

Explaining the Increase in Intellectual Property Disclosure

Timothy S. Simcoe

Joseph L. Rotman School of Management, University of Toronto

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Abstract

This paper documents a large and rather sudden increase in intellectual property disclosure at nine standard setting organizations during the early 1990s. It also examines the specificity of disclosure statements, the significance of disclosed patents, and the differences between disclosing firms. After considering several possible explanations for the increase in disclosure, the paper concludes with a discussion its policy implications.

Introduction

Standards can have a dramatic impact on the value of a technology. So it is not very surprising to find the owners of proprietary technology participating in the standard-setting process. In fact, most Standard Setting Organizations (SSOs) have rules that require these participants to disclose their Intellectual Property Rights (IPRs).

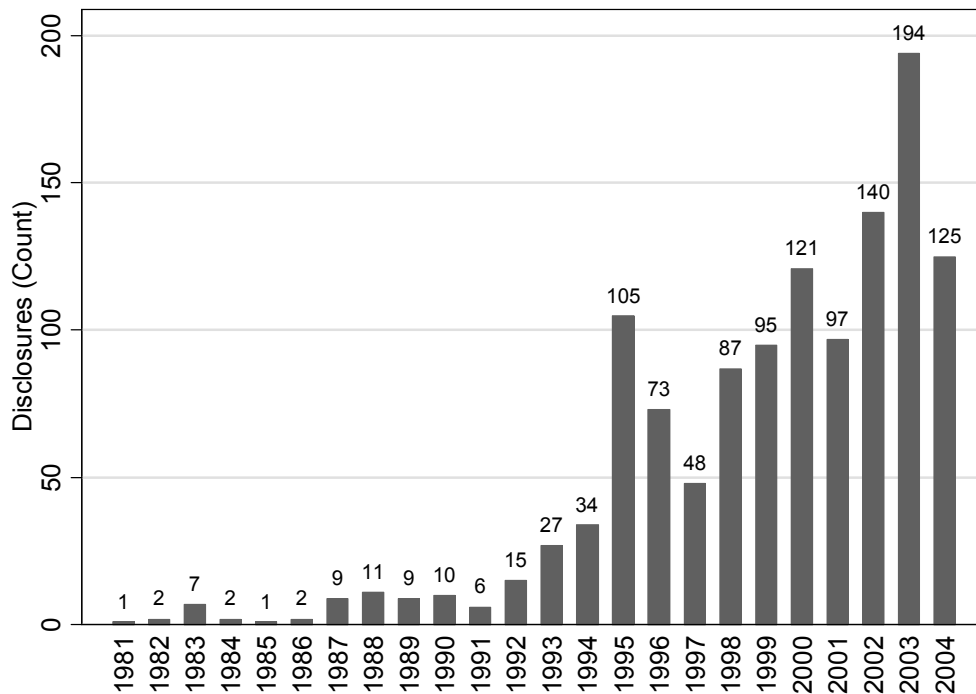
Recently, a number of SSOs have been tightening these intellectual property rules. This is partly a result of the highly visible Dell and Rambus antitrust cases. However, it also seems to reflect a growing unease—a sense that standards creation has become increasingly “political” and less cooperative. This concern is somewhat surprising to an outside observer, and it leads to a simple question. What happened?

This short paper examines the increase in formal IPR disclosures at nine SSOs between 1981 and 2004. By seeking to explain the growth in disclosures, I hope to learn something about the larger questions of whether standards creation has become more contentious and why. Answers might help to clarify policy debates that have emerged around the issue of standards and intellectual property.

IPR Disclosure from 1981 to 2004

Between 1981 and 2004 there was a dramatic increase in the rate of intellectual property disclosure. This increase is illustrated Figure 1, which is based on disclosure data from nine SSOs.¹ They are the American National Standards Institute (ANSI), ATM Forum, Alliance for Telecommunications Industry Solutions (ATIS), European Telecommunications Standards Institute (ETSI), Institute for Electrical and Electronics Engineers (IEEE), Internet Engineering Task Force (IETF), International Telecommunications Union (ITU), Open Mobile Alliance (OMA), and the Telecommunications Industry Association (TIA).

