

## **Can standard setting organizations address patent hold-up? Comments for the Federal Trade Commission**

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Standard setting organizations (SSOs) are forums where firms negotiate over shared design parameters so their products can work well together. This process produces many benefits: users may share information, or “mix and match” components; the cost of market entry declines; and there is a division of labor, enabling specialization in component production and innovation. While inter-operability can be achieved in other ways, such as decentralized technology adoption or the actions of a dominant firm, SSOs are perhaps the most common path to compatibility.<sup>1</sup>

Antitrust authorities have generally viewed SSOs as a form of pro-competitive horizontal cooperation. For example, the United States’ Standards Development Organization Advancement Act of 2004 (H.R. 1086) provides that SSOs are evaluated under an antitrust rule of reason, and are subject to actual rather than treble damages. However, there is concern among academics, policy-makers and practitioners that patent-holders can exploit the cooperative standard setting process to extract excessive royalties from standards implementers.

When a patent is necessarily infringed by compliant implementations of an industry standard, it is called “essential.” Essential patents can be very valuable, since a successful standard reduces competition from substitute technologies. Thus, while SSOs may have good reasons to include patented technology in an industry standard, doing so places essential patent owners in a very strong bargaining position if the standard succeeds. This is a special case of what economists call the “hold up” problem.

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<sup>1</sup> Biddle, White and Woods (2010) identified over 500 compatibility standards used in a prototypical laptop computer and found that 80 percent were developed by consortia and formal standards developing organizations. See Farrell and Simcoe (2011) for one discussion comparing alternative paths to compatibility.

Patent hold-up problems could be solved by disclosing patents and negotiating prices before choosing a standard. But uncertainty over the existence, validity and scope of potentially essential patents makes it difficult to negotiate a license prior to implementation. As an alternative, many SSOs ask patent-holders to commit to reasonable and non-discriminatory (RAND) licensing terms. However, many observers worry that it is not clear how firms or courts are meant to interpret this promise.

Proponents of the current system argue that SSOs should focus on technical issues; intellectual property owners should be compensated for the costs and risks of technology development; and that prospective licensees can avoid the hold-up problem by taking a RAND license or proposing an alternative technology within the SSO. These are valid points, but there is a counter-argument to each. Technical decisions should always be weighed against the likely costs of implementation, which include licensing. As described in the FTC's report on "The Evolving IP Marketplace" (FTC 2011), overcompensating patent owners has real social costs. And it is unclear whether the patent system or the disclosure rules adopted by many SSOs provide sufficient notice for prospective standards implementers to engage in *ex ante* negotiation.

This short essay argues that patent hold-up in standard setting is a real problem, and considers several steps that SSOs, courts and policy-makers might take to address the issue.

### **Standard setting and patent hold-up**

Standard setting organizations serve as a forum where industry participants perform collaborative research and discuss the merits of alternative technologies. The goal is to identify the best available solution to a given technical problem when there are gains from coordinating on a common design. Ultimately, SSOs choose a particular technology and issue a formal endorsement. This certification is meant to

signal the end of deliberations and promote industry-wide investments in the new technology.<sup>2</sup>

Difficulties arise when investments in a new standard are sunk (i.e. irreversible or technology-specific), leading to what economists call a “hold-up” problem.<sup>3</sup> Sunk investments make a technology cheaper to deploy (on a forward-looking basis) than alternative solutions that offered a potential substitute before standardization. Thus, when the technology in a standard is patented, the intellectual-property holder can charge royalties up to the difference in implementation costs before vendors will switch – even when the *ex ante* cost structure of two technologies was identical.<sup>4</sup> In other words, a patent that is worthless prior to standardization (given the existence of a perfect substitute) may become quite valuable if SSO endorsement leads to substantial technology-specific investments.<sup>5</sup>

In principle, producers that recognize the possibility of hold-up could protect themselves by conducting a comprehensive patent search and securing the necessary licenses before implementing a new standard. But firms in the information and communications technology (ICT) sector rarely do this given the large search and transactions costs associated with up-front licensing. Just finding the relevant patents can be hard, since a modern laptop or smart-phone will implement hundreds of standards and infringe thousands of patents. Assuming firms can locate all of these patents, they might reasonably hesitate to sign licenses when there is uncertainty over each patent’s scope and validity (FTC 2011). Finally, even if all relevant patents could be located and their scope and validity accurately

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<sup>2</sup> David and Greenstein (1990) and Shapiro and Varian (1998) describe the economic and business strategy issues associated with the formal standards process. Rysman and Simcoe (2008) provide some empirical evidence that SSO endorsements have an impact on the value of the underlying technology.

