UNCITRAL Model Law, available at: http://www.uncitral.org/uncitral/en/uncitral_texts/arbitration/1985Model_arbitration.html.

53 See Article V of the New York Convention, available at: http://www.uncitral.org/uncitral/en/uncitral_texts/arbitration/NYConvention.html.

54 Case C-126/97, Eco Swiss China Time Ltd v. Benetton International NV, [1999] I-03055. See also, Damien Geradin, Public Policy and Breach of Competition Law in International Arbitration: A Competition Law Practitioner's Viewpoint, available at:http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2786370.

Article [101(1) TFEU]."[55]

In addition, in its Notice on the co-operation between the Commission and the courts of the EU Member States in the application of Articles 81 and 82 EC (now 101 and 102 TFEU), the European commission confirmed that article 102 TFEU was also a matter of public policy.[56] This means that awards that would breach public policy on the grounds that they violate Article 102 TFEU (because, for instance, the royalty rates set by the tribunal would be discriminatory) could in principle be declared unenforceable or set aside by the reviewing court.

Whether a party trying to set aside or block the enforcement of the award will succeed depends not only on the facts of the case but also on the standard of review applied by the reviewing court. Some domestic courts have, for instance, adopted a minimalist approach giving a great deal of deference to arbitral awards and limiting their intervention to situations where the award "blatantly" violates competition rules.[57] In that case, it would be almost impossible for the standard implementer to demonstrate that an award violates EU competition rules given the inherent complexity of FRAND arbitration. In its opinion in the Genentech case,[58] however, Advocate General Wathelet observed that such a superficial review of arbitral awards is contrary to the effectiveness of EU law.[59] The CJEU did not take position on this issue, hence leaving it unaddressed.[60]

VI. CONCLUSION

Arbitral proceedings represent an efficient and, in principle, definitive method to settle licensing disputes involving SEPs. Such proceedings are well suited to hearing the evidence that needs to be presented by the parties to allow third-party determination of FRAND rates. For these reasons, I expect FRAND arbitration to continue to grow in the years to come.

55 Case C-126/97, Eco Swiss China Time Ltd v. Benetton International NV, supra note 54, at § 37.

56 The European Commission has expressly confirmed that Article 102 TFEU is part of international public policy: "[…] it should be remembered that [Article 101 TFEU] and [Article 102 TFEU] EC are a matter of public policy and are essential to the accomplishment of the tasks entrusted to the Community, and in particular, for the functioning of the internal market." Commission Notice on the co-operation between the Commission and the courts of the EU Member States in the application of Articles 81 and 82 EC, OJ C 101, 27.4.2004, at § II-A-3.

57 On the minimalist or maximalist approach towards the standard of review of arbitral awards see also, Gordon Blanke, "The 'Minimalist' and 'Maximalist' Approach to Reviewing Competition Law Awards: A Never-Ending Saga Revisited or the Middle Way at Last?," in Devin Bray and Heather Bray (eds.), PostHearing Issues in International Arbitration, Juris Publishing, 2013, 169, at 185; Gordon Blanke, "Defining the Limits of Scrutiny of Awards Based on Alleged Violations of European Competition Law," 23 (2006) Journal of International Arbitration, 249; Pierre Mayer, "The Second Look Doctrine: The European Perspective," 21 (2010) American Review of International Arbitration 201.

58 Opinion of AG Wathelet delivered on 17 March 2016, Case C-567/14, Genentech Inc. v. Hoechst GmbH, formerly Hoechst AG, Sanofi-Aventis Deutschland GmbH, [2016] E.C.R I-000.

59 Id. at § 58.

60 Case C-567/14, supra note 58.

ON THE PRACTICAL IRRELEVANCE AND THEORETICAL INADEQUACY OF THE ROYALTY-STACKING BENCHMARK IN STANDARD-ESSENTIAL PATENT NEGOTIATIONS

BY GERARD LLOBET & JORGE PADILLA[1]

I. INTRODUCTION

In recent years technological standards have become more and more prevalent. Many new high-tech products, such as smartphones and tablets, are extremely complex, as they embed a great variety of technologies that are contributed by a large number of firms. Furthermore, the need to make the complex products sold by different manufacturers interoperable has pushed manufacturers to cooperate with technology developers in the creation of standards. Typically, this coordination takes place within Standard Development Organizations ("SDOs"). One of the purposes of an SDO is to facilitate the development of the best technology for each of the aspects of the standards and coordinate that development with the other technologies being adopted. Because most of these technologies are patented, their developers are entitled to receive a remuneration for the licensing of their standard essential patents ("SEPs") in the form of a royalty payment.

The licensing of SEPs has become a controversial issue. Some companies, IP practitioners and scholars argue that SEP holders are over-rewarded as a result of what they call "patent hold-up" and "royalty stacking."

Those that argue patent hold-up is a problem consider that all that standardization bodies do is "select" one among several technologies to become part of the standard.[2] In doing so they argue, standard setting organizations ("SSOs") create de facto monopolists in a context where before there was none. We note that, unlike traditional SSOs, modern SDOs, such as the European Telecommunications Standards Institute, do not limit themselves to select among extant technologies but often coordinate the development of new technologies for which there is no alternative. SDOs, unlike SSOs, do not create market power, which may explain why no one has yet produced evidence of patent hold-up in the case of technologies developed by modern SDOs.

Royalty stacking is the focus of this brief paper. The concept of royalty stacking is based on a well-known idea in economics, denoted the Cournot complements problem,[3] and it applies to any context in which firms sell complementary goods. As an illustration of this phenomenon, consider the case of a firm that has a monopoly both in toothbrushes and toothpaste. Both goods are complementary because the demand for one product drives the demand

1 Gerard Llobet is associate professor at CEMFI and CEPR Research Fellow. Jorge Padilla is Senior Manager Director and Head of Compass Lexecon Europe.

2 Mark A. Lemley & Carl Shapiro, Patent Holdup and Royalty Stacking, 85 Texas Law Review 1991 (2007).

3 Augustin Cournot, Researches into the Mathematical Principles of the Theory of Wealth (Nathaniel T. Bacon trans., Macmillan 1987) (1838).

for the other; the more toothbrushes are sold, the more people will be interested in buying toothpaste (and vice versa). The monopolist internalizes this feedback effect, meaning that when it chooses the price for toothbrushes it anticipates that a lower price increases the demand for toothpaste, for which it can also benefit. This is in opposition to the case in which one monopolist sells toothbrushes and another one sells toothpaste. Neither of them will take into account this effect and, as a result, each will set a price for its product higher than the one a monopolist selling both products would choose. This is particularly harmful both for consumers and, interestingly, for the separate monopolists.

The proponents of the idea of royalty stacking have applied the previous reasoning to the licensing of SEPs.[4] They claim that patent holders licensing different and complementary SEPs will set royalties that are too high. Because SEPs are perfectly complementary – all technologies are essential to have a working product – a monopolist would choose the same royalty regardless of the number of technologies. However, the more fragmented patent ownership is, the higher the total or aggregate royalty burden will be faced by manufacturers implementing that standard. Furthermore, because manufacturers of standardized products cannot work around SEPs, SEP holders will receive a similar royalty payment, regardless of the strength of their patent portfolio or, in other words, irrespective to the relative contribution of the SEPs to the value of the standard.

II. THE ROYALTY-STACKING BENCHMARK

Those concerned with the possibility of royalty stacking in SEP licensing advocate the use of a "royalty-stacking benchmark" for assessing whether a royalty is fair, reasonable and non-discriminatory ("FRAND").[5] In a nutshell, using this benchmark would mean that a royalty would only be considered FRAND if it coincides with the royalty that a monopolist controlling all SEPs (or a pool comprising all relevant SEPs) would set.

Although the royalty-stacking benchmark may be appealing from the point of view of the Cournot complements theory, as with the case of patent holdup, there is no evidence that royalty stacking is a real issue in practice. In fact, Gupta and Galetovic (2016) show that, if anything, the available evidence proves the opposite: market outcomes are inconsistent with a royalty-stacking problem.[6]

A second practical concern with the use of this benchmark is that it may prove to be impossible to implement. First, licensing contracts are typically confidential so it is not possible to derive the aggregate royalty implications of a particular royalty request. Second, determining the royalty that would apply under a mandatory pool – i.e. the royalty the single monopolist would request – is a very difficult task because it requires considerable information about the price elasticity of demand of the end products implementing the technologies in question. For these reasons, this benchmark may create an under-compensation problem: while high royalty rates may have a negative effect on the final market as they raise prices, they may be essential to provide incentives for developers to innovate and create new technologies in the first place.

Together with the lack of empirical evidence, the plausibility of the idea of royalty stacking, and hence the justification for the royalty-stacking benchmark, has recently been challenged on purely theoretical grounds.

III. ACCOUNTING FOR VALIDITY CHALLENGES

In a recent paper[7] we show that royalty stacking is no longer an issue if the standard Cournot complements model is amended to take into account that in the real world patents are probabilistic, i.e. that they are only valid and infringed with some probability, and hence they can be, and often are, challenged in court. This is obviously a very realistic feature and we have seen in recent years numerous lawsuits in which technology users and patent holders argue over the validity of the patents and whether they have been infringed or not.[8]

Our model starts with the observation that, from the point of view of a technology user (or implementer) that produces in the downstream market, the decision to litigate is based on three important aspects: the strength of its patent portfolio, the legal costs of going to court and the additional profits that the producer expects to make if one or more patents are invalidated. Lower legal costs, weaker patents and higher expected gains from not being required to license the portfolio of a patent holder foster the decision of a technology user to litigate.

Of course, patent holders take into account the implementer's option to litigate when setting their royalties. In our model, litigation will impose a ceiling on the royalty rate that firms can demand. This cap varies depending on the strength of the patent holder's portfolio. A patent holder with a stronger patent portfolio will demand a higher royalty rate in the licensing negotiations than one with a weaker one. This is a first and important difference with the

4 See also, Carl Shapiro, Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting, Innovation Policy and the Economy 119, (Adam Jaffe, Joshua Lerner & Scott Stern, eds., MIT Press 2001); Mark Lemley & Carl Shapiro, Patent Holdup and Royalty Stacking, 85 Texas Law Review 1991 (2007).

5 Mark A. Lemley & Carl Shapiro, Patent Holdup and Royalty Stacking, 85 Texas Law Review 1991 (2007). See also, Microsoft Corp. v. Motorola, Inc., 854 F. Supp. 2d 993, 999 (W.D. Wash. 2012).

6 Alexander Galetovic and Kirti Gupta "Royalty Stacking and Patent Essential Patents: Theory and Evidence from the World Mobile Wireless Industry," unpublished (2016).

7 Gerard Llobet and Jorge Padilla "The Inverse Cournot Effect in Royalty Negotiations with Complementary Patents," unpublished (2016).

8 In fact the European Commission recently adopted a series of decisions aimed at protecting the right of potential licenses to challenge validity. See http://europa.eu/rapid/press-release_MEMO-14-322_en.htm.

standard model underpinning the royalty-stacking benchmark. It is undoubtedly a better description of the actual royalty rates that firms negotiate, because stronger portfolios command higher royalty rates, irrespective of whether those negotiations involved essential or non-essential patents.

Furthermore, we find that two patent holders with a small portfolio may command a lower royalty rate than a unique patent holder with a portfolio that corresponds to the sum of both and that this will be the case when the legal costs involved in litigating validity and/or infringement are low.

