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"Regulating Patent Hold-Up"

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by
Paul Belleflamme
Axel Gautier
Jorge Marcos Ramos
&
Norman Neyrinck

FIRST PANEL

Chaired by Prof. **Axel GAUTIER** (University of Liege, LCII), this first interdisciplinary panel sought to offer an academic perspective on the "patent hold-up" issue.

To introduce the panel, Prof. GAUTIER gave a brief recount of the patent hold-up theory as pioneered by economist Carl Shapiro (2001)[i]. According to Shapiro, standard setting processes and technology lock-in effects place holders of Standard Essential Patents ('SEP') in a position to extract royalties ***in excess of*** the added value of their patented technology. In turn, the cumulative operation of patent hold-up would lead to situations of "*royalty stacking*". In Shapiro's view, *ex-ante* disclosure and Fair Reasonable and Non-Discriminatory ('FRAND') commitments or *ex-post* litigation are not sufficient to solve the hold-up problem. Therefore, there is a risk that innovation could be significantly impeded.

Shapiro's patent holdup theory has been very influential. Various administrative agencies have tried to curb the bargaining power of SEP holders. To date, this has mainly been done by seeking to restrict SEPs owners' ability to seek injunctions before courts. More recently, scholars and SSOs have discussed new rules to frame licensing negotiations and their terms: Lerner and Tirole (2014)[ii] have proposed a structured price commitment by patent holders ***before*** the standard is finalized; the Institute of Electrical and Electronics Engineers ('IEEE') has proposed to use the "smallest saleable practicing unit" ('SSPPU') as the new benchmark reference for establishing FRAND rates. These changes would significantly modify the royalty rate negotiations between the patent holder and the technology implementers.

Professor **Stephen HABER** from Stanford University first discussed three problems which are often conflated in the literature: royalty stacking, patent hold-up and the market power that the standardization process allegedly confers to SEP holders. Although these three distinct problems have testable empirical implications, evidence of one is not evidence of the other two. In this respect, Prof. HABER provided separate evidence against royalty stacking and hold-up as widespread phenomena.

Royalty stacking implies that, when each patent holder individually sets its royalty rate, prices are inefficiently high due to complementarity between all the patents included in the standard. And, as the number of patents increases, the aggregate royalty rate goes up but individual rates go down. This problem is also known as the Cournot complement problem. Royalty stacking implies higher marginal costs for retailers and ultimately higher retail prices for consumers and a lower output. Looking at data from the wireless phone industry, Prof. Haber showed the opposite trend: the number of SEP holders has continuously grown in the industry while, at the same time, sales of phones increased and prices went down.

Referring to Williamson's definition of hold-up, Prof. HABER insisted on the fact that there is no hold-up without "*guile*" or opportunism. Opportunism in the context of asset specific investments allows Firm A, the SEP holder, to extract the quasi rents of Firm B, the downstream retailer, to the point that A's profits are maximized and B only covers its variable costs of production. Therefore, the retailer, firm B, no longer has an incentive to innovate.

Against this background, Prof. HABER showed empirical evidence of entry in the downstream market and continuous innovation (measured by a declining quality adjusted prices in the IT sector). This significant innovative activity tends to invalidate the hold-up hypothesis as a widespread phenomenon.

In turn, Prof. **Pierre LAROUCHE** from Tilburg University discussed how to frame patent hold-up within European laws. He insisted on how different fields of the law could be used to settle patent disputes. These disputes often stem from the probabilistic nature of patents. Patents can be invalidated by courts, which creates uncertainty over their value. Legal challenges (i.e.: validity challenges or claims for injunctions) are the only way to lift this uncertainty.

Against this background, Prof. LAROUCHE classified patent disputes in four categories (negotiation, hold-up, runaway and exclusion) and looked at the most appropriate legal intervention for each one.

- *Negotiation*: parties negotiate and can resort to arbitration/court if they fail to reach an agreement on royalty rates; in this case, no public intervention is needed.
- *Hold-up*: the SEP holder wants to extract exorbitant royalties from the implementer; hold-up cases can be treated as exploitative abuses under competition law.
- *Runaway* (or 'reverse hold-up'): the implementer wants to implement the standard without the SEP license; intervention falls under IP law (injunctions). However, injunction as an equitable relief is not harmonized in Europe since Directive 2004/48 on the enforcement of IP rights has diverging implementations in the Member States. EU competition law may be used to provide harmonization.
- *Exclusion* (with vertically integrated parties): the SEP holder seeks to exclude implementers from the market. This exclusionary conduct may fall within the scope of competition law.