<sup>3</sup> Williamson (1985) introduced the hold-up problem, which he called the “fundamental transformation.” Farrell et al (2004) provide a detailed discussion of hold-up problems in this context.

<sup>4</sup> While policy debates often focus on “technically essential” patents, it is worth noting that the hold-up problem can also apply to so-called “commercially essential” patents, which are complementary to a standard, but not an inherent part of the specification.

<sup>5</sup> Of course, this argument depends critically on the assumption that the patent is valid and enforceable. However, the threat of injunction may provide even “weak” patent owners with a very large stick in the bargaining process.

assessed, transaction cost considerations lead many ICT firms to prefer a broad company-wide cross license over a narrow license covering just those patents needed to implement a particular standard.

Given the large search and transaction costs in markets for intellectual property, ICT firms often design, build and market their products *before* trying to clear all of the relevant property rights, even though this exposes them to hold-up by patent owners. A few large firms negotiate up-front cross-licenses, but even these companies may find themselves locked into a counterparty's proprietary technology when those agreements are renegotiated.<sup>6</sup>

While inefficient markets for intellectual property are a general problem, hold-up problems are especially severe when firms hold patents in industry standards. Once a standard has been selected, SSOs work hard to promote coordinated investments by a broad community of implementers, and these investments are often very costly to reverse. Thus, a widely diffused standard provides a large pool of potential licensors, reduces competition from substitute technologies and makes infringement easy to detect. Simcoe, Graham and Feldman (2009) provide some evidence on this point. Their study found that patents declared to SSOs were 4 to 7 times more likely to be litigated than a typical patent with the same age and technology class. These high litigation rates do not imply widespread hold-up, but are a strong indication that the market for standards-related intellectual property is not functioning well.

Looking forward, there are several reasons to worry that conflicts over standards-related IP will increase and intensify. First, the secondary market for patents appears to be growing, with increased demand coming from patent-assertion entities (PAEs) whose main business is to acquire and assert patents. For example,

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<sup>6</sup> See Grindley and Teece (1997) for a discussion of broad cross-licensing practices. One example of a cross-license containing essential patents that fell apart at renegotiation is the deal between Motorola and Research in Motion (see *Motorola, Inc vs. Research in Motion, Ltd et al.*, U.S District Court Northern District of Texas, 3:08-CV-0317-G).

after negotiations between Nokia and Robert Bosch GmbH failed, Bosch sold several standards-related patents to a PAE called IPCom, who successfully asserted those patents in German courts. There is also a broad shift towards “open innovation” business models, where firms commercialize technology through out-licensing as opposed to manufacturing. Firms like Qualcomm, who develop new technology that becomes central to an industry standard, can earn substantial royalties from licensing their standards-related IP. The study by Simcoe, Graham and Feldman (2009) shows that when small firms (who appear to be a mix of PAEs and specialized technology developers) declare essential patents to an SSO, the probability of subsequent litigation increases significantly compared to essential patents declared by larger firms, who are more likely to be manufacturers.

Another cause for concern is the increasing importance of inter-operability, and particularly the push for standards to support the deployment of electronic health records and a “smart” electricity grid. New standards are clearly needed to coordinate the efforts of diverse vendors in responding to these potentially large market opportunities. However, given the highly inelastic consumer demand for health and energy services, it is not clear that intermediaries like hospitals or public utilities have the ability or incentive to be an active SSO participant or engage in protracted fights with sophisticated patent litigators if they can simply pass royalty costs on to consumers.