Introducing the threat of litigation in the standard Cournot complements model adds further and more troubling implications for the theory of royalty stacking. The previous discussion is cast on the idea that the gains a technology user expects from going to court are only given by the savings arising from not paying royalties to the owner of the invalidated patent portfolio. This idea, however, is only accurate in the context of stand-alone technologies. With complementary technologies, i.e. when the value of a technology is a function of the contributions of all other complementary technologies, the gains from invalidating a patent portfolio depend on the royalties that the technology user is expected to pay to all other patent holders. As an illustration, consider the case in which all other patent holders are charging a very large royalty rate. Profits from the sale of the product are going to be small regardless of whether the portfolio of an additional patent holder is invalidated or not. In that case, when the total royalty stack – the sum of all royalty rates – is high, the gains from litigation are small and, thus, the incentives to go to court against a specific patent holder are weak.

IV. THE INVERSE COURNOT EFFECT

We denominate this new insight the "Inverse Cournot Effect," to illustrate that it operates in the opposite way to the standard Cournot Effect. The Inverse Cournot Effect has far-reaching consequences. Because of this effect, when a patent holder considers which royalty rate to charge, it will take into account the effect of its choice on the total royalty stack. In particular, it will internalize that setting a lower royalty rate not only reduces the risk of being litigated by technology users but also, that because its lower rate causes the royalty stack to be smaller, other patent holders are more likely to be litigated. This last effect is profit enhancing since when other patent portfolios are invalidated the total royalty rate goes down and the costs of downstream producer also go down, which necessarily translates into higher sales. Furthermore, the response of those patent holders to the increased risk of litigation will be to lower their royalty rate which will further expand end-product sales.

When is the Inverse Cournot Effect likely to be relevant? In our paper we show that this effect is stronger when patent holders' portfolios are asymmetric in size and strength. A patent holder with a more valuable portfolio that is not particularly concerned about being litigated might choose to lower the royalty rate when participating in a standard with small patent holders in order to constrain the royalties other patent holders may be able to extract and benefit from the increase in downstream output. In fact, we find that when patent holders are quite asymmetric and the litigation threat is credible the royalty stacking result does not arise anymore. That is, it is not true that the aggregate royalty rate is higher when patent ownership is fragmented.

When the patent portfolios are of a similar size or value, however, the Inverse Cournot Effect becomes less relevant. The reason is that a strategy of reducing the royalty to force other patent holders to lower theirs may backfire. This is because if the other patent holders end up being litigated, their portfolios may be invalidated, the total royalty stack may diminish and the result may be that the patent holder that set a lower royalty in the first place may face litigation later on.

It follows from the previous discussion that a model that accounts for the threat of litigation has radically different implications that the standard Cournot complements model regarding the likelihood and magnitude of the royalty-stacking problem. Patent holders will reduce their royalty demands to minimize the risk of litigation. They will also reduce them in order to force other patent holders to reduce theirs in order to avoid that risk. In fact, the resulting royalties may prove so low that, at least in the case of patent holders with small and weak portfolios, they may prefer to exit the licensing market and stop being active licensors. The consequence of all these effects is that it is no longer possible to claim that the aggregate royalty burden is increasing in the degree of fragmentation of patent ownership.

V. IMPLICATIONS FOR PATENT POOLS

While the economics literature has supported the view that patent pools involving complementary patents are welfare enhancing,[9] this prediction is no longer obvious when the threat of a validity challenge is considered. Whether a patent pool increases social welfare or not will depend on the strength of the portfolio of the firms pooling their patents. If firms have large and valuable patent portfolios and, thus, are unlikely to be constrained by litigation, a patent pool will be beneficial from a social viewpoint for two reasons. First, because firms in the pool will coordinate their royalty demands in order to limit the adverse impact on downstream prices and output. This is the standard reason identified in the literature. In addition, by forming a patent pool large patent holders will lower even further their aggregate royalty if by doing so they constrain the royalty that small patent holders that do not participate in the pool can charge.

Instead, a patent pool involving small firms will typically reduce social welfare. The reason is that in this case patent holders will pool their portfolios in order to increase their strength and have stronger protection in court. This allows them to charge a higher total

9 Lerner & Tirole, "Efficient Patent Pools," American Economic Review 94(3), 691-711 (AEA 2004).

royalty which, in turn, raises the royalty stack. Furthermore, because the threat of litigation against these firms becomes less relevant, the Inverse Cournot Effect will be weaker and any large patent holder will have fewer incentives to lower its royalty for strategic reasons.[10]

VI. CONCLUSION

The previous discussion shows that although the royalty-stacking benchmark has received substantial attention in the policy debate it lacks not only practical evidence but also a proper theoretical foundation. Based on these findings, we see no reason at the moment to force patent holders to adjust their royalty requests downwards to accommodate the royalty demands of other patent holders.

10 In the case of a mixed pool, understood as a combination of large and small patent holders, the two effects go in opposite directions but it is typically the case that social welfare increases.

ANTITRUST POLICY TOWARD TECHNOLOGY STANDARDS

BY DANIEL F. SPULBER[1]

I. INTRODUCTION

What should be antitrust policy toward technology standards? Antitrust policy makers agree that standard setting organizations ("SSOs") and technology standards provide significant economic benefits. However, antitrust authorities also express concerns that technology standards pose a competitive problem because they allegedly give market power to owners of Standard Essential Patents ("SEPs"). Thus, antitrust authorities appear to find a conflict between antitrust policy and technology standards, at least where patents are involved.

This article argues that there is not a conflict between antitrust policy and technology standards. A better understanding of the economic role of technology standards suggests that standard setting increases competition in product markets and markets for inventions. SSOs and technology standards are vital for entrepreneurs seeking to apply new technologies and to establish innovative firms. This implies that antitrust authorities should view antitrust policy and technology standards as complementary.

Antitrust policy should be based on a realistic view of the market for inventions and economic institutions. The concerns expressed by antitrust authorities about SEPs often are based on inaccurate pictures of patent licensing and the standard setting process. Patent licensing typically involves bargaining rather than posted prices. Economic analysis shows that bargaining over license royalties blocks standard antitrust concerns about SEP holdup, royalty stacking, patent thickets and the Tragedy of the Anticommons.[2]

In addition, standard setting typically involves voting by SSO members. Economic analysis shows that voting procedures tend to result in efficient technology standards.[3] The interaction between technology standards and patents strengthens the pro-competitive effects of standards.

Standards aside, antitrust authorities have come to recognize that antitrust policy and protections for intellectual property ("IP") are complementary. Antitrust authorities should recognize that antitrust policy toward technology standards and maintenance of strong IP rights also are complementary. Economic analysis implies that antitrust policy makers should consider the important contributions of technology standards to competitive markets. Accordingly, antitrust policy makers should exercise forbearance toward technology standards and SEPs.

II. DO STANDARDS CREATE MONOPOLY?

The key question is whether or not technology standards create monopolies for SEP owners. Antitrust authorities have expressed the concern that standard setting gives undue market power to owners of SEPs. FTC Chairwoman Edith Ramirez observes: "In the standard-setting context, the risk of patent hold-up creates the type of competitive harm that falls properly within the scope of antitrust

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2 Daniel F. Spulber, Patent Licensing and Bargaining with Innovative Complements and Substitutes, Research in Economics, September 2016, 70, 3, http://dx.doi.org/10.1016/j.rie.2016.08.004.

3 Daniel F. Spulber, Standard Setting Organizations and Standard Essential Patents: Voting Power versus Market Power, Kellogg School of Management, Working Paper, Evanston, IL, Revised, March, 2016.

enforcement."[4] The European Commission expresses similar views about market failure in licensing SEPs.[5] These concerns are misplaced for a number of important reasons.

These concerns about SEPs recall the common but incorrect belief that any patent creates a monopoly. This view is inaccurate because patents do not limit access to markets and so do not create economic monopolies. Patents limit the usage of new technologies thus allowing inventors to obtain returns to their inventions, to apply their inventions and to transfer technologies to innovators. Patents serve to promote competition, not only in the market for inventions but in markets for goods and services as well.

Patents are property rights that allow technology providers and adopters to transact more efficiently. Patents provide standardization and market information that lowers transaction costs in the market for inventions.[6] Patents help IP owners coordinate with innovative producers.[7] Patents provide many of the important economic functions associated with other forms of property rights. Lower transaction costs mean more efficient markets and thus more competition. Patents help entrepreneurs develop startups and establish innovative firms.

Patents also support the "market for innovative control," a term used to describe how property rights in technology help in the development of innovations based on that technology.[8] The market for the transfer of technology is not just a mechanism for allocating returns from inventions. Instead, the market is a mechanism for allocating the control of inventions, allowing inventorsto affect innovativedecisions. Just as the stock market is a market for the control of corporations, the market for inventions is a market for the control of innovations based on patented inventions. More effective innovations generate dynamic efficiencies and promote entrepreneurship and competition.

Patents also are very useful for financing invention, innovation and entrepreneurship.[9] Patents allow inventors to license or transfer their inventions to others, helping to finance their inventions. Patents allow innovators to raise capital to support their projects. Finally, patents provide help to entrepreneurs in financing and growing new ventures. In this way, patents strengthen the financing of technological change, thus further promoting competition.

These three factors – lowering transaction costs, supporting the market for innovation control and financing invention and innovation – demonstratethat patents are pro-competitive. In turn, greater competition stimulates invention and innovation, whether there is competition among inventors or among technology adopters.[10] Patents stimulate invention, innovation and entrepreneurship. This is why antitrust enforcement and protection for IP rights are complementary.

One of the antitrust issues raised by critics of technology standards is that SEPs create monopoly power for IP owners. The argument is that prior to setting standards, a greater number of patents compete in the market for inventions. After a standard is established, the argument goes, the number of competing patents goes down, thereby generating monopoly rents for the owners of patents that read on the standard.

This argument is an oversimplification of market institutions; it is a basic numbers game that does not accurately describe markets. Elsewhere, I refer to this view as the "standards-conduct-performance" paradigm.[11]

The "standards-conduct-performance" paradigm is reminiscent of the old antitrust view known as the "structure-conduct-performance" paradigm. That view was that simply knowing how many firms were in a market was enough to predict competitive conduct and economic performance of that market. In short, few firms meant monopoly and many firms meant competition. This characterization was eventually rejected because evidence showed that simply counting firms did little to predict the strength of competition. In practice, competitive entry, entrepreneurship and innovation improved market performance over time. Just counting firms did not accurately describe competition.

The "standards-conduct-performance" paradigm is a similar

4 Edith Ramirez, Standard-Essential Patents and Licensing: An Antitrust Enforcement Perspective, Address by FTC Chairwoman Edith Ramirez, 8th Annual Global Antitrust Enforcement Symposium Georgetown University Law Center Washington, DC, September 10, 2014.

5 European Commission, 2014, Patents and Standards: A modern framework for IPR-based standardization, A study prepared for the European Commission Directorate-General for Enterprise and Industry, http://ec.europa.eu/DocsRoom/documents/4843/attachments/1/translations, Accessed August 12, 2016 ("The licensing of such standard essential patents (SEPs) is however prone to market failures such as externalities (positive and negative), information problems, market power and free-riding. The various forms of market failure can result in barriers obstructing the efficient licensing of SEPs and can thus hinder the realization of the economic and societal benefits of the affected standards." at 9).

6 Daniel F. Spulber, How Patents Provide the Foundation of the Market for Inventions, Journal of Competition Law and Economics, 2015, 11(2): pp. 271-316.

7 F. Scott Kieff, Coordination, Property, and Intellectual Property: An Unconventional Approach to Anticompetitive Effects and Downstream Access, Emory Law Journal, 2006, 56, pp. 327-438.