Figure 1: Total IPR Disclosures



The interesting thing about Figure 1 is that it shows a fairly sudden increase in the disclosure rate beginning in the early 1990's. This change reflects both a rapid increase in the number of disclosures made at older SSOs (e.g. ANSI, IEEE, and the ITU) and an increase in the number of SSOs where disclosure is taking place.

Table 1 shows the first year in which a disclosure was observed at each of the nine SSOs. This is not necessarily the year that the SSO was founded. For example, the IETF was formed in 1986, but remained quite small until the early 1990s, and had no formal IPR

¹ Since there is no standard definition of "disclosure" these counts are based on the convention that an IPR disclosure is an announcement (usually a letter or e-mail message) that some legal entity owns one or more property rights (usually patents or patent applications) that may be required to implement a particular compatibility standard.

disclosures until 1995. However, the increasing number of SSOs does suggest that the standards developing process is becoming more fragmented, as others have suggested (Cargill 2001).

Table 1: SSO Summary Statistics

| | First | Total | Total | U.S. Patents |
|--------------|-------------------|--------------------|---------------------|-----------------------|
| SSO | Disclosure | Disclosures | U.S. Patents | per Disclosure |
| ANSI | 1981 | 208 | 112 | 0.54 |
| ATIS | 1986 | 58 | 19 | 0.33 |
| ATMForum | 1995 | 25 | 46 | 1.84 |
| ETSI | 1990 | 167 | 626 | 3.75 |
| IEEE | 1988 | 121 | 220 | 1.82 |
| IETF | 1995 | 271 | 77 | 0.28 |
| ITU-T | 1983 | 223 | 172 | 0.77 |
| OMA | 1999 | 22 | 30 | 1.36 |
| TIA | 1989 | 126 | 18 | 0.14 |
| Total | | 1,221 | 1,320 | 1.08 |

Table 1 also shows the number of disclosures made at each SSO, and the number of U.S. patents listed in those announcements. While there is an average of one patent per disclosure, this ratio varies a great deal from one organization to the next. This reflects variation in scope (i.e. the number of IPRs per disclosure) and the large number of international patents and patent applications.

Variation in the number of patents-per-disclosure is also influenced by the *specificity* of IPR disclosures. Many announcements simply do not contain any patent or application number that might be used to identify the relevant property rights. Moreover, when it comes to the *terms* on which the IPR would be made available, most disclosures provide very little information. Table 2 shows how the specificity of disclosure statements has changed over time.

Table 2: Specificity of IPR Disclosures

| | IPR Specificity | | | Pricing Specificity | | |
|--------|------------------------|-----|------|----------------------------|-----|------|
| | Patent | App | None | Free/Term | RND | None |
| 87-89 | 65% | 18% | 18% | 10% | 62% | 28% |
| 90-92 | 69% | 10% | 20% | 10% | 58% | 32% |
| 93-95 | 42% | 6% | 52% | 5% | 61% | 33% |
| 96-98 | 52% | 18% | 30% | 4% | 50% | 46% |
| 99-01 | 37% | 20% | 43% | 6% | 47% | 47% |
| '02-04 | 57% | 24% | 20% | 11% | 37% | 52% |
| Total | 49% | 18% | 33% | 8% | 47% | 46% |

In spite of the large increase in disclosure, there has been little change in specificity. About half of all IPR disclosures provide a reference to specific patents or patent

applications—either U.S. or international. Eighteen percent of the disclosures referred to unpublished patent applications, while the remaining 33 percent simply provided no information that could be used to identify the IPR.