### **Private solutions**

Most SSOs take steps to mitigate the patent hold-up problem, typically by adopting intellectual property policies that impose certain obligations on members’ behavior during and after the standard setting process. Lemley (2002) surveyed these policies at a number of SSOs. Here, I discuss a few of their main features.

#### *Disclosure rules*

Many SSOs have rules that require members participating in technical deliberations to disclose relevant patents or pending patent applications. For instance, the patent

policy guidelines endorsed by the American National Standards Institute (ANSI 2011) encourage SSOs to adopt “procedures whereby one or more requests are made to participants for the disclosure of patents that may be required for use of standards in process.” Many SSOs also maintain a public repository of patent disclosures or letters of assurance, which can be searched by prospective implementers who wish to seek a license before committing to the standard.

In principle, disclosure allows SSO participants to evaluate trade-offs between technical quality and the expected cost of implementation. In practice, there are several reasons why the disclosure process may not work well. One problem is that disclosure rules rarely require firms to search for or disclose specific pieces of IP. As a consequence, many firms issue “generic” or “blanket” disclosures indicating that they hold essential patents, but without providing any publication numbers. Clearly, these disclosures provide little guidance to standards developers who are trying to understand what parts of a specification are actually covered by patents, or whether those patents are valid and enforceable. Simcoe (2005) suggests that one third of all disclosures made to a group of nine SSOs provide no reference to specific IP, with much higher rates of blanket disclosure at certain SSOs.

The logic of blanket disclosure is closely tied to the problem of patent notice. Given long pendency lags, and the widespread use of continuations and divisional applications to amend claims over time, it is often unclear whether a pending application will be essential at the time a standard is endorsed. The costs of locating essential patents can also be large for firms with sizable patent portfolios that participate in many SSOs. Of course, the switch to blanket disclosure does not actually reduce these search costs; it merely shifts them onto prospective implementers and other standards developers, who are arguably less informed.

Simply mandating disclosure specificity will not necessarily solve the problem of poor notice under blanket disclosure policies, since large patent holders can adopt a highly inclusive approach, e.g. claiming that nearly all of their patents are potentially

essential. For example, ETSI requires explicit disclosure and sometimes gets thousands of declared essential patents for a single project. If only a few of these patents are truly essential, implementers and standards developers face essentially the same search and discovery problem as under a blanket policy.

A second problem with SSOs' disclosure rules is that they do not guarantee timely information provision. Standards committees may take several years to agree on a specification. During that time, as consensus begins to emerge on key design parameters, firms will often begin to commit design and marketing resources to the nascent specification. While SSOs encourage participants to disclose patents as early as possible, there is nothing to prevent an opportunistic patent-holder from waiting until the last moment. At that point, if there is little chance that the standard will be redesigned, the patent-holder has managed to put themselves in a position to hold-up implementers without violating the letter of the SSOs disclosure policy. Moreover, to an outside observer, these opportunistic delays will often be indistinguishable from "late" disclosures caused by last-minute changes to the standard that make a firm's previously irrelevant IP essential. Efforts to define "timely" disclosure would likely encounter strong resistance, given the practical difficulties of distinguishing benign from opportunistic delays.

While timing and specificity pose difficult problems for SSOs, disclosure policies remain a useful tool for their members. In particular, the disclosure process provides a place where firms can make unilateral licensing commitments (perhaps with an eye towards gaining acceptance of their technology). The disclosure process also provides a forum where patent-holders can place prospective implementers on notice that they expect to be paid. Finally, when SSOs provide a public repository of disclosures or letters of assurance, it simplifies the process of matching future implementers to key intellectual property owners.

Perhaps the best way to address the problems of disclosure timing and specificity would be through reforms to the underlying patent system. High quality patents

that issued more quickly, and whose evolving claims were easier to predict, would make it simpler for SSO participants to evaluate trade-offs among solutions with different cost-quality profiles on a forward-looking basis.

### *Licensing Commitments*

In addition to disclosure rules, many SSOs require participants to make commitments regarding the terms and conditions of any license they will offer for patents needed to implement a standard. A few SSOs ask for very specific licensing commitments. For instance, the World Wide Web Consortium (W3C) will only endorse technologies that can be implemented on a royalty-free basis, and the HDMI Consortium asks implementers to sign an “Adopters Agreement” and pay an annual fee of \$10,000 plus a royalty of \$0.15 per unit sold.<sup>7</sup> However, the most common policy is to require a commitment to license on “reasonable and non-discriminatory” (RAND) or “fair reasonable and non-discriminatory” (FRAND) terms.