8 The term "market for innovative control" is introduced in Spulber, 2015, id.

9 Spulber, 2015, id.

10 Daniel F. Spulber, How Do Competitive Pressures Affect Incentives to Innovate when there is a Market for Inventions?. Journal of Political Economy,2013, 121(6): 1007-1054.

11 Daniel F. Spulber, Innovation Economics: Technology Standards, Competitive Conduct and Economic Performance, Journal of Competition Law and Economics, 2013, 9 (4), pp. 777-825, doi:10.1093/joclec/nht041.

misconception. Simply counting patents does not accurately describe competition. Companies may declare their patents to be SEPs and these patents may be incorporated in the standard. Patents declared to be SEPs need not be technologically essential. They may compete against other SEPs or alternative technological solutions. Companies involved in standard setting often develop new technologies in response to opportunities and information generated by the standard-setting process. These patented technologies compete in the market for inventions. The extent of competition in the market for inventions depends on innovation and entry, rather than the number of SEPs.

Even if standards do restrict the number of technologies to be included in the standard at a particular time, it does not mean that future inventions and innovations are reduced. The result of standards can be more inventions, greater innovation and increased entrepreneurship in response to standardization. Standardization increases demand for final products and thus generates returns to invention and innovation. Standardization can increase incentives to invent and to innovate.

Greater incentives to invent and to innovate imply that standards do not create monopoly. Standards do not restrict access to markets and are not a barrier to entry. Standards created by SSOs are freely available to market entrants. There can be multiple standardized products that compete in the marketplace. There can be multiple technologies that are applied to design and manufacture products conforming to a standard. There can also be multiple standards that compete in the marketplace. For these and other reasons, just counting patents does not describe the dynamics of competition.

III. LICENSING SEPS

Many of the concerns expressed about SEPs are due to a mischaracterization of patent licensing. These concerns generally are developed by theoretical economic analyses with a common source: Cournot's complementary monopolies model from 1838. In that model, monopoly sellers of complementary inputs independently choose input prices such that total input prices are greater than what would be charged by a monopolist selling the bundle of inputs. The reason for Cournot's famous result is that input sellers are free riders; they do not recognize that increasing their prices diminishes the returns to other input sellers. The lack of coordination, either explicit or implicit, results in inefficiently high prices. Input suppliers and producers are made worse off in comparison to a monopoly selling the bundle of inputs.

This reasoning has been frequently applied to the study of SEPs. The idea is that patent owners are free riders; they increase patent royalties without recognizing that increasing royalties diminishes the returns to other patent owners. Producers that license patents are made worse off in comparison to what they would pay to a monopoly IP owner licensing the bundle of inventions.

On the basis of the Cournot model, economists have raised a variety of concerns. First, they suggest that "SEP holdup" may occur, with patent owners asking high licensing royalties for technologies already in use that satisfy the standard. Second, they suggest that total royalties will exceed the monopoly level, a problem known as "royalty stacking." Third, they suggest that a lack of coordination between producers and many owners of SEPs will deter innovation and the development of standardized products, a problem referred to as "patent thickets." Fourth, they suggest that patents in general and SEPs in particular will generate excessive entry of patent owners to the point where production is discouraged, a problem referred to as the "Tragedy of the Anticommons."

Because all of these problems have a common source, it is necessary to ask whether the Cournot model generates accurate predictions. The problem with the Cournot approach is that it is based on an inaccurate description of market institutions. The Cournot approach to patent licensing presumes that patent owners use posted prices. In practice, however, patent owners negotiate licenses with technology adopters. Bargaining over license royalties is an important feature of the market for patent licensing.

The question is whether a proper description of the market institutions makes a difference in describing market outcomes. Bargaining does indeed lead to very different predictions in comparison to posted prices. In particular, bargaining between IP owners and technology adopters addresses the free rider problem. Bargaining between IP owners and technology adopters results in joint profit maximization.

With bargaining, total royalties are less than what a monopoly IP owner would charge for the bundle of inventions.[12] Bargaining between IP owners and technology adopters eliminates antitrust concerns that are based on posted prices. In particular, bargaining over patent licenses blocks problems such as SEP holdup, royalty stacking, patent thickets and the Tragedy of the Anticommons.[13]

Hypothetical concerns such as SEP holdup are inconsistent with observed market institutions. This helps explain why alleged problems with SEPs are rarely if ever observed in practice. It follows that SEP holdup and related issues should not be the basis for antitrust policy toward technology standards. Because of the importance of bargaining, concerns about SEP holdup also should not be used to alter SSO policies toward IP.[14]

Despite hypothetical fears about SEPs, standardized products are produced routinely in a variety of industries, including information

12 Spulber, 2016, supra note 2.

13 Spulber, 2016, supra note 2.

14 Ron D. Katznelson, Perilous Deviations from FRAND Harmony – Operational Pitfalls of the 2015 IEEE Patent Policy, IEEE SIIT 2015, 9th International Conf. on Standardization and Innovation in Information Technology, Sunnyvale, CA. (Oct-8-2015).

and communications technology ("ICT"). Complex innovations conforming to standards incorporate many inventions, including SEPs. The extensive use of bargaining in patent licensing helps IP owners and technology adopters effectively coordinate their activities.

IV. SSOS AND THE EFFICIENCY OF TECHNOLOGY STANDARDS

There is another important institutional aspect of standard setting that makes a difference in understanding how standards work. SSOs generally establish technology standards through voting. The interaction among members of SSOs requires multiple meetings, exchange of information and discussion of alternatives. Voting plays an important role in the selection of standards.[15]

Voting in SSOs has implications for the economic performance of standard setting. Voting helps SSOs choose economically efficient technology standards.[16] Concerns about the market power of SEP owners are offset by the voting power of industry members that participate in SSOs.[17]

Antitrust restrictions on SSO activities and on licensing of SEPs wouldlimit private coordination both in the SSOs themselves and in the market for inventions. [18] Antitrust pressures that restrict SSO policies could reduce competition and innovation. As Ron Katznelson explains, Institute of Electrical and Electronics Engineers policy changes will lead to problems when new standards incorporate older standards or standards established by other SSOs, which could reduce efficiencies in innovation.[19]

Antitrust policies that restrict SSO policies on IP would reduce the effectiveness of standards. Such policy changes could diminish incentives to participate in standard setting or to include patented inventions in standards.

15 For data on SSOs, see Justus Baron and Daniel F. Spulber, Technology Standards and Standard Setting Organizations: The Searle Center Database, Searle Center on Law, Regulation, and Economic Growth, Working Paper, Revised August, 2016.

16 Spulber, 2016, supra note 3.

17 Spulber, 2016, supra note 3.

18 Richard Epstein, F. Scott Kieff, Daniel F. Spulber, The FTC, IP, and SSOs: Government Hold-Up Replacing Private Coordination, Journal of Competition Law and Economics, March 2012, Volume 8, Issue 1, pp. 1-46. doi: 10.1093/joclec/nhs002.

19 Katznelson, 2015, supra note 14.

V. CONCLUSION

Technology standards are fundamental for the development of inventions and their application to innovations. Standardization has provided extensive efficiencies to practically every industry. Technology standards are valuable in reducing transaction costs and helping industries coordinate their activities.

Technology standards also are important as means of improving production methods, transaction techniques and final products. Technology standards will only increase in importance with the continued development of network-based innovations, including the "Internet of Things" and extensions of the "Sharing Economy."

Entrepreneurs are vital in the application and development of innovations.[20] SSOs help their members exchange information about new technologies and the specifications necessary for interoperability. Technology standards and SSOs are very helpful to entrepreneurs seeking to learn about and apply new technologies developed by others. SSOs also are important institutions because the standard setting process helps members determine what technologies to develop and helps members disseminate information about new technologies. This implies that SSOs provide important benefits to entrepreneurs in their efforts to establish firms that provide innovations to industries. Technology standards thus help foster competitive entry.

Antitrust policy toward technology standards should be well grounded in an understanding of private institutions such as SSOs and market institutions such as bargaining over patent licensing. The economic contributions of SSOs and technology standards depend on effective IP rights, including SEPs. Antitrust policy objectives in promoting competition and increasing consumer welfare are complementary to an effective system of technology standards.

20 Daniel F. Spulber, The Innovative Entrepreneur, 2014, Cambridge: Cambridge University Press.

EXPLOITING OTHERS' INVESTMENTS IN OPEN STANDARDS

BY SCOTT A. SHER & BRADLEY T. TENNIS[1]

I. INTRODUCTION

Technological standards promote competition by encouraging two varieties of interoperability: technical interoperability, meaning enabling hardware and software from different vendors to communicate through shared protocols, and operational interoperability, meaning enabling users to switch easily among competing products or platforms. Understood in the technical sense, standards solve a coordination problem and increase the odds that a new technology will be successful through "greater realization of network effects, protecting buyers from being stranded, and enabling competition within an open standard."[2] Standards encourage innovation by reducing barriers to entry.

De jure standards are formally specified through the activities of standard-setting organizations comprised of industry participants. By contrast, de facto standards arise from informal industry activity. De facto standards sometimes result from a "standards war" in which rivals compete to persuade the market to adopt a preferred technology. Standards wars will frequently be fought to an impasse, with multiple technologies remaining on the market. But in some cases, the market may tip so that a single technology comes to dominate. Classic examples of standards war "victories" include competitor VHS defeating Beta-Max to become the industry standard video cassette format and Blu-ray later defeating HD-DVD in high-definition video discs.

This brief article principally is concerned with de facto standards that arise from later entrants adopting products or technologies employed by an established player—referred to for clarity as "unilateral" de facto standards. Significant examples of a unilateral de facto standard include the IBM BIOS, later adopted by Compaq to spur the development of the PC-compatible industry, and the menu and command hierarchy employed in the Lotus 1-2-3 spreadsheet program (discussed in greater detail below). Unilateral de facto standards are susceptible to certain forms of abuse because they lack the formal safeguards of de jure standards or the market constraints that limit the winners of standards wars. In particular, the original developer of a technology that becomes a unilateral de facto standard can employ an "open early, closed late" strategy to induce industry reliance on the technology and then later exploit that reliance to create lock-in and exclude rivals.

II. "OPEN EARLY, CLOSED LATE" STRATEGIES

In general, standards are most effective at promoting competition when they are "open." The term "open" can be applied either to access to the standard—meaning that the standard is publicly available to any firm that wishes to implement it, though not necessarily at no charge—or to the standard-setting process itself. Indeed, unilateral de facto standards can only arise where the established firm's technology is openly available—or at least where it is understood to be so.

Open standards reduce entry barriers by "neutraliz[ing] installed-base disadvantages" faced by new entrants or allowing them to "assemble allies" to combat entrenched players.[3] Openness can also help to drive market adoption by assuring customers or firms creating complementary products that they will not become locked into a single supplier of the standardized technology. In other words, agreement to compete on implementing a standard rather than setting a standard "results in greater compatibility among products, which in turn gives consumers a broader range of choices."[4]

1 Scott A. Sher and Bradley T. Tennis are attorneys in the antitrust group at Wilson Sonsini Goodrich &Rosati.

2 Marc Rysman& Tim Simcoe, Patents and the Performance of Voluntary Standard Setting Organizations, 54 MGMT. SCI. 1920, 1932 (2008).

3 CARL SHAPIRO & HAL R. VARIAN, INFORMATION RULES: A STRATEGIC GUIDE TO THE NETWORK ECONOMY STRATEGY/TECHNOLOGY 200 (1999).