In terms of pricing, only 8 percent of the IPR disclosures gave specific terms. In almost every case, these disclosures indicated that the IPR would be freely available. Of the remaining 92 percent, just over half promise to offer “reasonable and non-discriminatory” licenses—either explicitly or implicitly (by way of the SSO’s licensing rules). The remaining 46 percent do not discuss prices.

The sudden increase in disclosures seen in Figure 1 suggests that IPRs have become a more important part of the standard setting process. Unfortunately, it is very difficult to measure the importance of a disclosure with respect to a particular standard or proposal.² However, when a disclosure references a specific U.S. patent, it is possible to measure the economic and/or technological significance of the underlying IPR.

Table 3 contains several measures of the significance of U.S. patents disclosed to the nine SSOs. For comparison, it also includes two sets of “control patents.” The first set of controls contains every U.S. patent with an application-year and technology-class matching one or more of the SSO patents. The second set of controls was chosen to have the same application-year, technology-class, and a cumulative citation count as close as possible to the matched SSO patent.

Table 3: The Significance of Disclosed IPR

| | All | Cite-matched | SSO |
|-----------------------------|-----------------|---------------------|----------------|
| | Controls | Controls | Patents |
| # of U.S. Patents | 139,168 | 1,314 | 1,366 |
| Number of Claims | 14.7 | 17.8 | 21.4 |
| International Family | 30% | 35% | 52% |
| Continuation | 30% | 29% | 45% |
| Litigated | 0.61% | 0.91% | 6.88% |

Table 3 shows that SSO patents average 6.7 more claims than the baseline control sample, and 3.6 more than the citation-matched controls. Another indicator of a patent’s value or significance is whether the applicant files for protection in more than one jurisdiction. On average, thirty percent of the control patents are linked to these international “patent families.” For the SSO patents, fifty-two percent of the U.S. patents have an international counterpart.

The most interesting measure of value in Table 3 is the probability that a patent is tested in court. The final row of this table uses litigation data provided by Stuart Graham to show that SSO patents are 10 times more likely to appear in court than an average patent,

² The basic difficulty is that observing an IPR disclosure is probably a good indication that the underlying technology or proposal is already considered important. Otherwise, why should firms go out and search their IPR portfolio?

and 7.5 times more likely to be litigated than the citation-matched controls. It is important to be careful with this statistic, since the causality could easily run in both directions. That is, disclosure may increase the probability of litigation *and* patents that are likely to be litigated may also be more likely to get disclosed. In either case, these litigation rates and the other figures in Table 3 show that “SSO patents” have a great deal of economic and/or technological significance.

What Happened?

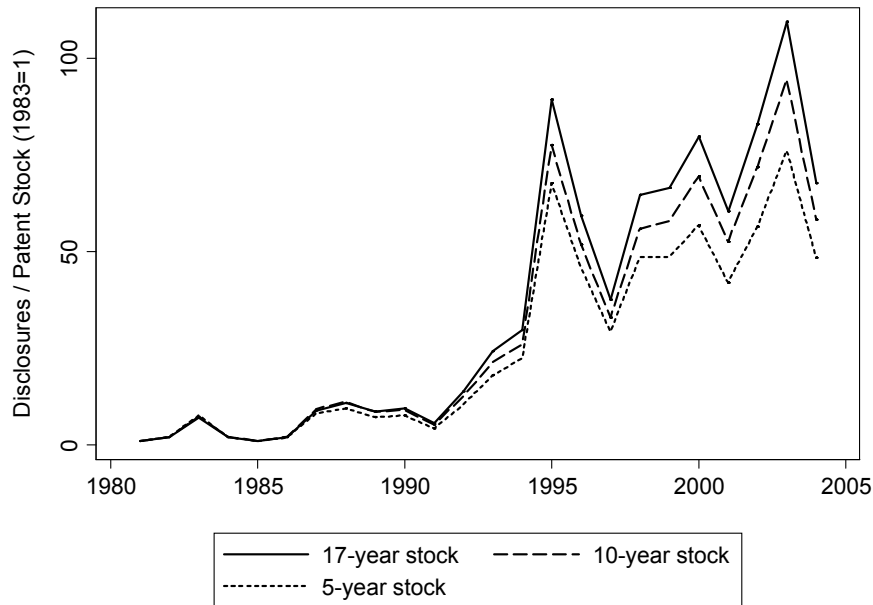
There are a number of potential explanations for the sudden increase in IPR disclosure that appeared in the early 1990s. This section considers several possibilities, and asks whether they are consistent with the facts described above.