Whether because of antitrust fears, or concerns that they will upset certain members, SSOs typically shy away from providing an explicit definition of RAND, leaving the matter to individual firms, and ultimately courts. As a consequence, firms often treat this commitment as merely a promise to enter licensing negotiations. There is nothing to prevent patent-holders from going beyond a RAND commitment, for instance by pledging to offer a royalty-free license. But aside from unilateral commitments, it is not clear that a RAND promise places any restrictions on prospective prices or licensing terms, aside from a ban on exclusivity.<sup>8</sup>

How then, should we interpret the RAND promise? Economists have suggested that a reasonable royalty will reflect the *ex ante* benefits of adopting a particular technology as the industry standard, but not the additional switching and

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<sup>7</sup> The W3C patent policy is published at <http://www.w3.org/Consortium/Patent-Policy-20040205/> and the HDMI Adopters Agreement is published at <http://www.hdmi.org/manufacturers/terms.aspx> (both accessed July 8, 2011).

<sup>8</sup> While there is considerable debate over the meaning of RAND, it is clear that firms cannot void their RAND pledge by selling the patent. See *In the Matter of Negotiated Data Solutions LLC*, *FTC File No. 0510094*, for a discussion of efforts to circumvent SSO licensing commitments through patent sales.



coordination costs created by standard-setting process and the technology-specific investments it encourages (e.g. Swanson and Baumol 2005; Layne-Farrar et al 2007; Farrell et al 2007). But these proposals rarely specify how one might calculate a reasonable price after investments are sunk, or in settings with significant network effects and complementarities among component technologies. As for non-discrimination, firms clearly do not interpret this to mean uniform pricing for a stand-alone license to essential patents. Perhaps non-discrimination means that essential patent holders cannot offer an exclusive license? But if licensors are allowed to charge different rates to each licensee, and there is no cap on a reasonable price, it seems that licensors could offer *de facto* exclusivity, or at least substantial competitive advantage, without violating a FRAND commitment.

One approach to the “reasonable” prong of the RAND commitment is to treat it as a promise to forgo lost profits as the approach to calculating damages in patent infringement litigation. In its place, courts would presumably set reasonable royalty damages based on a hypothetical negotiation between a willing licensor and willing licensee. The U.S Federal Trade Commission (FTC 2011) describes several difficulties with such an analysis, and suggests that courts may systematically overcompensate patent holders in applying the hypothetical negotiation framework. Here, I set aside the controversial question of excessive damages and highlight the economic importance of assuming that any hypothetical negotiation takes place before the selection and diffusion of the standard.

First, as emphasized by the economists cited above, an *ex ante* negotiation will compensate licensors for the benefits created by selecting their technology as the standard, but not the switching and coordination costs caused by implementers’ sunk investments. Second, in a hypothetical *ex ante* negotiation, there should be no presumption that the patents were known to be valid and infringed. Third, and perhaps most importantly, the existence of alternatives to the patented technology place an upper bound on a licensees’ willingness to pay. The last point is subtle in the standards context. It may be difficult to view technologies that look lousy *ex post*

as post as attractive *ex ante* substitutes, or to distinguish between a technology's innate benefits and the cumulative effect of sustained investment by a broad community of implementers. Moreover, a hypothetical licensee's *ex ante* willingness to pay will depend not only on the merits of the best available substitute (as in the case of a bilateral negotiation), but on the anticipated actions of other firms with respect to the nascent standard. Thus, courts may need to consider the price at which the substitute technology becomes a suitable choice for the pivotal SSO participant (i.e. the SSO member who casts the deciding vote) and not just the difference in *ex ante* willingness to pay of the defendant in a particular case. Despite these complexities, it is important to recognize that when there are close *ex ante* substitutes for a patented technology, a reasonable royalty may be very small.