4 Press Release, Fed. Trade Comm'n, Dell Computer Settles FTC Charges (Nov. 2, 1995), available at: https://www.ftc.gov/news-events/press-releas-

However, standards are by their nature potentially subject to hold-up problems. Firms can exploit the power to exclude access to some input necessary to implement or make use of a standard—the most common example being standard-essential patents—to obtain market power after a standard is set. This risk is particularly acute once a standard has become widely deployed and the industry has made standard-specific investments that would be costly to unwind. For this reason, ex ante control mechanisms have been developed to preserve openness. For instance, de jure standards developed by standard-setting organizations frequently bind members to license their relevant intellectual property on fair, reasonable and non-discriminatory ("FRAND") terms.

The difficulties of preserving openness are greatly exacerbated in the case of unilateral de facto standards because there is no opportunity for ex ante control. Even for de facto standards resulting from a standards war, there is an opportunity for the evaluation of competing standards and market pressure that may induce commitments tending to preserve the standard as open. For instance, to win a standards war, the proponent of a proposed standard must convince other firms to adopt its technology over competing options. This persuasion tends to lead to wide licensing of any intellectual property necessarily to implement the proposed standard. Further, a standards war is public and understood to be a form of standards development, giving firms an opportunity to evaluate the risk that the winning technology will be subject to later hold up and to obtain assurances that it will not.

For this reason, unilateral de facto standards are particularly vulnerable to "open early, closed late" strategies in which a firm obtains or entrenches a dominant position by holding out a technology as open only to reverse its position later in order to exclude competition. As Professor Carl Shapiro observed in his testimony before the Antitrust Modernization Commission in 2005:

> [I]n a network industry, a firm might obtain a dominant position based in part on certain "open" policies that induce reliance by complementary firms, and then later exploit that position by offering less favorable interconnection terms or by refusing to interconnect with them altogether. Indeed, it is very common in the computer industry for firms controlling "platforms" to welcome suppliers of complementary products, even those offering products that are directly competitive with products offered by the firm controlling the platform. Indeed, such "openness" can be crucial for a platform to become successful in the first place. But therein lies the danger: that a firm will employ an open policy in order to gain dominance and then impose less favorable interconnection terms once dominance has been achieved. . . . When the effects of opportunism are market-wide, antitrust concerns arise.[5]

A dominant firm can close access to a previously open standard in a variety of ways—for instance by increasingly restrictive interconnection terms as in Professor Shapiro's example—but the assertion of intellectual property rights is a particularly common tool.

III. EVALUATION OF "OPEN EARLY, CLOSED LATE" STRATEGIES UNDER COMPETITION LAW

The leading case evaluating this kind of "open early, closed late" conduct as a potential competition law violation is Eastman Kodak Co. v. Image Technical Services, Inc.[6] The United States Supreme Court found that Kodak's change in policy to no longer supply replacement parts to independent copier service firms could violate Section 2 of the Sherman Act.[7] Kodak benefitted from initially supplying parts because the assurance of competition among service firms (and therefore lower service prices) induced customers to buy Kodak's copiers.[8] Once Kodak's customers were locked in through long-term investments in copiers, Kodak was able to opportunistically change its policy and charge a supracompetitive combined price.[9] Critically, as Judge Easterbrook later observed, Kodak's strategy allowed it to charge a combined price "above the price that Kodak could have charged had it followed a closed-service model from the outset."[10] Kodak "took advantage of the fact that its customers lacked the information to anticipate this change" much less quantify the risk of a change in policy and factor that into the initial copier purchase decision.[11]

The Federal Trade Commission's 2009 complaint against Intel included a challenge to a similar course of conduct. NVidia had for years relied on open access to buses, connections and interfaces to Intel CPUs—covered by Intel intellectual property rights—to produce complementary processing chips known as GPUs.[12] The FTC alleged that "[f]or many years, Intel allowed unhindered accessibility to these interfaces and encouraged others to become reliant on that accessibility," but once the industry became "dependent" on these interfaces, Intel selectively limited access, preventing NVidia and

es/1995/11/dell-computer-settles-ftc-charges

5 Testimony of Carl Shapiro, Antitrust Modernization Commission, Exclusionary Conduct 15-16 (Sept. 29, 2005) (internal citation omitted).

6 504 U.S. 451, 482-85 (1992).

7 504 U.S. 451, 482-85 (1992).

8 See Susan A. Creighton & Jonathan M. Jacobson, Twenty-Five Years of Access Denials, ANTITRUST, Fall 2012, at 50, 52-53.

9 Id.

10 Schor v. Abbott Laboratories, 457 F. 3d 608, 614 (7th Cir. 2006).

11 PSI Repair Servs., Inc. v. Honeywell, Inc., 104 F.3d 811, 820-21 (6th Cir. 1997).

12 In re Intel Corp., FTC File No. 061-0247, Administrative Complaint ¶ 80 (Dec. 16, 2009), available at:https://www.ftc.gov/sites/default/files/documents/cases/091216intelcmpt.pdf

others from producing compatible GPUs in the future and forcing customers to purchase Intel GPUs.[13] Just as in Kodak, Intel had "reversed its previous course" and closed access in order to preserve a monopoly position developed in part due to the industry's reliance on a previously open standard.[14]

"Open early, closed late" strategies based on copyright can be particularly problematic. Copyright terms are extremely long, and modifications to copyrighted works restart the clock for the entire work, unlike with patents where the original invention falls into the public domain at the expiration of the original patent term. In addition, copyrights are not subject to independent review of validity as patents are through the Patent Trial and Appeal Board. Finally, the holders of copyrights covering unilateral technology standards can easily exploit the operational benefits of the standard to turn customers' investments against them and create lock in.

For instance, in *Lotus Development Corp. v. Borland Int'l, Inc.*,[15] the First Circuit considered the potential exclusionary effects of a copyright claim on user interface elements of the Lotus 1-2-3 spreadsheet program that Borland had reproduced in its own software. Borland, interestingly, had been on the other end of a similar "open early, closed late" strategy a few years earlier in connection with its acquisition of Ashton-Tate in the early 1990s. The Department of Justice found that "Ashton-Tate has enjoyed competitive advantages as a result of [the] adoption [of its dBASE software] as a 'standard' by corporate customers."[16] Ashton-Tate later asserted a copyright claim against one of its competitors that had employed the dBASE standard, but the Department forbade Borland from pursuing the claim or asserting any similar claim post-acquisition.[17]

Judge Boudin's concurrence is instructive on how "open early, closed late" strategies can allow the originator of a unilateral de facto standard to appropriate the benefit of its customers' investments. Judge Boudin observed that "for a period Lotus 1-2-3 has had such sway in the market that it has represented the de facto standard for electronic spreadsheet commands."[18] As a result, elements of the Lotus 1-2-3 user interface—particularly the menu hierarchies and macro system—themselves became unilateral de facto standards that later entrants adopted to produce operational efficiencies for their customers:

> Requests for the protection of computer menus present the concern with fencing off access to the commons in an acute form. A new menu may be a creative work, but over time its importance may come to reside more in the investment that has been made by users in learning the menu and in building their own mini-programs—macros—in reliance upon the menu. Better typewriter keyboard layouts may exist, but the familiar QWERTY keyboard dominates the market because that is what everyone has learned to use. The QWERTY keyboard is nothing other than a menu of letters.[19]

In other words, Lotus's emergence as the dominant spreadsheet program was the result of its customers' investment in learning to use Lotus1-2-3—an effect bolstered at least in part by others' adoption of similar interfaces. As Judge Boudin observed, allowing Lotus to exploit these investments, which Lotus did not make, could have pernicious consequences:

> So long as Lotus is the superior spreadsheet—either in quality or in price—there may be nothing wrong with this advantage. But if a better spreadsheet comes along, it is hard to see why customers who have learned the Lotus menu and devised macros for it should remain captives of Lotus because of an investment in learning made by the users and not by Lotus.[20]

These examples show clearly how a firm employing an "open early, closed late" strategy can initially benefit from standardization and then later capture those benefits for itself by exploiting reliance on the standard to exclude competition.

IV. CONCLUSION

Even technologies covered by intellectual property rights can come to be de facto standards in the market as a result of the acquiescence, or even the encouragement, of the rights holder. As seen in the cases discussed above, firms may benefit from an initially open strategy to establish or reinforce a dominant position in the market. Those firms may then opportunistically reverse course and use their intellectual property to limit access once customers and competitors have come to rely on the standard, exploiting others' investment to exclude competition and maintain their dominance. The D.C. Circuit observed in United States v. Microsoft that a firm does not have an "absolute and unfettered right to use its intellectual property as it wishes."[21] Antitrust scrutiny may be necessary to ensure that dominant firms do not implement "open early, closed late" strategies that use intellectual property "not only as a shield to protect [its] invention, but as a sword to eviscerate competition unfairly."[22]

13 Id. ¶ 81.

14 Id. ¶ 84.

15 49 F.3d 807 (1st Cir. 1995).

16 Competitive Impact Statement at 9, United States v. Borland Int'l, No. C-91-3666-MHP (N.D. Cal. Oct. 22, 1991) (internal citation omitted), available at: https://www.justice.gov/atr/case-document/file/627986/download.

17 Id. at 5; see also id. at 9-11.

18 Lotus, 49 F.3d at 821 (Boudin, J., concurring).

19 Id. at 819-20 (emphasis in original) (internal citation omitted).

20 Id. at 821.

21 253 F.3d 34, 63 (D.C. Cir. 2001).

22 Atari Games Corp. v. Nintendo of Am., Inc., 897 F.2d 1572, 1576 (Fed. Cir. 1990).

FRAND AND THE SMALLEST SALEABLE UNIT

BY[1] JOSEPH KATTAN[2], JANUSZ ORDOVER[3] & ALLAN SHAMPINE[4]



I. INTRODUCTION

Standard-setting organizations ("SSOs") incorporate patented technology into standards, such asthose enabling cellular telephony. While there may originally have been credible alternatives to the patented technologies ultimately selected by standard-setting organizations, once a patented technology is included in a standard, firms using the standard must use the patented technology in order to be standard-compliant, and the technology thus becomes "standard essential."One of the primary economic concerns that can arise in that situation is that holders of standard essential patents ("SEPs") may be able to hold up licensors by demanding payments related to access to the standard itself rather than the intrinsic value of the patents.That is, because both consumers and producers make investments that are to various degrees irreversible and are based on standards, the loss of access to a standard can become very costly. SEP holders can potentially exploit those sunk costs – which are generally unrelated to the value of any particular patented technology – and hold up users of the standard.

While hold-up can occur with any patent where the patent-holder attempts to extract value unrelated to the patented technology, the concern is particularly important in the standard setting context because of the elimination of competition through the actions of the SSO.In part because SSOs could be subject to antitrust liability for excluding competition through the collective action of industry participants, SSOs address these concerns by requiring firms whose patented technology may be included to agree to license those patents on fair, reasonable and non-discriminatory ("FRAND") terms.[5] The application of the FRAND concept to licensing terms allows SEP holders to collect royalties based on what they could have secured for their patents ex ante, before they declared their patents to be standard essential, and not appropriate to themselves the increased value of the patents that stems from the incorporation of the patents in industry standards, which is commonly referred to as the hold-up value.[6]

The FRAND concept intersects with the smallest saleable unit ("SSU") rule, which is a patent law concept that seeks to limit patent holders' ability to collect royalties that exceed the contributions of their patents.This rule requires that patent damages (and, hence, patent royalties) be calculated on the basis of the value of the smallest saleable patent practicing unit unless the patent drives demand the demand for the entire product in which the smallest saleable unit is incorporated.Although the SSU rule has its origins outside the standard-setting context, and applies to all patents, it is of particular importance in enforcing a FRAND commitment, precisely because hold-up is of particular concern in the standard setting context.This article discusses the intersection between the SSUruleand FRAND requirements.