Gregor LANGUS, a former vice president at Compass Lexecon, talked about the institutional aspects of the hold-up debate. This context is of prime importance since hold-up may take place only where FRAND commitments are not enforceable. If FRAND commitments are enforceable, either an unbiased third party can review the terms of the license or a court can assess the willingness of the licensor to take a license before granting an injunction. In both cases, this seems to be sufficient to eliminate the risk of a direct hold-up. In contrast, FRAND commitments can create a risk of reverse hold-up (royalties below FRAND) since FRAND commitments are only one-sided: no obligation lies on the shoulders of the implementer, but only on those of the SEP holder. Furthermore, antitrust liability is also one-sided and reinforces the risk of reverse hold-up. In that regard, the recent *Huawei/ZTE* Judgment insists on the need for an explicit FRAND assessment in the procedure but does not remove the antitrust liability risk that Mr. LANGUS considers to be unnecessary.

The last speaker, Professor **Jorge CONTRERAS** from the University of Utah made a critical re-assessment of the hold-up debate. He discussed the lack of direct and indirect empirical evidence concerning the likely *effects* of the alleged conduct. He stressed that effects should be assessed against an appropriate counterfactual, which is obviously hard to construct. Prof. CONTRERAS said that well-functioning markets are not sufficient to exclude anticompetitive behavior. For the enforcement of antitrust law, anecdotal evidence is sufficient to prosecute antitrust/competition violations and market-wide statistical/empirical evidence is <u>not</u> required. Therefore, agencies should continue to monitor, investigate and prosecute anticompetitive conduct involving SEPs (with or without hold-up). Preventing potential hold-up remains thus a valid policy objective.

SECOND PANEL

The second panel aimed at gathering the views from policy makers and stakeholders. It was chaired by **Gunnar WOLF** (DG COMP, European Commission).

Opening the second panel, **Yann MENIERE,** Chief Economist of the European Patent Office (EPO), sketched the context in which patent hold-up takes place and discussed the (limited) role of the EPO to tackle these issues. He stressed that, in stark contrast with other industries[iii], the specificities of the ICT sector – i.e. a high number of granted patents and rapid cycles of innovation-and-imitation – are the causes for *ex post* negotiations of non-exclusive licenses taking place after the adoption of the standard. Yet, in most cases the industry efficiently deals with these features through patent pools and portfolios agreements, Mr. MENIERE said. Patent hold-up would then only appear in an Standard Setting Organizations ('SSO') context[iv]. Yet, even in such scenarios, hold-up is not a matter to be dealt with under patent law but a matter for contract or competition law since "essentiality" is a matter of infringement and not a matter of validity. Against this background, the sole duty of the Patent Office is to maintain the quality and the transparency of the patent system. On this, the efforts of the EPO are twofold. First, the EPO tracks ownership transactions and patent sales over time. Second, it works to offer an accurate picture of the prior art. These efforts allow SSOs players to better assess the validity and the ownership of SEPs.

Serge RAES, Vice-Chair of the ETSI IPR Special Committee, Chair of the ITU IPR Ad Hoc Group, Rapporteur on Patent Issues, Orange, highlighted several dynamics regarding the implementation of SSOs IP licensing Policies. He emphasized that FRAND requirements only demand fair-play in negotiations and that any additional requirement would increase the burden of the dealings and, in turn, increase costs. Moreover, FRAND must be applied to all licensing terms and not only to royalty fees, Mr. RAES said. Heated debates are still taking place amongst most SSOs but some conclusions can already be drawn. There is no consensus on the need (1) to limit the right to seek injunctive relief in case of a SEP infringement; (2) to define or quantify the meaning of FRAND or adopt the adopt the "smallest saleable practicing unit" principle; (3) to grant a license at the demand of any implementer regardless of its position in the manufacturing chain. In contrast, consensus has emerged to (a) include rules for transferring SEP FRAND pledges to any successor of the patent holder; and (b) to look for means to improve transparency in SEP declarations.

Scott KIEFF, Commissioner of the US International Trade Commission (ITC), brought an institutional view from the other side of the Atlantic. He discussed the dynamics of litigation before the US ITC. He emphasized that, contrary to what could happen before the US Patent Office and the DoJ Antitrust Division, the US ITC had the opportunity to simultaneously hear about all relevant legal issues on patent and antitrust law – namely, infringement, patent validity, antitrust and remedies. Scott KIEFF stressed that such a feature imposes modesty and self-discipline on parties. For instance, under such circumstances, the parties cannot claim an excessive patent scope for the purpose of infringement without exposing themselves to the threat of an invalidity decision. Commissioner SCOTT concluded that institutional design does have an impact on the quality of decision-making.