Assuming the "reasonable" prong of RAND does refer to the method of computing infringement damages, SSOs could take several steps to improve the likelihood that courts understand these points, and reach economically sound conclusions when calculating reasonable royalty damages. One such step would be to clarify the meaning of RAND by explicitly defining "reasonable" as the price reached through *ex ante* negotiation between a willing licensor and willing licensee. Another useful step would be to clearly document cases where there was a conscious choice between competing solutions, and providing some indication of how the relative merits of the different approaches were viewed at the time.

Some observers take the view that RAND commitments not only commit patent holders to a particular damages rule, but also waive their right to seek injunctive relief against standards implements. For instance, Miller (2007) writes that, "by adopting a RAND policy... SSO participants... contract out of an injunction-backed property rule into a reasonable-royalty liability rule." While this is an interesting proposal, patent holders might reasonably object that without the threat of injunction it is very difficult to bring an obstinate infringer to the negotiating table. The matter is ripe for clarification from SSOs. But regardless of the relationship between RAND and injunctive relief, proper application of the hypothetical

negotiation framework should not rely on “comparable” licenses that were negotiated in the shadow of an injunction, since that threat would not be available to the patent holder in an *ex ante* world where the essentiality, validity and infringement of the patent are unknown.

While much has been written on the determination of reasonable royalties, the non-discrimination prong of a RAND commitment has received relatively little attention. One interpretation of ND might be that licenses will be made available at a uniform price. But outside of royalty-free licensing, it is hard to see how this would be practiced, since essential patents are often covered by broad cross-licenses whose terms vary from one deal to the next. Another interpretation of non-discrimination is that patentees may not adopt “divide and conquer” adoption-forcing strategies, such as an escalating royalty rate that guarantees early licensees a decisive cost advantage over later ones. A final interpretation of the ND requirement is that it prohibits exclusive licensing, though this would be redundant if the reasonable prong of RAND implies a willing licensor. Perhaps ND simply assures an easily pronounced acronym.

So far, courts have managed to avoid providing a clear interpretation of the RAND standard. The appeals court in *Broadcom v. Qualcomm* suggested that the fifteen *Georgia Pacific* factors provide a useful starting point.<sup>9</sup> However, those guidelines have little to say about how one could determine a reasonable price in settings with hundreds or thousands of complementary patents per product, and where firms make substantial irreversible investments to bring products to market before entering into licensing negotiations. Moreover, as the FTC’s report on the evolving IP marketplace (FTC 2011) highlights, the *Georgia Pacific* factors are only a list of evidentiary categories, and not a coherent analytical framework that can be used to calculate a reasonable royalty. In my view, the current ambiguity surrounding RAND commitments contributes to the high litigation rate of declared essential patents,

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<sup>9</sup> See *Broadcom Corp. v. Qualcomm, Inc.*, 501 F.3d 297; 2007.

making it reasonable for courts and policy-makers to push SSOs for more clarity regarding this key dimension of their intellectual property policies.

### *Ex Ante Negotiations*

One widely discussed alternative to RAND commitments is for patent-owners to actually negotiate specific licensing terms – including prices – before irreversible investments and coordination on a particular solution make substitute technologies less attractive. This is essentially the mechanism proposed by Swanson and Baumol (2005), Layne-Farrar et al (2007) and Farrell et al (2007) for determining a reasonable price.

In principle (and perhaps in practice), firms may conduct bilateral *ex ante* license negotiations outside of an SSO (see Herman, 2010). But when the outcome of any bilateral negotiation is confidential, it provides no information to other implementers about the terms that a particular patent-holder views as reasonable, and therefore induces less *ex ante* price competition between substitute technologies. For this reason, the recent policy discussion has focused on *ex ante* policies where patent holders publicly disclose a maximum royalty rate and set of most restrictive terms.

The main appeal of *ex ante* disclosure policies is that they mimic the hypothetical negotiation between a willing licensor and willing licensee that might take place before a standard is adopted. In particular, in *ex ante* negotiations a rational licensor would be unwilling to pay an unreasonable price, i.e. a price that exceeds the difference in surplus between adopting a preferred technology and the next best alternative (which could be an existing or as-yet undeveloped substitute or a decision to narrow the scope of the standard).