II. BACKGROUND OF THE SSU RULE

A more than century old patent damages doctrine requires "apportion[ing] the defendant's profits and the patentee's damages between the patented feature and the unpatented features [of the infringing product]," unless "the entire value of the whole machine, as a marketable article, is properly and legally attributable to the patented feature."[7] This "entire market value" rule has been at the

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5 Dennis Carlton & Allan Shampine, An Economic Interpretation of FRAND, 9 J. COMPETITION L. & ECON. 531 (2013) (hereafter "Carlton & Shampine, Economic Interpretation").

6 See, for example, Fed. Trade Comm'n, The Evolving IP Marketplace: Aligning Patent Notice And Remedies With Competition (2011) (hereafter "Evolving IP Marketplace").

7 Garretson v. Clark, 111 U.S. 120, 120 (1884) (internal quotation marks

center of a number of highly publicized cases decided by the Court of Appeals for the Federal Circuit that involved computing and electronic products.The issue in these cases was whether patentees holding patents over individual, typically minor, features of richly featured, complex products such as computers or office software were entitled to single digit percentage damages based on the entire market value of these products.The court held that the rule requires royalties to be based on the value of the smallest saleable unit that practices a patented feature, unless the patented feature drives the demand for the entire product.[8]

Under these holdings, patent damages may be "based on the entire market value of the accused product only where the patented feature creates the 'basis for customer demand' or 'substantially create[s] the value of the component parts.'"[9] The basis for this rule is a concern that "[w]here small elements of multi-component products are accused of infringement, calculating a royalty on the entire product carries a considerable risk that the patentee will be improperly compensated for non-infringing components of that product."[10]

For example, in LaserDynamics, the plaintiff sought damages of twopercent of the price of laptop computers for a single patent that allows optical disc drives to identify what type of disc is inserted into them ("optical disc discrimination").Looked at in isolation, that figure might strike a trier of fact as a relatively small portion of the price of the laptop.However, laptop computers are complex products that implement at least 251 industry standards,[11] most of which are subject to numerous patents, as well as highly sophisticated non-standardized technologies that themselves are subject to numerous patents.If there are 5,000 patents used in a laptop and each were to receive a twopercent royalty, the royalty on a $1,000 laptop would be $100,000.This, of course, makes no economic or business sense as no supplier could sell a $100,000 laptop or pay for the stack of license fees if the laptop sells for $1,000.

The final product price would have to adjust enough to make it feasible (profitable) for manufacturers to pay the sum of even small royalties imposed on the end product.Considering a single patent in this larger context, a two percent royalty for the one patent is not so innocuous, and one should think hard about the value of that patent in the context of the large amount of additional functionality in a laptop.[12]

The smallest saleable patent practicing unit for these purposes is the component that substantially embodies the infringed patent claims.Thus, where all of the inventive elements of a patent are substantially embodied within an individual component, the non-inventive mention of other components in patent claims does not enable the patentee to collect damages based on the value of a larger product that incorporates those additional components.[13]

The Federal Circuit has extended the smallest saleable unit requirement to sub-components.This is an important refinement of the rule in an era in which systems on a chip combine the functionalities of numerous discrete components on a single piece of silicon.The court held that where the smallest saleable component is itself a multicomponent product, patent damages must account for the "portion of the value of that product [that] is attributable to the patented technology."[14] Accordingly, the "realistic starting point" for computing royalties is "the smallest salable unit and, at times, even less."[15] Moreover, in cases involving SEPs, "[j]ust as we apportion damages for a patent that covers a small part of a device, we must also apportion damages for SEPs that cover only a small part of a standard."[16]

Although disputes may arise as to whether a particular component substantially embodies the inventive elements of an SEP, it is indisputable that any standard implementer that infringes an SEP by virtue of its product's compliance with a standard is entitled to obtain a license to that SEP.For example, a chipset manufacturer whose chipset practices a standard essential patent could be sued by an SEP holder for infringing the SEP, which it must practice in order to comply with a relevant standard.The FRAND concept, which as a matter of antitrust law does not permit the exclusion of competitors through the adoption of an industry standard, therefore requires that the opportunity to obtain an SEP license be extended to the chipset manufacturer.

The Federal Circuit's Ericsson decision raised the possibility that the smallest saleable unit requirement might be merely an evidentiary rule to avoid misleading juries, whose members may be improperly influenced by references to the value of a finished product, rather than a substantive requirement of patent law for determining

omitted).

8 See, e.g. Lucent Tech., Inc. v. Gateway, Inc., 580 F.3d 1301, 1332 (Fed. Cir. 2009) (damages for patent on "date picker" feature of Microsoft Outlook may not be based on entire market value of Outlook); Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292 (Fed. Cir. 2011) (damages for software activation patent may not be based on entire market value of Microsoft Windows and Office).

9 Id. at 1318 (citations omitted).

10 LaserDynamics, Inc. v. Quanta Computer, Inc., 694 F.3d 51, 67 (Fed. Cir. 2012).

11 Brad Biddle et al., How Many Standards in a Laptop? (And Other Empirical Questions) (2010), available at: http://www.standardslaw.org/How_Many_Standards.pdf.

12 LaserDynamics, 694 F.3d at 69.

13 In re Innovatio IP Ventures, LLC Patent Litigation, 2013 WL 5593609, at *13 (N.D. Ill. 3 Oct. 2013).

14 VirnetX, Inc. v. Cisco Systems, Inc., 767 F.3d 1308, 1327 (Fed. Cir. 2014).

15 Ericsson, Inc. v. D-Link Systems, Inc., 773 F.3d 1201, 1227 (Fed. Cir. 2014).

16 Id. at 1232-33.

patent damages.[17] However, the court's subsequent CSIRO decision made it clear that the rule had two independent bases, one of which is the fundamental risk that a larger royalty base will compensate patentees for unpatented features.[18]

III. SSU, FRAND AND INCENTIVES FOR INNOVATION

Both the ex-ante principle, which has been recognized by multiple courts and antitrust enforcement agencies, and the SSU rule have been the subject of ongoing debate whether patent holders that make FRAND commitments are over- or undercompensated for their inventions.[19] This debate has been fierce in the SEP context, and particularly in relation to the interpretation of the FRAND rules that ultimately conduce to the benefits of all stake-holders, including the consumers who purchase the standard-compliant products.

It is obvious that whether patentees are over- or undercompensated depends both on the rate and the base to which the rate is applied, as well as the benchmark against which such compensation is to be gauged.It is by now reasonably well established that a patentee that has made a FRAND commitment should be constrained in the rates that it can collect on a per-unit basis by the incremental contribution that the innovation makes to the value of the standard, as compared to what the value of the standard would be absent its inclusion.As the Federal Circuit has noted, "[w]hen a technology is incorporated into a standard, it is typically chosen from among different options."[20] This is confirmed by observations of significant participants in the wireless telecommunications standardization activities, including the former chair of the European Telecommunications Standards Institute's Technical Committee Special Mobile Group, who has attested that "[i]n nearly all cases, ETSI can choose between alternatives with comparable performance."[21]

The availability of alternatives before standardization is the principal reason for the adoption of the ex-ante approach to SEP royalties.Some advocates have expressed a concern that this approach, which appropriately focuses on the incremental contribution of a given SEP to the value of the standard, will generally "undercompensate" the patentee because the patentee has already expended the necessary resources to innovate and thus can be subjected to a reverse hold-up by the potential licensors.While such reverse hold-up cannot be ruled out as a theoretical possibility, hold-up of potential implementers by the owner of a SEP (or portfolio of SEPs) is far more likely.Indeed, the potential for hold-up (and other strategic action) is the raison d'etre for the FRAND regime.[22]

One way in which SEP holders may attempt to circumvent their FRAND commitment is by charging royalties based on the price of complete finished products for patented technology (SEPs) that read on individual components that sell for a small fraction of the price of the finished products.[23] While the issue can, and does, arise in all types of patent litigation, hold-up by a patent holder that extracts value not directly stemming from its patented technology is of particular concern with respect to SEPs because standardization creates an additional value for the SEP holder by compelling entire industries to implement SEPs and thereby eliminating competition for the SEPs.Because of lock-in stemming from standardization, unless constrained by a FRAND commitment, the patentee may extract not only the incremental value of its innovation relative to the alternatives that are available before standardization, but also the additional value that flows directly from the inclusion of the SEP in the standard.Because, by definition, the standard-essential patents cannot be avoided in standard-compliant products, the SEP owner can extract that incremental value, which it would not be able to do in a market environment outside the SEP context.

Advocates for SEP holders with patent monetization programs have argued that there is no risk that holders of FRAND-encumbered SEPs would be overcompensated after standardization.For example, Richard Stark[24] cites a price difference between a $249 32GB iPod

17 Id. at 1226-27.

18 Commonwealth Scientific and Industrial Research Organisation v. Cisco Systems, Inc., 809 F.3d 1295, 1302 (Fed. Cir. 2015).

19 See, e.g.Ericsson, 773 F.3d at 1233 ("the royalty for SEPs should reflect the approximate value of that technological contribution, not the value of its widespread adoption due to standardization); Broadcom Corp. v. Qualcomm Inc., 501 F.3d 297, 309, n.4 (3d Cir. 2007) (FRAND requirement seeks "to preserve the competitive benefits of ex ante technology competition"); FTC, Evolving IP Marketplace,at 23 ("Courts should cap the royalty at the incremental value of the patented technology over alternatives available at the time the standard was chosen"); European Commission, Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements, ¶ 289 (FRAND rate may be determined by "compar[ing] the licensing fees charged by the company in question for the relevant patents in a competitive environment before the industry has been locked into the standard (ex ante) with those charged after the industry has been locked in (ex post)");Case COMP/38.636 – Rambus (2009), § 32 (forcing licensees "to accept higher licencing fees than those which could have been negotiated … before the adoption of the standard" represents "bad faith").

20 Ericsson 773 F.3d at 1233.

21 Expert Report of Friedhelm Hillebrand, Dkt. No. 359-2, Nokia Corp. v. Qualcomm Inc., Case No. 09-cv-791 (D. Del. May 16, 2011) at ¶11. Similarly an SEP licensor that has been active in the same standard-setting activities has stated that standard-setting participants "typically" reach a consensus-based decision after considering "multiple proposed solutions to the same technical problem."Ericsson on FRAND and SEP Litigation, submission to the International Telecommunications Union at 1 (Oct. 10, 2012), http://www.itu.int/dms_pub/itu-t/oth/06/5B/T065B0000340007MSWE.docx.

22 FTC, Evolving IP Marketplace at 22-23; Carlton & Shampine, Economic Interpretation.

23 For a detailed treatment of this issue, see Joseph Kattan, The Next FRAND Battle: Why the Royalty Base Matters, CPI Antitrust Chronicle, March 2015 (1).

24 Richard Stark, Debunking the Smallest Salable Unit Theory, CPI Antitrust

Touch (which lacks LTE cellular capability) and a $649 32 iPhone 5C (which has such capability) as evidence that the $400 price difference is attributable to specific SEPs.He argues that the $400 is attributable entirely to the iPhone's LTE capability and that SEP holders therefore should be able to impose a royalty on the entire price difference and, in fact, on the price of the entire iPhone.