Changes in Patent Policy

Over the last twenty years, there has been a “patent explosion” in the United States. The dramatic increase in U.S. patenting has been examined by a number of authors (e.g. Lemley 2001; Jaffe and Lerner 2004). The short version of this story is that the creation of the CAFC (a special “patent appeals court”) has expanded the scope of patents and made them stronger, while developments at the USPTO have made patents easier to get. Perhaps the increase in IPR disclosure simply reflects the fact that there is more IPR to disclose?

While the increase in patenting is almost certainly connected to the increase in IPR disclosure, the magnitude of the latter change suggests that it cannot be the only factor. Figure 2 compares the IPR disclosure rate to the five, ten, and seventeen year stock of U.S. patents (normalizing this ratio to one in 1983 for comparison). It shows that IPR disclosures are growing significantly faster than the patent-stock.

Figure 2: IPR Disclosures Normalized by U.S. Patent-stock



The disclosure data also show that U.S. patents are not increasing as a share of the total amount of IPR in disclosures. Since the early 1990's, international IPR has remained relatively constant at around 30 percent of this total (i.e. as a proportion of all IPR whose origin could be determined). Moreover, Table 2 shows that 52 percent of the U.S. patents disclosed to SSOs have an international counterpart—suggesting the international scope of the standard setting process.

Figure 2 and the international scope of the standard setting process do not rule out the possibility that the increase in IPR disclosure and the increase in patenting have a common set of underlying causes. In particular, the strengthening of patent rights probably plays an important role in both processes. However, the straightforward explanation that more patents leads to more disclosure does not appear to hold up under close examination.

Changes in Industrial Organization

In the days of incumbent telephone monopolists and large integrated hardware/software vendors, the companies who developed new technologies also commercialized them. Cooperation in standards development was easy for these firms since there were only a handful of them, they were relatively symmetric, and competition occurred downstream from standard-setting/product-development—primarily in sales and delivery.

Today, things are different. More small entrepreneurial firms are engaged in technology development. Many of these companies commercialize their inventions via the technology input market (i.e. licensing) or the market for corporate control (i.e. buyouts).

For these firms—whose business model does not involve downstream competition—the benefits achieved through cooperative standard setting are much smaller. Standardization is a game that will produce winners and losers.

This story suggests that the sudden increase in IPR disclosure is driven by changes in the organization of technology development and commercialization. In particular, the vertical dis-integration of new product development has created a group of firms that specialize in technology development who have a much larger stake in the outcome of the standard setting process. Moreover, since these firms sell into the “technology input market” their business model is more likely to rely heavily on IPR.

Table 4 begins to investigate this idea by examining the relationship between disclosure and one measure firm “specialization”—the number of SSOs where a firm discloses IPR. The first two columns in Table 4 group companies according to the number of SSOs where they made an IPR disclosure. The firms who disclose to more than a handful of SSOs are primarily large diversified companies that serve both the technology input and finished goods markets.³ The last two columns show the total number of disclosures made by firms in each size category.