However, *ex ante* disclosure policies also have some weaknesses. The first one is widely recognized: price setting and group negotiations among product market competitors within an SSO raises the specter of antitrust law, particularly charges of

collusion. A second concern draws less attention: considering pricing requires a change of culture and organization of SSOs that may distract from their primary goal of developing technical standards. Finally, some argue that shifting to *ex ante* will reduce the incentive to participate, or that firms will be able to game the policy.

With regards to the first concern, are the SSOs' antitrust fears justified? There is in fact gathering support to have SSOs negotiate licensing fees simultaneously with determining a standard (e.g. Majoras, 2005). The US Department of Justice has issued Business Review Letters that endorse a policy of *ex ante* price disclosure at VITA (an SSO that promotes the VMEbus computer architecture) and the IEEE.<sup>10</sup> The VITA policy requires IP holders to commit to a "price cap" (i.e. a maximum royalty rate and most restrictive set of licensing terms), which can be amended downwards, while the IEEE policy allows firms to disclose their most restrictive licensing terms on a voluntary basis. Both policies continue to forbid direct negotiations over prices within the SSO.

So why do SSOs remain hesitant to allow *ex ante* negotiations? While Business Review Letters insulate SSOs against public lawsuits, there would no doubt be private antitrust suits in this context, and it remains to be seen whether courts will view *ex ante* rate setting as legal. For example, Golden Bridge sued the 3GPP for facilitating collusion after the firm disclosed a patent and began negotiating license agreements, only to find that 3GPP members rewrote the standard so as not to infringe Golden Bridge's patents. Similar claims of monopsony and group boycotts by SSO members were litigated in *Sony Electronics vs. Soundview Technologies* and *Addamax vs. Open Source Software Foundation*.<sup>11</sup> Farrell et al (2007) suggest that the economic merits of these claims are weak: the damage to innovation incentives from collective negotiations are no greater than when the innovator must negotiate with

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<sup>10</sup> These letters are available at <http://www.usdoj.gov/atr/public/busreview/219380.htm> and <http://www.justice.gov/atr/public/busreview/222978.htm> (accessed on October 19, 2010).

<sup>11</sup> *Golden Bridge, Inc. vs. Nokia, Inc.*, 416 F. Supp. 2d 525, 528 (E.D. Tex. 2006). *Sony Electronics Inc. vs. Soundview Technologies, Inc.*, 157 F. Supp. 2d 180, 185 (D. Conn 2001). *Addamax Corp. vs. Open Source Software Found.*, 888 F. Supp. 274, 278 (1995).

a single large user. Nevertheless, SSOs are understandably reluctant to incur the risk of litigation.

With regards to the second concern, standards are typically developed by engineers who lack the training and authority to consider prices. Business executives are certainly involved in SSOs from time to time. However, combining technical deliberations with royalty negotiations would presumably lead to significant changes in the ways that SSOs work and in who attends. Such changes would be costly and difficult, and not particularly welcome by many SSO participants. While it is difficult say how much weight should be placed on these concerns, they are clearly important.

A third concern with *ex ante* policies is that they might force patent-holders to price a product that no licensee actually wants. In particular, most ICT licenses cover a firm's entire patent portfolio, thereby ensuring a licensee's freedom to operate with respect to a particular counterparty. Firms rarely offer a narrow license that covers only the essential patents for a single standard.<sup>12</sup> However, in the absence of a stand-alone licensing option, it is hard to know whether current practice reflects the preference of licensees or licensors.

A final concern with *ex ante* policies is that they will be ineffective, or even harmful. In particular, firms might declare very high royalty rates to preserve flexibility in subsequent negotiations (essentially preserving the status quo) or stop participating in an SSO rather than commit to prices in advance. These arguments are not especially strong. While firms could certainly declare high maximum royalties under an *ex ante* policy, this would still remove some element of uncertainty. When combined with incentives to make timely disclosures, it is hard to see how mandatory *ex ante* disclosure would not lead to some price competition between substitute technologies.

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<sup>12</sup> [[Note on technically versus commercially essential patents.]]