This type of argument not only misses the point and is flawed as a matter of economics, but actually demonstrates the importance of concerns about hold-up.To the extent that any part of the price difference is in fact attributable to LTE technology, it is attributable to that technology as a whole, and not necessarily to any individual SEP holder's patents.Thus even assuming that the price difference is attributable to LTE technology and not to other factors, unless the SEP holder can show that the difference is attributable specifically to its SEPs and, if so, to the advantages that its SEPs conferred over technologies that were offered for standardization ex-ante, it is seeking to appropriate value that is not attributable to the incremental value that its SEPs provided over available alternatives.As a result, this price gap is not at all informative as to the incremental value that should accrue to any individual SEP holder.The relevant question is not how much higher a price is charged because of the presence of LTE, but whether there would be any difference in price if the version of LTE used an alternative to the patented technology.That is, some version of LTE would likely still exist if the particular SEPs at issue were not present in the standard, but that version of LTE would use alternative technology.

To illustrate, if an alternative technology would have resulted in a version of LTE that is valued one dollar less per handset (whether because of a minor technological inferiority or a higher implementation cost), the included SEPs would have commanded at most one dollar per handset in license fees ex-ante.Importantly, the same maximumfee would likely be negotiated independently of the base: that is, whether the fee would be paid on the perhandset basis or perchipset basis.This is because if the chipset is the smallest saleable unit that substantially embodies the SEP-holder's SEPs, that chipset could command a price premium relative to chipsets that would have implemented the alternative technology that was available ex-ante.

Put another way, even if the price difference between two handsets with and without LTE may be quite large because end-users value LTE cellular capability generally, it is not generally likely (or even plausible) that all of that difference can be uniquely attributed to a given SEP-holder's SEPs.This is not to say, of course, that some SEPs may not command significant premiums relative to all the viable alternatives even before the standard is put in place.But such substantial license fees would be properly attained under the ex-ante approach.That is, truly innovative technology that brings great value relative to alternatives can and should command high royalties under the ex-anteframework.However, SEP holders that seek higher royalties based on a claim that products that implement a standardized technology are more valuable because they implement a standard should be required to prove that the value difference is attributable to their contributions rather than presume, as Mr. Stark and other advocates for his position do, that the entire value difference is attributable to any particular SEP holder's SEPs.Indeed, this misplaced focus on the incremental value of the whole standard can create the erroneous perception in factfinders' minds that the demanded royalty is FRAND compliant when, in fact, it is nothing of the sort.

The conclusion that the SSU-based royalty could potentially generate a low absolute per unit royalty rate is not in any way evidence that the innovator is undercompensated.In fact, the opposite can be the case.First, the rate of return on investment in the pertinent SEPs (or on a more broadly defined R&D program) depends both on costs associated with the relevant SEPs and on the revenues generated by the investment, all appropriately adjusted for risk.There is no evidence with which we are familiar that the investments associated with the developments of the SEPs in the telecommunications field are especially large, sunk or risky.In fact, such investments are often undertaken by manufacturers that benefit from their R&D investments both directly (via their market presence) and indirectly (via licensing or cross-licensing).

Having an SEP incorporated into a standard can confer enormous benefits on SEP holders by expanding demand for patents to every manufacturer of the product covered by patents for which otherwise no demand may exist.That is, in the context of standards that achieve broad commercial adoption, an SEP, unlike a typical patent, cannot be replaced by a superior (or cheaper) patent unless and until such time as the relevant standard is superseded by a new standard.There is no evidence that we have seen that shows that the voluntarily agreed to constraints on license royalties from FRAND restrictions have a greater value than the undisputed benefits that an SEP holder derives from the inclusion of its patents in a standard and the concomitant flow of revenues (including the reduction in licensing expenses by means of cross-licensing).In particular, in industries such as wireless telecommunications, SEP holders gain a guaranteed pool of licensees for their intellectual property that otherwise may not have used the patents at all.[25] In a market in which a nearly billion and a half standard-compliant handsets are sold annually, this is a hugely valuable benefit.

The fact that many telecommunications standards are highly successful does not demonstrate that the frequently noted concerns with hold-up, royalty stacking and market eviction though injunctive relief (and hold-up achieved with the threat of market eviction) have not had some adverse consequences in the relevant markets.The appropriate benchmarks here are the levels of market performance that would have been realized absent these potential distortions in the licensing domain.For example, if the value of a standard (not of the patented technology, but of the standard itself) is $10 per unit to an implementer, SEP holders can hold up the implementer for up

Chronicle, July 2015, at 5.

25 See Joseph Kattan and Chris Wood, Standard-Essential Patents and the Problem of Hold-Up at 3, available at: http://ssrn.com/abstract=2370113.

to $10 and the implementer will still participate in the market, even if SEP holders could only obtain royalty rates of $1 per unit if competition from alternatives present prior to standard setting were still present.That hold-up acts like a random tax and discourages downstream innovation.The fact that wealth is transferred to SEP holders does not mean that incentives for upstream innovation are increased in any economically efficient fashion.The additional windfall is one not contemplated in the patent system, can generate inefficient rent-seeking activity (e.g. firms engaging in activities to ensure their patents are included in a standard in order to extract supra-competitive rates later) and will decrease returns to downstream innovation, because the SEP holders can effectively tax returns on downstream innovation.

This example also illustrates the fallacy of the argument, often made on behalf of companies that aggressively monetize their SEPs, that declining prices of standard-compliant products evidences the absence of hold-up.Assuming that the cost of manufacturing electronic products declines in accordance with Moore's law, one would expect the non-licensing costs to decline by roughly 50 percent every two to three years.Over a four- to six-year period, this would mean that costs would decline by 75 percent.Consequently, a phone which costs $300 to manufacture at the beginning of such a period may cost as little as $75 to produce a few years later.Thus, even with a substantial overcharge by the SEP holder ($9 in the example above), the cost of the phone will decline by $225, and its price will decline as well, depending on the extent of industry-wide pass-through rate.

In summary, the FRAND requirement is designed to prevent holders of FRAND-encumbered SEPs from extracting value associated with the standard itself rather than the incremental contribution of the patented technology to the standard.The SSU rule is intended to prevent patent holders generally from extracting value associated with other aspects of a product.The two are closely related and, indeed, a standard-compliant product will frequently incorporate aspects of a standard unrelated to the particular patented technology in a litigation, as well as a great deal of other unrelated functionality and technology.[26] The SSU rule is not only appropriately applied in a FRAND context, but is of particular importance in that context, as the risk that SEP holders will extract value unrelated to their patented technology are higher in the FRAND context as a result of the elimination of competing options through the standard setting process.

26 For example, it is estimated that a contemporary smartphone incorporates as many as 250,000 patents.See RPX Corp., Amendment No. 3 to Form S-1, Apr. 11, 2011, at 59, http://www.sec.gov/Archives/edgar/data/1509432/000119312511101007/ds1a.htm; Steve Lohr, Apple-Samsung Case Shows Smartphone as Legal Magnet, N.Y. Times, Aug. 25, 2012, http://www.nytimes.com/2012/08/26/technology/apple-samsung-case-shows-smartphone-as-lawsuit-magnet.html.

INNOVATION UNDER THREAT? AN ASSESSMENT OF THE EVIDENCE FOR PATENT HOLD-UP AND ROYALTY STACKING IN SEP-INTENSIVE, IT INDUSTRIES

BY ALEXANDER GALETOVIC & STEPHEN HABER


I. INTRODUCTION: AN INFLUENTIAL THEORY PREDICTS MARKET FAILURE

Most electronic devices we use such as smartphones, laptop computers, televisions or audio systems rely on technological standards that make them interoperable. Technology standards enable the owner of a Samsung Galaxy to call a friend subscribed to a different network who uses an iPhone, switch to WiFi while at home, or make a video recording that can be edited on a laptop and then viewed on a TV or tablet. A myriad of firms design apps that enable the owner of that smartphone to order a cab, read her favorite magazine or apply for a home mortgage. Yet Patent Holdup Theory, an influential body of thought among legal academics and antitrust authorities around the world, predicts market failure in precisely these SEP-intensive, information technology ("IT") industries. Indeed, many authors argue that innovation in IT is under threat. As one seminal paper puts it: "…I submit that this holdup problem is very real today, and that both patent and antitrust policymakers should regard holdup as a problem of first order significance in the years ahead."

According to Patent Holdup Theory the holders of standard essential patents ask for "excessive royalties" for the use of their technologies after manufacturers make standard- specific, sunk investments. Opportunistic patent owners are therefore "holding up" manufacturers, charging royalties that only allow them to cover their short-run costs. The predictions of the theory are straightforward: because there is no incentive to continue investing once capital equipment wears out, innovation ceases and the industry stagnates or even collapses.

Royalty stacking is claimed to be patent holdup repeated multiple times. At the same time, it is also claimed to be an application of the Cournot complements theory — the idea that when two separate upstream input monopolies collude and price as a single monopoly they charge less than when each sets prices independently. Patent holdup theorists substitute SEP patent holders for Cournot's upstream monopolists, and then note that there may be dozens, or hundreds of such patent holders, each independently charging a royalty. Lemley and Shapiro (2007: 2014) provide a mathematical expression to operationalize the Cournot complements problem caused by multiple patent owners:

> […] if marginal costs are constant and the downstream firm faces linear demand, the output level if N essential patents are owned by N separate firms is equal to the output level if all N patents were owned by a single firm multiplied by the factor 2/(N+1).

Figure 1 shows the implications of Lemley and Shapiro's expression. As the graph shows, in a competitive industry with no royalties, output would be 100. If only one patent holder charges a profit-maximizing royalty rate however, she reduces equilibrium output by half relative to marginal cost pricing - even a single patent holder acting as a monopolist would significantly worsen the industry's performance. With a second patent holder, the cumulative royalty rises and output falls further to one-third relative to no royalties. By the time the number of patent holders reaches 9, output is ten percent of the quantity with no royalties. And if the number of patent holders is 99, then output would be 99 percent lower. In short, it does not take a large number of patent owners to devastate an industry, a result that holds regardless of the shape of the demand curve.

II. A THEORY IN SEARCH OF EVIDENCE

We have shown elsewhere that patent holdup and royalty stacking cannot happen together; they are mutually exclusive economic mechanisms. We have also shown that, claims by patent holdup theorists to the contrary, patent holdup is not a straightforward variant of the transactions cost theory of holdup in mainstream economics.3 We will not, therefore pursue those issues here.

Nevertheless, the mechanics of both patent holdup and royalty stacking independently predict market failure, and thus call for government intervention in markets to prevent that failure. Neither mechanism permits effects at the margin, such that an industry can be saved by exogenous technological change or falling manufacturing costs; if surplus increases for whatever reason, then patent owners will raise the royalty rate to extract it. Hence, the literature makes dire predictions about the future of innovation. As Shapiro (2001: 1260) puts it:

> The holdup problem is worst in industries where hundreds if not thousands of patents, some already issued, others pending, can potentially read on a given product. In these industries, the danger that a manufacturer will step on a land mine is all too real. The result will be that some companies avoid the mine field altogether, that is, refrain from introducing certain products for fear of holdup.

Farrell et. al (2007: 647) concur: "…surprise hold-up may be largely a transfer, but anticipation of hold-up encourages a range of inefficient forms of self-protection, such as postponing or minimizing investment, or ensuring that standards use only antique technology." Lemley and Shapiro (2007a: 2012) reach a similar conclusion:

> In the long run, if products are expected to be subject to some degree of holdup, the firm may not find it worth incurring the costs necessary to develop, manufacture, and sell the product. Assertions based on the shut-down condition that royalty stacking is somehow a minor problem or that royalty stacking cannot stifle innovation or hinder the market penetration of products that have been developed are simply unfounded.