Alvaro RAMOS, Antitrust Legal Counsel with Qualcomm, dismissed the idea of any systematic patent hold-up problem. He made the claim that disclosure *does* happen in the vast majority of cases before the standard is adopted so that implementers know what they are confronted with. He underlined that SEPs do not provide market power since FRAND requirements are enforceable in court, and patentees have incentives not to be too greedy since the commercial success of the standard is in their best interest. Alvaro RAMOS also criticized the "smallest saleable practicing unit" principle as having no rationale but to serve as a psychological tool for shifting bargaining power (and revenues) away from patentees.

Lastly, **Hugues de la MOTTE,** Policy Officer at DG GROW, pleaded for a better regulatory framework for IOTs. He advocated for more predictability on IP issues, through inclusive efforts on essentiality, enforcement and the valuation of technologies. He pleaded for a cascade of actions to clear the picture and identify essential patents through (i) patent disclosure, (ii) an essentiality check by engineers and (iii) third-party scrutiny by patent examiners. Regarding enforcement, Hugues de la MOTTE advocated for a clarification of the legal regime (clearer rules than Huawei). On valuation, he pleaded for tools to better determine the value of inventions and distribute that value across the production chain.

THIRD PANEL

The third panel focused on the main trends in antitrust and IP law with a strong focus on the legal implications of the patent hold-up phenomenon.

Renata HESSE, DAAG with the US Department of Justice (DOJ), gave a general view of the US perspective on the matter and some personal insights as DAAG. In particular she commented on the DOJ's Business Review Letter regarding IEEE's revised patent policy, and expressed concerns that millions of dollars were being spent by industry on fighting against clarity regarding FRAND.

According to Mrs. HESSE, the theory of hold-up is well founded in economics and whether it is happening is a bit of a side-show. In fact, (F)RAND commitments are incorporated into the IP policies of SSOs to deal with hold-up. This ensures that the patent holder retains a reasonable reward, and that the implementer will not be held up. In particular, Courts in the US have been clear that SEP owners do not get to be compensated for the value of the standardization but for the value of the technology to which the patent has contributed.

In a similar way as Prof. LAROUCHE, Renata HESSE considered that antitrust laws are well placed to address the phenomenon of hold-up, as hold-up necessarily involves the misuse of market power. On the contrary, hold-out (or reverse patent hold-up) situations seem to be better addressed under the IP law system by recourse to invalidity and infringement proceedings.

Renata HESSE explained that the business review letter issued in relation to the IEEE revised patent policy concerned "proposed conduct" that IEEE had not yet already implemented. The objective of IEEE's submission was to give information about an intended behavior and ask the DOJ for its opinion in terms of enforcement intentions. In clarifying its position, the DOJ employed a rule of reason analysis, aimed at discovering the pro-competitive efficiencies associated with IEEE's patent policy that included licensing negotiations and the improvement of the standard setting process. The DOJ concluded that the IEEE revised patent policy did not pose anticompetitive threats for four main reasons: (i) licensing rates are bilateral; (ii) they are not out of step with the direction of the case-law in the US; (iii) patent holders can avoid making licensing commitments under the updated patent policy and still participate in the standard setting process; and (iv) patent holders can still choose to depart to other SSOs

Nicolas PETIT, Professor, LCII, University of Liege, discussed the EU competition law implications of SSOs' patent policy guidelines.

In particular, Prof. PETIT argued that the rules on coordinated conduct in the EU are much more stringent than under US antitrust law. He discussed, whether SSO changes in their IP licensing policies – such as IEEE revised patent policy that provides a definition of reasonable rates and then advises on a valuation methodology – could lead to liability under EU competition law.

Several past judgments of the EU courts where trade associations had tried to come up with an understanding concerning reasonable rates suggest that this can be the case.

In those decisions, the EU Courts embraced the idea that any coordination that tampers with the price system is a "sin" in itself. As a result, the more SSOs encourage FRAND terms and give substance to reasonable rates, the closer they come to a risk of antitrust liability.