Concerning participation, the main reason for a firm to quit an SSO that adopts an *ex ante* policy is that it expects to earn less royalty income. But if an *ex ante* process mimics the hypothetical negotiation that would lead to a reasonable price, this implies that the departing firm expected to collect unreasonable royalties under the RAND policy. In that case, what harm comes from having them outside the SSO? Arguably, the *ex ante* policy screens out firms who view RAND as an empty promise, and reduces the chance that they will end up holding truly essential patents. Ultimately, the impact of adopting an *ex ante* disclosure policy on SSO participation is an empirical question. While there are only a few cases to study, the W3C and VITA are two examples of SSOs that have strengthened their licensing requirements without suffering a catastrophic decline in membership.

#### *Other Policies*

While recent debates on SSO intellectual property rules have focused on RAND commitments and *ex ante* disclosure rules, there are many other possibilities. One alternative to holding up-front negotiations within SSOs is to encourage more price competition between them. For example, a number of standards consortia use a “Promoter-Adopter” model where a small group of founding members (Promoters) contribute the key technologies and agree to an explicit licensing regime before signing up implementers (Adopters). Standards developed using this approach include the USB 2.0 and HDMI specifications. In comparing *ex ante* disclosure policies to the Promoter-Adopter model, one can discern a trade-off between the procedural costs of combining technical and licensing negotiations inside a single body, and the possibility of increased fragmentation and coordination failure when substitute technologies are promoted by competing SSOs.

There are also several alternative policies that could be carried out within an SSO. For instance, Mark Lemley (2007) proposed several interesting extensions to *ex ante* negotiation. One option is to couple *ex ante* disclosure requirements with low “penalty default” royalty rates. Under this policy, the SSO would set a very low

default royalty rate (perhaps free) as the maximum allowable royalty for firms that failed to provide explicit pricing commitments or make timely disclosures.

One weakness of a RAND or *ex ante* policy with penalty defaults is that it does not address the royalty stacking problem: even with a low default rate, total royalties may add up when there are hundreds of declared essential patents and hundreds of standards per product. To address this issue, Lemley proposed that SSOs could adopt a step-down royalty procedure. Under this policy, an SSO could cap the total royalties associated with a standard and award a share to each essential patent or firm. These shares could decline as patents are added to the pool, and might be higher for those who disclose earlier. While this step-down procedure might not award the most royalties to the highest value patents, it would certainly provide an incentive for early disclosure, which would allow committees to make better-informed decisions about any trade-off between quality and implementation cost.

Finally, Rysman and Simcoe (2011) suggest an alternative patent policy that dispenses with both RAND commitments and *ex ante* negotiations. Their proposal of Non-Assertion After Specified Time (NAAST) would mimic the incentives of the underlying patent system by allowing patent-holders a period of unrestricted licensing (i.e. they would not be bound by RAND or any other commitment), but forcing them to give up all rights to assert essential patents after some pre-determined period of time. This policy would allow patent-holders to recoup their investments in innovation during the assertion phase, but provide freedom of access to implementers and innovators who wish to build on the standard after the non-assert phase begins. A major virtue of the NAAST policy is that it would be easy to adjudicate, since it does not rely on complex formulations for determining a reasonable price. It might also bring the effective patent term for essential patents into line with the length of ICT product life cycles. On the other hand, it is hard to know the appropriate length of the NAAST assertion period, or when it should commence.



Penalty defaults, step-down royalties and NAAST are not perfect solutions to the hold-up problem. Rather they illustrate the wide range of feasible options for SSO intellectual property policies. Given the many possible policies, one might ask why we currently observe relatively little variation, and whether we should expect competition between SSOs to lead towards the best possible set of IPR policies? I do not think we know the answer to these questions.