Scott Morton and Shapiro (2016: 124) have recently applied this framework to suggest that patent holdup and royalty stacking threaten the "Internet of Things":

> …the "Internet of Things" is a new and growing area where royalty stacking and patent holdup appear to be very real dangers…. Failure to prevent patent holdup relating to tomorrow's information technology and communications standards is likely to cause significant social welfare loss in the years ahead.

Patent holdup theorists should have tested these claims about patent holdup, royalty stacking, and collapsing rates of innovation directly. Doing so would have been straightforward: economists measure differential rates of innovation by comparing differential rates of change of quality-adjusted prices across industries and within industries over time; and thus researchers should have asked: "Within an affected product line, has the number of SEPs and SEP holders increased over time, and were those increases followed by increasing quality adjusted prices, relative to product lines not affected by patent holdup or royalty stacking?" Similar tests might have focused on the relationship of the number of SEP and SEP holders to output, industry structure or rates of new firm entry in affected product lines. One would think, for example, that if patent holdup or royalty stacking were causing market failure in an industry, then incumbent firms would cease to invest and new firms would not enter the industry.

Instead of testing the observable implications of patent holdup or royalty stacking against equilibrium economic outcomes, the proponents of Patent Holdup Theory focused on anecdotes about litigation involving SEPS or claims by reluctant licensees that they were asked to pay royalties they deemed excessive.4 To the degree that they focused on quantitative data, they presented evidence about assumptions of the theory, rather than the outcomes predicted by the theory. For example, Contreras (2015: 2) cites the large and increasing number of patents in IT industries as evidence of royalty stacking:

> It is well known that modern computing, telecommunications, and consumer electronics devices are covered by multitudes of patents. In 2011, patent aggregator RPX estimated that an average smartphone is covered by at least 250,000 different patents, up from only 70,000 in 2000. To the extent that the multiple owners of patents covering a single standard or device charge royalties to the manufacturer, the cumulative effect of those royalty demands can be appreciable. This phenomenon is often called royalty "stacking."

The number of patents reading on a product is not, however, evidence that royalty stacking is occurring. If that would be the case, any industry that uses many inputs produced by different suppliers — from motorcycles to ski parkas — would be a victim of the Cournot complements problem; it would be a wonder that anything is produced at all. Thus, demonstrating that there are large numbers of SEP holders in a product line is only a first step in demonstrating that royalty stacking is hindering innovation. As a second step, a researcher must show that those SEP holders have market power and independently charge a per-unit royalty.5 As a third and crucial step, it must be shown that, as the number of SEP holders has increased over time, the equilibrium price of the final good has increased as well, while output has fallen. Indeed, according to Lemley and Shapiro's formal expression, if royalty stacking is taking place, a researcher should observe that once there are 10 or more SEP holders each independently setting a per-unit royalty output should almost completely collapse.

Other authors have cited as evidence of royalty stacking the allegedly excessive cumulative royalties demanded by patent holders. For example, in 2007 Mark Lemley famously stated that the cost of paying patent royalties might exceed the price of final products in the wireless phone industry:

> Time and time again, we have seen this sort of royalty-stacking problem arise. One great example is 3G telecom in Europe. The standard-setting organization (SSO) put out a call for essential patents, asking which they must license to make the 3G wireless protocol work and the price at which the patent owners would license their rights. 3G telecom received affirmative responses totaling over 6,000 essential patents and the cumulative royalty rate turned out to be 130%. This is not a formula for a successful product.

Beyond the fact that looking at opening-bids is a notoriously inaccurate way of measuring the market price of anything, a 130 percent cumulative rate should have brought the industry to a grinding halt at its inception - an observable outcome. Given that more than 1.4 billion 3G and 4G phones were sold worldwide in 2015, and that the prices of those devices have fallen like stones since 2007, this outcome obviously did not obtain.

To our knowledge, the closest any paper has come to providing any evidence that fragmented patent ownership has had an effect on innovation is Cockburn, Macgarvie and Muller (2010), which looked at a sample of German firms. Nevertheless, this study found that the firm in the sample with the highest royalty burden spent only 2.12 percent of its sales on patent licenses. The average amount spent on patent licenses across all firms was only 0.054 percent of sales. These royalty rates are one or two orders of magnitude smaller than the royalty rates predicted by the theory. Thus, rather than being evidence consistent with the hypothesis that royalty stacking slows innovation, they are evidence showing that these German firms are not affected by royalty stacking.

Many authors have pointed out that there is scant evidence of patent holdup or royalty stacking. In 2008 Denicolo et al concluded (p. 600) that: "Taking all of the evidence together, we find the proof of prevalent, recurring patent holdup, and royalty stacking in high-tech industries to be extremely weak."

The same year, Gerardin, Layne-Farrar and Padilla (2008) surveyed the literature on royalty stacking. After an exhaustive study of the theory and evidence they found that there was a possible but limited royalty stacking effect in the software industry, a possible effect in the semiconductor industry that appeared to be mitigated by cross-licensing, no measurable effect in the mobile telecom industry and no systematic evidence in the biomedical industry.

Noel and Shankerman (2013: 484) reached a similar conclusion regarding the software industry. They note: "Despite widespread concern about patent thickets, the econometric evidence on their effects is quite limited."

Layne-Farrar (2014) also reviewed the empirical literature on patent holdup and royalty stacking and concluded:

> Certainly the theories have been developed, but the empirical support is still lacking. Despite the 15 years proponents of the theories have had to amass evidence, the empirical studies conducted thus far have not shown that holdup or royalty stacking is a common problem in practice.
>
> Similarly, a comprehensive review of 164 papers on patent thickets (which includes, as a special case, royalty stacking) by Egan and Teece (2015) concluded that:
>
> It would be nice to conclude this paper by answering the two big questions in the literature: Do patent thickets exist? And do patent thickets cause economic inefficiencies? But, despite carefully reading and analyzing the 164 papers that make up our sample, what we can say is limited. [...] there is simply no evidence that this is the happening even in areas like software.
>
> Finally, Hall, Helmers, and Graevanitz (2015: 23) recently summarized the state of the literature about the effect of patent thickets as follows:
>
> The theoretical analysis of patent thickets (Shapiro, 2001) and the qualitative evidence provided by the FTC in a number of reports (FTC, 2003; 2011) suggest that thickets impose significant costs on some firms. The subsequent literature has focused on the measurement of thickets (e.g. Graevenitz et. al. 2011;
>
> Ziedonis, 2004) and has linked thickets to changes in firms' IP strategies in a number of dimensions. There is still a lack of evidence on the effect of patent thickets as well as their welfare implications at the aggregate level.

In summary, almost 15 years after Carl Shapiro (2001) argued in an influential paper that patent holdup is "a problem of first order significance," no systematic evidence has been produced that supports the contention that SEP-intensive, IT industries are under threat.

III. EVIDENCE OF THRIVING, NOT DYING, INDUSTRIES

As we have already mentioned, there is a straightforward way to measure the differential rate of innovation in SEP-intensive industries; look at differential rates of change in quality adjusted prices in SEP-intensive and non-SEP-intensive product lines. In fact, there is a broad and deep literature on the economics of productivity growth, whose key insight is that there is a one-to- one relationship between

differential rates of innovation and differential rates of changes in quality-adjusted prices.6 That is, if technological progress is 10 percent faster in good A relative to good B, the quality-adjusted price of good A falls 10 percent faster than the quality-adjusted price of good B.

Research that we carried out with Ross Levine (Galetovic, Haber and Levine 2015) therefore takes this approach to assessing the empirical implications of patent holdup and royalty stacking. The main findings of Galetovic, Haber and Levine (2015) are summarized in Figure 2, which graphs an index of quality adjusted prices for a broad range of SEP-intensive and products between 1997 and 2013 relative to the rest of the economy. Rates of technological progress in SEP-intensive industries (phone equipment, video equipment, audio equipment, televisions and laptop computers) were very fast relative to technological progress in the overall economy and almost any other industry. For example, the overall rate of innovation in phone equipment (which includes such low tech items as fax machines and landline phones, as well as wireless phones) was 10 percent per annum faster than the economy-wide average. The rate of innovation in portable and laptop computers was faster still, 31 percent per annum faster than the economy-wide average. The figure also shows that these fast differential rates of innovation in SEP-intensive products have not slowed over time.

Galetovic, Haber and Levine (2015) also exploited the U.S. Supreme Court's decision in eBay Inc. v. MercExchange LLC, which made it relatively more difficult for SEP owners to obtain injunctions against infringers. One argument made in the SEP holdup literature is that SEP owners extracted excessive royalties by threatening licensees with an injunction. If the manufacture of products that were highly reliant on SEPs were being held up prior to eBay, after eBay we should see faster decreases in the quality-adjusted prices of those products, relative to the quality-adjusted prices of products that that are non-SEP-reliant. Nevertheless, no matter how they treated the data, Galetovic, Haber and Levine could not reject the null hypothesis that there was no patent holdup or royalty stacking in SEP-reliant industries.

Galetovic and Gupta (2016) assess the hypothesis that royalty stacking has occurred in a canonical patent holdup industry – mobile wireless. Figure 3 is adapted from their paper. The right axis shows that the number of firms that declared SEPs to ETSI (a consortium of standard setting organizations formed to develop 3G technology) increases from 2 to 128 between 1994 and 2013. On the left axis, Figure 3 shows the average annual wholesale price of phones and tablets by technological generation (2G, 2.5G, 3G, 3.5G, 4G). Note that the introductory price of every generation is lower than previous generation — even though each generation delivers better products. Note also that, within each generation, prices fell between 10 and 20 percent per annum. The behavior of prices is inconsistent with royalty stacking: as the number of SEPs grew from 2 to 128, prices should have increased.

The rapid fall of prices is a sign of a thriving industry. As Mallinson (2016) reports, "[…] at around 7.5 billion subscriber connections by June 2015, basic cellular telephony has already achieved extraordinary, worldwide penetration, given the estimated global adult population of 5.0 billion." Indeed, during the last ten years fast technological progress has reshaped the industry. According to Malinson (2016):

> Successive generations of mobile technology have continued to massively increase performance. For example, end-user data rates have increased well over 1,000-fold since 1991. With the first commercial services of GPRS in 2000, this 2G GSM technology initially provided users with data speeds of up to 56 kilobits per second. By around 2005 in most developed nations, 3G UMTS with WCDMA provided users up to 384 kbps. Technology enhancements to WCDMA with HSDPA and HSPA+ then provided ever-increasing speeds from megabits per second to tens of megabits per second. Today, 4G Long-Term-Evolution ("LTE") networks are providing users in excess of 100,000 kbps (100 Mbps).

Indeed, faster speeds have

> […] transformed the purpose of cellular communications. What, until the latter part of the last decade, was primarily a means of voice and simple text communication is now overwhelmingly used for the high-bandwidth data that smartphones both consume and generate. Usage includes viewing web pages, downloading video, uploading photographs and video, on-line gaming, immediate dissemination of such content through social media platforms, audio and video streaming including video conferencing.

IV. CONCLUSION

For many years Patent Holdup Theory has influenced antitrust thinking and action in SEP- intensive industries the world over. Yet while the theory predicts market failure or industry stagnation at best, SEP-intensive industries have thrived and consumers have benefitted from better products at lower prices. It should not be surprising, therefore, that proponents of the theories have failed to produce evidence that patent hold up and royalty stacking systematically affect the performance of SEP-intensive industries. Thriving industries are inconsistent with both patent holdup and royalty stacking and show that Patent Holdup Theory is rejected by the data. It is a failed theory and should be abandoned as guide of antitrust policy.