Table 4: Asymmetries and Cumulative Disclosure

| Number of SSOs | Number of Companies | Total Disclosures | Percent of Disclosures |
|-----------------------|----------------------------|--------------------------|-------------------------------|
| 1 | 314 | 405 | 32% |
| 2 | 41 | 143 | 11% |
| 3 | 13 | 61 | 5% |
| 4 | 9 | 75 | 6% |
| 5 | 6 | 107 | 8% |
| 6 | 6 | 131 | 10% |
| 7 | 3 | 148 | 12% |
| 8 | 4 | 195 | 15% |

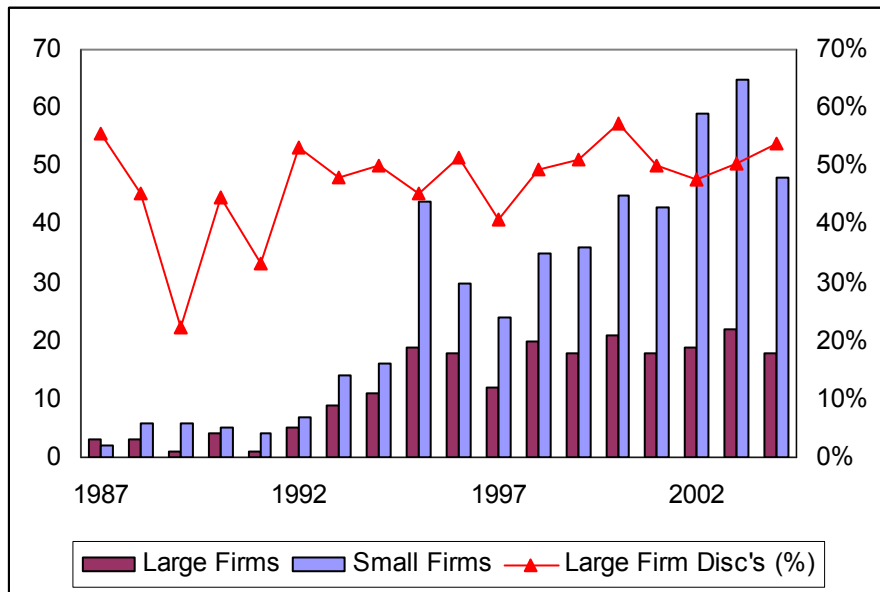
There are some clear asymmetries among the firms disclosing IPR. While the 13 companies that disclose at six or more SSOs made 37 percent of the total disclosures, a there were 368 “small” companies who disclosed to three SSOs or fewer. So, while the majority of disclosures do not necessarily come from small firms specializing in technology development, a large number of these firms are clearly participating in the standards creation process.

The story told above suggests that the surge in IPR disclosure should be accompanied by an increase in the number of specialized firms. Figure 3 shows that the sudden increase in disclosure reflects both an increase in the *number* of smaller more specialized firms disclosing, and an increase in the *amount* of IPR disclosed by larger more diversified companies. (A small/specialized company discloses to three or fewer SSOs, while a

³ For example, the thirteen firms that disclose at six or more SSOs are Alcatel , Cisco, Corning, Hitachi, IBM, Lucent, Motorola, NEC, Nokia, Nortel, Philips, Qualcomm and Siemens.

large/diversified firm discloses at four or more.) Interestingly, each group is responsible for about half of the total disclosures in any given year.

Figure 3: IPR Disclosure by Small and Large Firms

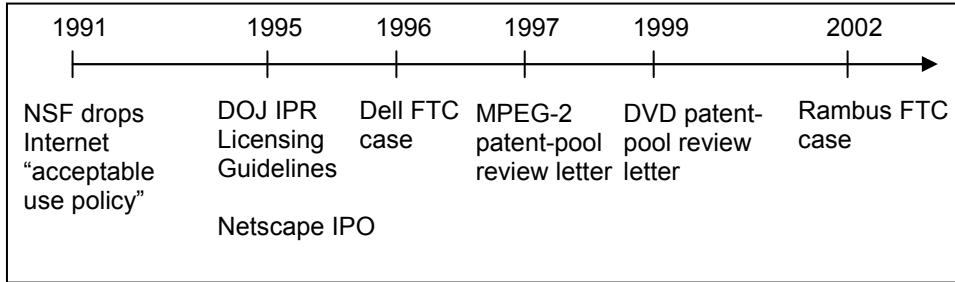


While these data show that the increase in IPR disclosure coincides with an increase in small-firm disclosure, they do not provide any explanation for the timing of this shift. The vertical dis-integration of high-tech R&D did not happen overnight. Ideally, we might use data on licensing and buyouts to examine the growth of the technology input market during the early 1990's, and to see whether the firms in that market are also making IPR disclosures. Unfortunately, it is extremely difficult to find this kind of data.