To be sure, many SSOs have tweaked and tightened their IP policies in the wake of Rambus and other major antitrust cases. There have been experiments with *ex ante* negotiation at VITA and the IEEE; the W3C switched to a royalty-free policy, and OASIS allows individual technical committees to decide on the most appropriate IPR policy. However, many SSOs continue to rely on RAND policies that provide little clarity about disclosure timing and specificity, or how courts could determine a reasonable price. For some SSOs that run into few patent disputes, sticking with RAND may be a pragmatic approach that reflects the costs of creating a new IP policy as well as antitrust concerns. On the other hand, even at SSOs like ETSI, which have been embroiled in a number of major patent disputes, efforts to move away from the RAND regime (e.g. by defining “timely” disclosure) have encountered strong resistance. Ultimately, it is not obvious whether competition among SSOs takes the form of developing more efficient rules and procedures, or of providing alternative venues that favor the interests of different constituencies. These issues deserve more research.

### **Public policy**

How can public policy support the emergence of private solutions to the problem of patent hold-up in industry standards? One role for public agencies is to provide a credible threat of discipline for firms that violate SSO policies. Standard setting organizations typically have very limited enforcement powers: while they can threaten to withdraw support for a standard, this happens infrequently, and will have little effect when the specification already has a large installed base. However, antitrust agencies have brought actions against Dell, Unocal, Rambus and others for

seeking to license patents that were not disclosed during the standard-setting process.<sup>13</sup> Simcoe (2005) shows that there was a substantial uptick in the number of patent disclosures following the Dell action in 1996. Thus, even if the terms of individual patent disclosures remain vague, these antitrust actions have arguably increased the information available to standards developers and implementers by making the enforcement of SSO policies credible.

Another productive step taken by antitrust agencies in the US and Europe has been to offer Business Review Letters and public statements encouraging SSOs to allow more *ex ante* price negotiation. In particular, allowing the VITA and IEEE *ex ante* disclosure policies to move forward clearly signals that regulators understand the pro-competitive potential of policies that lead to public price commitments. SSOs may still fear that *ex ante* policies will lead to private antitrust actions. This is a reasonable concern, particularly in the wake of the *Golden Bridge v. Nokia* ruling that group boycotts in SSO bargaining can be found *per se* illegal. However, statements by the DOJ and FTC suggest that conduct in *ex ante* price negotiations will typically be judged under a rule of reason standard, reflecting both the coordination benefits associated with joint technical decision making inside SSOs and the potential for *ex ante* negotiations to thwart patent hold-up.

A more controversial recommendation is that policy-makers nudge SSOs towards providing more explicit guidance on disclosure rules and licensing commitments as part of their IPR policies.<sup>14</sup> One way for policy-makers to encourage more clarity might be to indicate a preference for explicit IPR policies and procedures in government purchasing guidelines, such as OMB Circular A-119. The current guidelines indicate the voluntary consensus standards must “include provisions requiring [that] intellectual property [be made] available on a non-discriminatory,

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<sup>13</sup> See *Dell Computer Corp.*, 121 F.T.C. 616 (1996); *Union Oil Co. of Cal.*, FTC Docket No. 9305, and *Rambus, Inc.*, FTC Docket No. 9302.

<sup>14</sup> The Rambus court made several disparaging remarks about the lack of clarity in VITA’s IPR policies. However, my impression is that subsequent efforts at many SSOs have focused on clarifying procedural requirements as opposed to the substance of these rules.

royalty-free or reasonable royalty basis to all interested parties” and encourage agencies to use of voluntary standards wherever practical. But these guidelines say very little about the choice among competing private standards. When government agencies act as consumers, it would be quite reasonable for them to favor standards that involve more certainty and less risk of *ex post* patent hold-up. And since these purchasing guidelines leave agencies with considerable discretion, there is little risk that such a change would lead to excessive uniformity of SSO policies and procedures should vagueness be the optimal IPR policy for certain technologies or markets.

Finally, though it is outside the scope of this essay, hold-up problems could be mitigated through patent system reforms that reduce the myriad search and transaction costs that make markets for intellectual property function rather poorly in the ICT sector. In particular, the patent hold-up problem would disappear if it were practical for firms to identify relevant patents and take-out all of the necessary licenses before designing, building and marketing new products. This is far from the current reality. While private solutions such as SSOs and patent pools may provide a work-around to the problems of patent hold-up and royalty-stacking, this essay has highlighted some of the inherent costs, limitations and trade-offs of the primarily private approach.

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