Figure 1
Royalty stacking and output

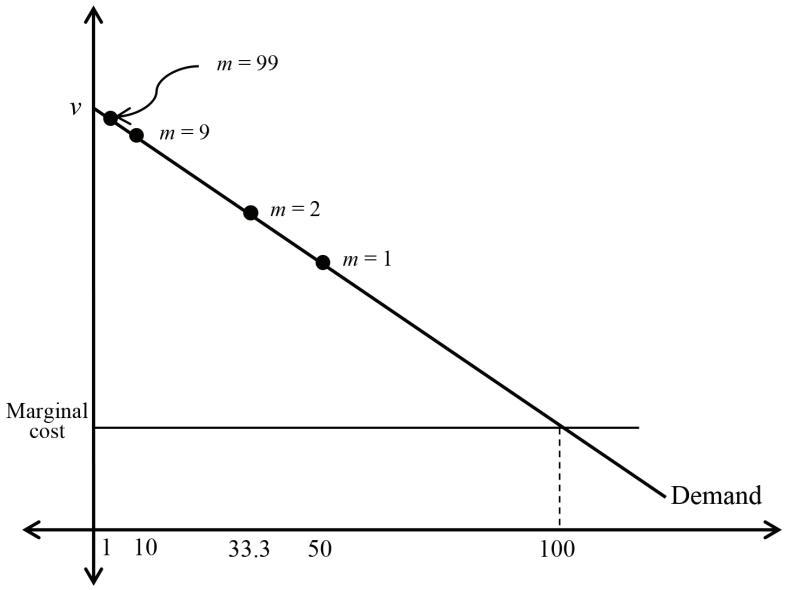


Figure 2
Quality-Adjusted Relative Prices of SEP-Intensive Consumer Products (rest of the economy = 100)

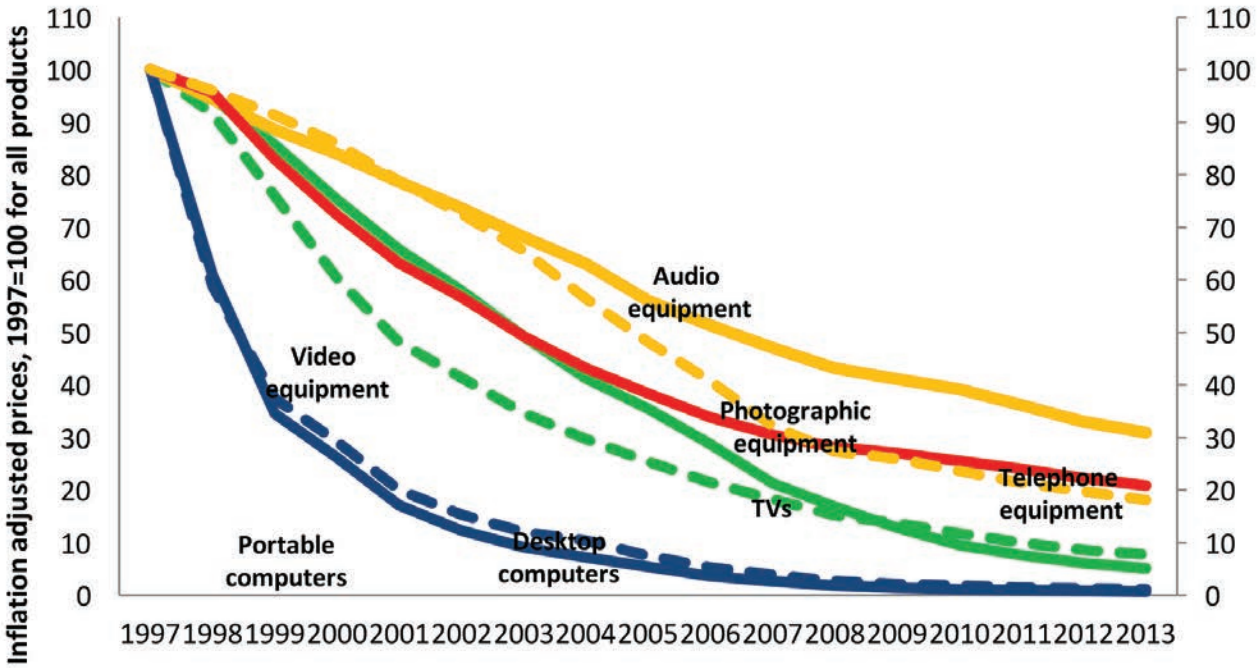
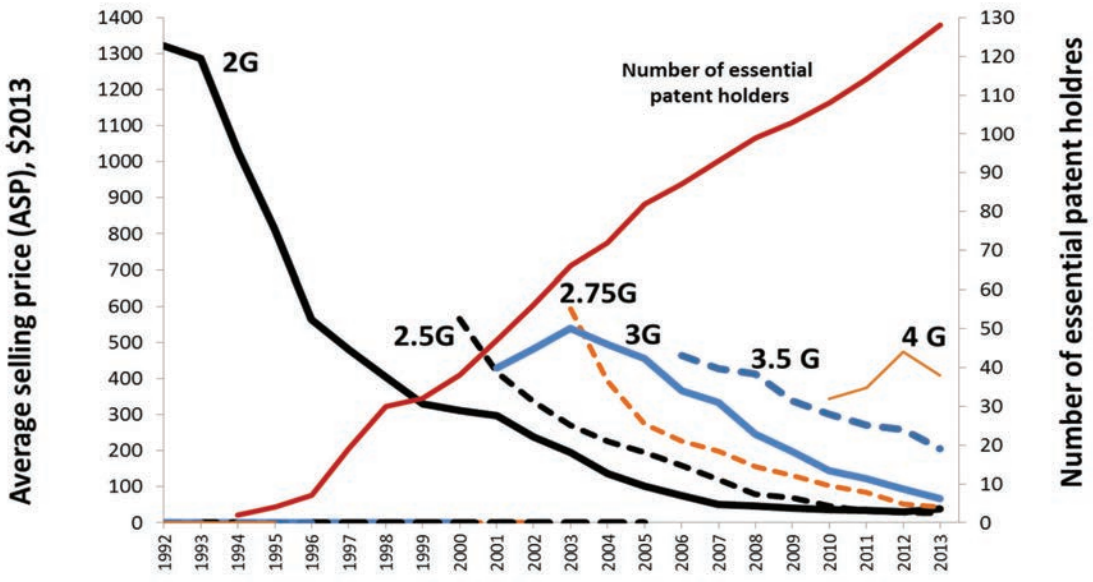


Figure 3
Average selling price of devices and number of SEP holders



REFERENCES

Cockburn, I, M. MacGarvie, E. Muller, 2010, "Patent Thickets, Licensing, and Innovative Performance," Industrial and Corporate Change 19: 899-925.

Contreras, J., 2015, "Standards, Royalty Stacking, and Collective Action," CPI Antitrust Chronicle, March, 1-8.

Contreras, J., 2016, "Patents and Internet Standards," Global Comission on Internet Governance Paper Series N° 29, London: Chatam House.

Denicolo, V., D. Geradin, A. Layne-Farrar, and J. Padilla. 2008. "Revisiting Injunctive Relief: Interpreting eBay in High-Tech Industries with Non-Practicing Patent Holders." Journal of Competition Law and Economics 4: 571-608.

Egan, E. and D. Teece, 2015, "Untangling the Patent Thicket Literature," Working Paper.

Farrell J., J. Hayes, C. Shapiro and T. Sullivan 2007, "Standard Setting, Patents and Hold-up," Antitrust Law Journal 74: 603-70.

Flamm, K. 2010, "Economic Benefits from Technological Innovation in Microelectronics," Working paper.

Galetovic, A. and K. Gupta, 2016, "Royalty Stacking and Standard Essential Patents: Theory and Evidence from the World Wireless Industry," Hoover IP2 Working Paper 15012.

Galetovic, A. and S. Haber, 2016, "Disentangling a Conceptual Thicket: The Economics of Patent Holdup," Hoover IP2 Working Paper.

Galetovic, A., S. Haber, and R. Levine. 2015. "An Empirical Examination of Patent Holdup." Journal of Competition Law and Economics 11: 549-78.

Gerardin, D. A. Layne-Farrar and J. Padilla, (2008), "The Complements Problem Within Standard Setting: Assessing the Evidence on Royalty Stacking," Boston University Journal of Science and Technology Law 14, 144-76.

Griliches, Z. and D. Jorgenson, 1967, "The Explanation of Productivity Change". Review of Economic Studies 34, 249–83.

Hall, B., C. Helmers, and G.von Graevenitz, 2015, "Technology Entry in the Presence of Patent Thickets." NBER Working Paper 21455.

Jorgenson, D., 2004, "Accounting for Growth in the Information Age," in D. Jorgenson and C. W. Wessner (editors), Productivity and Cyclicality in Semiconductors: Trends, Implications, and Questions, Washington DC, National Research Council.

Jorgenson, D. and C. W. Wessner (editors), 2004, Productivity and Cyclicality in Semiconductors: Trends, Implications, and Questions, Washington DC, National Research Council.

Jorgenson, D. and C. W. Wessner (editors), 2007, Enhancing Productivity Growth in the Information Age: Measuring and Sustaining the New Economy, Washington DC, National Research Council.

Layne-Farrar, A., 2014, "Patent Holdup and Royalty Stacking: Theory and Evidence, Where do

We Stand after 15 Years of History?" Directorate for Financial and Enterprise Affairs, Competition Committee. Paris OECD.

Lemley, M., 2007, "Ten Things to Do About Patent Holdup of Standards and One Not to," Boston College Law Review, 48: 149-168

Lemley, M. and C. Shapiro, 2007, "Patent Holdup and Royalty Stacking," Texas Law Review 85, 1991-2049.

Mallinson, K., 2016, "Don't Fix What Isn't Broken: The Extraordinary Record of Innovations and Success in the Cellular Industry Under Existing Licensing Practices," George Mason Law Review 23, 967-1006.

Noel, M. and M. Schankerman, 2013, "Strategic Patenting and Software Innovation," Journal of Industrial Economics 61: 481-520.

Nordhaus, W., 2007, "Two Centuries of Productivity Growth in Computing," Journal of Economic History 67, 128-59.

Scott Morton, F. and C. Shapiro, 2016, "Patent Assertions: Are We Any Closer to Aligning Reward to Contribution?" in Josh Lerner and Scott Stern, eds., Innovation Policy and the Economy: Volume 15. Chicago: University of Chicago Press, 89-133.

Shapiro, C., 2001, "Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting," in Adam Jaffe, Josh Lerner, and Scott Stern, eds., Innovation Policy and the Economy: Volume 1. Chicago: University of Chicago Press, 119-150.

Shapiro, C., 2007, "Patent Reform: Aligning Reward and Contribution," in Adam Jaffe, Josh Lerner, and Scott Stern, eds., Innovation Policy and the Economy, Volume 8, ed., 111 - 56.

Spulber, D. 2016, "Complementary Monopolies and Bargaining," mimeo, Northwestern University.

United States Federal Trade Commission, 2003, To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy.

United States Federal Trade Commission, 2011, "The Evolving IP Marketplace: Aligning Patent Notice and Remedies With Competition."

Von Graevenitz, G, S. Wagner, and D. Harhoff, 2011, "How to Measure Patent Thickets: A Novel Approach," Economic Letters 111: 6-9.

Ziedonis, R., 2004, "Don't Fence Me In: Fragmented Markets for Technology in the Patent Acquisition Strategies of Firms," Management Science 50: 804-20.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