Prof. PETIT was however careful to stress that his analysis shall not be understood as meaning that competition authorities will open cases against SSOs for adopting such pricing and valuation guidelines, but rather that there is a need for a rigorous *ex ante* assessment of changes of the kind brought about by IEEE. Such *ex ante* assessment is warranted by the expansive theories of liability regarding the price system.

Peter TOCHTERMANN, Judge at the Mannheim District Court, discussed some gaps left open post *Huawei*. To support his claims, he provided evidence from litigation concerning SEP injunctions before German courts:

1. Is the regime already applicable to cases where the claim was filed before the *Huawei* decision was rendered? Under German law the SEP owner wanted to follow the *Orange Book* case law according to which it is up to the infringer to take the first step and make an offer. On the contrary *Huawei* contends that the SEP owner has to take this first step. What would the SEP owner do if the Court were to dismiss its claim because it did not follow the framework set by *Huawei* ex ante when it filed the claim? Under German law, the SEP owner could then withdraw the claim, fulfil the requirement and then file the case again where the oral hearing had not yet taken place. Instead, if the oral hearing had already taken place, the withdrawal would only be possible as long as the defendant would consent to it. The Manheim court ultimately decided that *Huawei* applies *ex nunc*.

2. How must the patent infringer be alerted or informed? Should the claim be substantiated so as to allow the Court to render a judgment on default or is it sufficient to inform the other side with claim charts? Does the claimant have to give sufficient information only about the patent that is the basis of the claim or, if it seeks a worldwide portfolio license, make a substantiated description of *all* the patents in the portfolio? The Manheim court does not consider the latter an adequate approach and considers that claim charts are enough to inform the infringer and summarize the technical field of the invention. Thereafter, it will be for the defendant to assess whether the patent is valid and whether it is incorporated into the technology itself.

3. Should FRAND be assessed objectively or from the claimant's perspective? According to the *Huawei* ruling, the question is whether a claimant has convincing grounds for thinking that its offer is FRAND. According to the Manheim court, claimants can prove this is the case by referring to licensing programs they already have. The defendant can then put forward a counterclaim, explaining why the offer isn't FRAND.

4. When the ECJ held that, upon rejection of the counteroffer by the claimant the infringing party has to provide an appropriate security, how should the quantum of the deposit be fixed? Should this amount be based on the sales of allegedly infringing products in the country where the claim was filed or worldwide? Most of defendants offered securities on a per country basis. But such cases usually concern portfolio licenses that implement and sell the technology worldwide. A deposit based on worldwide sales would thus be more appropriate.

Miguel RATO, Partner at Shearman & Sterling LLP, made some comments on *Huawei* from a practitioner's perspective, and also put in doubt the "quick look" and not "full-fledged" approach of the German courts, as a negative quick look appraisal could unduly trigger antitrust liability. In Mr. RATO's view, *Huawei* provides several insights:

1. The ruling introduces a novel type of abuse: antitrust liability for asking remedies from the court in the field of SEPs.

2. The ruling creates a limited safe-harbor for *dominant* SEP holders that have given a FRAND commitment. In these special circumstances, they can seek injunctions. The ruling is mute when those circumstances are not met.

3. The ruling requires the establishment of dominance. The owner of an SEP is not automatically dominant. The *Huawei* Court actually observes that both parties have equivalent bargaining power as holders of numerous SEPs vis-à-vis each other.

4. The ruling requires that the SEPs are valid, that they are actually essential (not just declared as essential). This would actually presuppose that the Court has to carry out an analysis of these factors..

5. It implicitly rejects the notion of "*willing licensee*" as described by the Commission in *Motorola*, *Samsung* and *Google/MMI*. Under the "*willing licensee*" test, the plaintiff must prove that that the defendant was unwilling to take a license for the SEP.

6. The burden of proof is reversed. It is the implementer who has to prove that the SEP holder's conduct is abusive.

7. The ruling is silent on the theories of hold-up, royalty stacking and the notion of excessive royalties/exploitation.

8. The ruling only applies to implementers that compete downstream. It is thus based upon the notion of anticompetitive leveraging. Under this theory of harm, the owner of the patent wants to "*reserve to itself the manufacture of the products in question*" (§52).

9. The ruling excludes the threat to an injunction as a possible antitrust infringement. This marks a departure from *Motorola* where the mere threat of an injunction was seen as sufficient to give rise to antitrust liability. This creates a possible enforcement gap. An SEP owner could avoid antitrust liability by making a request for an injunction *conditional* upon a prior finding by the court that it has complied with the *Huawei* prescriptions.