Ad-hoc Explanations

Figure 4 lists a number of significant legal, administrative, technological, and competitive events from the world of standard setting. Any of these events might have been the catalyst for a sudden increase in IPR disclosure. However, it is very difficult to establish whether any of them actually *did* have a significant impact. That is because these events work by changing important variables that are hard to observe, such as the demand for new standards, firms' expectations about the costs and benefits of disclosure, or participants' beliefs about the way the game is played. Nevertheless, it is worth considering whether some of these ad-hoc explanations are particularly consistent with the sudden increase in IPR disclosures observed above.

Figure 4: Significant Events



The events in Figure 4 can be grouped into three categories. The first group contains events like the FTC actions in Dell and Rambus, which help to clarify the rules governing IPR disclosure. The second group is based on the resurgence of the patent pool. And the third group is related to the commercialization of the Internet.

The Dell and Rambus cases are clearly significant events within the standard setting community, and a great deal has been written about each of them. The overall message of these cases is that there are potential costs of non-disclosure (for firms) or ambiguous IPR rules (for SSOs). It is hard to say how much these cases contributed to the increase in IPR disclosure. While there is clearly a large disclosure spike in 1995—the year of the Dell case—the increasing trend appears to have started a few years earlier.

The increase in disclosure may also be tied to a number of “licensing success stories”, which are closely related but hard to assign to a particular date. A host of companies, like IBM, Sony, Qualcomm, Rambus, and Acacia have used patents on standardized technology to develop large revenue streams. This strategy that raises extremely interesting questions for SSOs and policy-makers about the counter-factual value of licensed patents had the standard evolved differently.⁴ However, its success has almost certainly led to a certain amount of imitation.

The second group of events in Figure 4 are related to the resurgence of patent pools following publication of the DOJ/FTC (1995) “Antitrust Guidelines for the Licensing of Intellectual Property.” These guidelines encouraged collaborative licensing arrangements—subject to antitrust review—to help solve the “thicket” problem that emerges when the IPR needed to implement a single product is distributed among a large group of patent holders. The creation of the MPEG-2 and DVD patent pools showed that firms could create joint-licenses without violating antitrust law. Companies like Via Licensing are working to establish pools for other standards, such as MPEG 4 audio encoding and the 802.11 wireless networking protocols.

Patent pools provide a mechanism for generating revenue from standards-related IPR. Moreover, this mechanism allows small firms to capture value from their patents without

⁴ Simcoe and Rysman (2005) examine the related question of how much impact SSOs’ have on patent citations.

having to enter cross-licenses negotiations with much larger customers and/or rivals. Patent pools therefore create incentives for small firms to disclose more in order to ensure they don't lose the opportunity to use their IPR. And by helping to solve the "thickets" problem, patent pools may encourage SSOs to create new standards that they would have ignored because of the difficult IPR issues associated with the underlying technology.

Finally, Figure 4 uses the end of NSF's "acceptable use policy" (which restricted commercial use of the Internet) and Netscape's remarkable IPO to represent the rapid commercialization of the Internet—which occurred around the same time as the increase in IPR disclosure. The Internet is a general purpose technology or meta-standard used to deliver a host of specialized applications, and its rapid diffusion in the early 1990's had a dramatic impact on the supply of new complementary standards. While this suggests that the increase in disclosure reflects an increase in standards production, the SSOs most responsible for Internet standards (IETF and W3C) had no disclosure until the mid-1990's.