10. The judgement's main flaw is that it is at odds with basic principles of competition law, which requires a factual analysis of competitive constraints and circumstances. This is, for example, evidence is section 7 of the Commission's guidelines on cooperation agreements. According to the guidelines, the potentially anticompetitive effects of a standardization agreement depend on the question of access. If there is competition between standardized and non-standardized solutions, a limitation of access may not produce restrictive effects of competition. *Huawei* runs counter to this analysis. The Court ruled that "*the fact that that patent has obtained SEP status means that its proprietor can prevent products manufactured by competitors from appearing or remaining on the market*" (§52). The Huawei Court thus equates an SEP with the ability to engage in anticompetitive conduct.

Jorge PADILLA, Senior Managing Director, Compass Lexecon, gave an economist's perspective on the difficulties encountered when assessing FRAND commitments.

In his view, the role of economists in licensing negotiations and arbitration has increased following *Huawei* as it has brought back FRAND to the center of the debate. The job of determining FRAND is however tough for arbitrators, courts and economists. This task is complicated by the polarized literature surrounding the notion of FRAND. There is however consensus as to the rationale of FRAND: FRAND commitments are there because the process of standardization might potentially increase market power. FRAND commitments mitigate these concerns. But how should FRAND be calculated? Mr. Padilla divided his presentation in two sections: a theoretical framework and practical considerations.

<u>The theoretical framework</u> would tell us to compare the actual scenario with a counterfactual: what would have been the royalties obtained in a negotiation taking place before standardization happened? According to Mr. Padilla a calculation of what constitutes a FRAND royalty rate requires an assessment of:

- the number and quality of *ex ante* substitutes;
- the incremental value of the technology over other alternatives as revealed *ex post* (once the standard has been implemented);
- the technological contribution to the standard (complements).

However, the theoretical framework does not tell us how to calculate all these elements. He further highlighted that the incremental value rule should be used with care it could create distortions in terms of incentives to innovate and incentives to participate in SSOs.

<u>In practice,</u> the incremental value rule is impossible to implement since, in most cases, there are either no clear *ex ante* benchmarks or these are not available. Moreover, according to Mr. PADILLA the approach advanced in *Innovatio*[v] is flawed as a matter of economics because it assumes that the price of the product is fixed and is independent of the royalty rate.

Practice is thus left with the use of "comparables" which are not without challenges such as: out-licenses vs. cross-licenses vs. in-licenses; per unit vs. ad valorem rates, the need to take into account differences across portfolios, the need to account for asymmetries in bargaining power (*ex ante* market power of the licensor), volumes, ASPs, etc. Potential hold up and hold out biases in benchmark rates must also be taken into account. Mr. PADILLA also questioned how the probabilistic nature of patents should be accounted for.

Mr. PADILLA discussed in particular what royalty base should be chosen: ad valorem or per unit royalties? In his view the discussion between the two types of royalties is to some extent arbitrary because the royalty rate can easily adjust upwards or downwards: the final royalty payment can be mathematically identical irrespective of the royalty base. However, ad valorem royalties are easier to apply and prone to fewer errors and subjective decisions than royalties based on the price or the value of components (or portions thereof) implementing a particular patented technology.

Josef DREXL, Professor, Max Planck Institute for Innovation and Competition, closed the panel addressing three points raised by the rest of the panelists.

He first criticized the point made by Mr. Rato regarding the applicability of *Huawei* to vertically integrated firms. To dismiss RATO's view, Mr. DREXL explained that in *Sisvel v Haier*, the first judgement rendered post-*Huawei* in Germany, the Düsseldorf court applied the *Huawei* framework to an injunction sought by *Sisvel*, an *NPE*, and eventually granted the injunction by applying *Huawei*. This was in his view enormously important and the correct outcome, given the increasing number of NPEs.

Secondly, he criticized the *ex nunc* application of *Huawei* as defended by Mr. TOCHTERMANN. In Mr. DREXL's view, the Orange Book standard could hardly create any legitimate expectations on FRAND-encumbered SEP owners, as the framework in the judgement was not based on the existence of a FRAND commitment.

Thirdly, he noted that there was a split between German courts. On one side, the Düsseldorf higher Court suspended the interim enforcement of the lower court judgement in favor of the patent owner on the basis that the lower Court had not looked at the FRAND nature of the offer made by the patent owner. It thus took a more pro-licensee approach. On the contrary, the Manheim Court seemed more "*pro patent owner*" since it did not look at the FRAND nature of the offer given by the patent owner.

<u>CONCLUSIONS</u>

Professor Paul BELLEFLAMME, CORE and LSM, Université catholique de Louvain made the concluding remarks of the conference.

Throughout the workshop, participants had attempted to answer the following three questions:

- What is the problem?
- How serious is the problem?
- How to solve the problem?

The first question – **what is the problem?** – concerned the definition of patent hold-up. It is widely agreed that a patent hold-up may arise in the context of negotiations between a patent holder and an implementer when ex ante licensing is impractical and when the patent holder enjoys a larger bargaining power in ex post negotiations. What separates 'ex ante' from 'ex post' is the moment when the implementer sinks some resources that are specific to the patent at stake. The patent holder can then take advantage of the implementer's reduced flexibility and, opportunistically, extract larger ('unreasonable') licensing fees, especially when the patent holder can obtain an injunction for patent infringement if licensing negotiation fails. In the case of standard-essential patents (SEPs), another form of hold-up is the 'patent ambush', whereby a participant to a standard development process fails to disclose that it holds (or will hold) a patent that is relevant to the standard and only asserts it once the standard is adopted.

The second question – **how serious is the problem?** – was both conceptual and empirical. From a *conceptual point of view*, several commentators suggest that the problem may be over-emphasized. First, one may conclude too quickly that SEPs confer market power and that market power leads to hold-up, while none of these two causal links is clearly established. Second, the possibility exists that it is not the patent holder but the implementer who has the largest bargaining power in licensing negotiations, for instance because of a monopsony position; in this case of ‘reverse hold-up’, the patent holder may end up receiving licensing revenues that are lower – and not higher – than the value of their patent. From an *empirical point of view*, the question is how to measure the problem. First, several stylized facts suggest that the problem is likely to exist, especially in the field of ICTs where the need for interoperability and the high pace of technological progress imply that most licensing contracts are negotiated ex post. Yet, there is a clear lack of direct evidence, as most licensing agreements are kept secret. One should then rely on secondary evidence by testing if the likely consequences of patent hold-up (such as higher final good prices or lower rate of entry in the industry) are observed in reality; however, this methodology is fraught with at least two difficulties: the counterfactual is hard to determine and the lack of secondary evidence is in itself no proof that the problem does not exist. Anyway, as some commentators claim, this debate may be a bit vain, as it is not necessary to collect evidence of a market-wide phenomenon to prove the anticompetitive conduct of a particular company.

As for the final question – **how to solve the problem?** – it is debatable whether it should be asked at all: if the problem is largely exaggerated, then no solution is needed. There is an agreement, however, on the need to address properly the issue not only to make standard development processes more predictable but also to preserve incentives to innovate. A first way to solve the problem is to prevent it from happening. This can be achieved through ad hoc contractual arrangements (portfolio licensing, cross-licensing, patent pools) or through regulatory means implemented by standard-setting organizations (such as the definition of (F)RAND licenses). If this fails, then solutions need to be found to fix the problem when it occurs. Some commentators argued that disputes could be addressed under intellectual property law or contract law. Others posited that these issues would be better addressed under competition law. Although the issue is not settled, some conditions were advanced for competition law to be used to address hold-up problems: the theory of harm should be better articulated, and neither the probabilistic context of patents nor the possibility of reverse hold-up should be ignored.

In sum, even it was suggested to “*stop obsessing over hold-up*”, the variety of analyses and viewpoints that were proposed during the workshop suggests that the debate over the existence of a systemic or anecdotic problem with patent hold-up, and the necessity of remedying it with regulation, is far from over. The various interventions undoubtedly brought some clarification to this ongoing debate.

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[i] SHAPIRO, Carl. “Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting” in A. Jaffe, J. Lerner,and S. Stern, eds., Innovation policy and the economy, Vol. 1. Cambridge, MA: MIT Press, 2001, pp. 119-50.

[ii] LERNER, J. and J. TIROLE (2014) “A Better Route to Tech Standards”, Science, vol 943, pp 972-3.

[iii] For instance, in the pharma sector negotiations are said to take place *ex ante* through exclusive transfers of knowledge.

[iv] Yann MENIERE dismissed ‘Patent Assertion Entities’ (or ‘patent-troll’) issues. A phenomenon said to have mainly taken place – if not exclusively – in the US, before the *eBay* and *Alice* cases, because of weak US software patents and injunctive reliefs granted by non-professional jury’s.

[v] Also referred to as the top-down approach.