The Internet is also the leading example of even larger trend—the convergence of the information technology and telecommunications industries. These industries have distinct technical cultures with different assumptions about the standard setting process. The idea that standards creation has become increasingly contentious may reflect the difficulty of finding a compromise that works for both sides.

While all of these ad-hoc explanations for the increase in IPR disclosure are plausible, it is not possible to test their relative importance with the data at hand. In particular, trends in aggregate disclosure are unlikely to tell us much about the impact of an "event" unless its influence is systematically different for different firms or SSOs or standards. While this places some limits on what we can claim to know about the increase in IPR disclosure, it also brings us to a larger and more important question. Do we need to know the "true" cause of the increase in IPR disclosures to make good policy? For that matter, do we even need to formulate a policy response?

Does it Matter?

In the wake of Rambus, standards policy-makers have been preoccupied with the "hold up" problem. This is the possibility that patent-holders are waiting for companies to make non-recoverable investments in a standard before demanding large royalties for use of their IPR. In addition to raising questions of fairness, excessive hold-up will eventually lead to underinvestment in the creation of new standards.

The solution is to ensure that SSO members are aware of the relevant IPR during the standard setting process. This knowledge allows them to evaluate *both* technical and economic trade-offs when considering alternative designs. That is why there are disclosure rules. When done right, these rules can encourage *ex ante* competition between substitute

technologies without limiting the legitimate rights of patent-holders or harming innovation incentives.

Of course, transparency is not free. SSOs are naturally worried about increasing the disclosure burden they place on participants. Moreover, increasing the intensity of *ex ante* competition is likely to lead to more forum shopping, as competing vendors try to find some SSO to endorse their proprietary technology. Unfortunately, there is no simple solution to this dilemma—which is why it is important to try and understand what is driving the increase in IPR disclosure.

Optimists will interpret the disclosure trend in Figure 1 as a sign of increasing transparency. Pessimists will respond that since many disclosures occur late in the standard setting process—when commitments have already been made—it is simply a sign of increasing hold-up. I believe that Table 2 tells the real story. Half of all IPR disclosures fail to identify a specific patent or patent application, and ninety percent do not provide information about pricing. Whether or not more firms are meeting the letter of their obligation, the current system simply does not provide standards developers with enough information to fully evaluate competing proposals. In this environment, the threat of hold-up is very real.

Why do so few disclosures provide more than the minimally required level of information? Figure 3 suggests that it is because there has been a real change in the way that standards-driven technologies are commercialized. In addition to the large vertically integrated companies that once dominated the standard setting process, many smaller more specialized firms are now disclosing IPR. Presumably, these two types of company expect to find themselves on opposite sides of a bargaining table. With the strengthening of patent rights, IPR can play an important role in these negotiations. So, firms are naturally cautious about giving away or giving up too much in their disclosures.

However, given firms' apparent reluctance to move beyond the threshold of compliance, it is appropriate for policy-makers to consider moving that threshold a bit. In particular, disclosure rules should encourage firms to provide relevant information in a timely fashion—especially basic details about the technology and the price at which it might be acquired. There are two simple reforms that will encourage better up-front information provision in the standard setting process. The first are changes in SSO disclosure rules, and the second are clear antitrust guidelines on the legality of making *ex ante* licensing commitments within SSOs.

The IPR policies at many SSOs could easily be improved. These policies should require the disclosure of unpublished applications as well as the *specific* identification of published patents and/or applications at the earliest possible date. They should spell out the implication of participating in an SSO but failing to disclose IPR. They should make sure that disclosures take place before the SSO commits to a specification. And finally, they should encourage firms to provide much more information about prospective licensing terms—which need not be limited to the two extremes of free or “reasonable and non-discriminatory.”

Some of this is clearly starting to happen. However, SSOs have been extremely cautious about allowing *ex ante* license negotiations or pricing discussions to become a part of the standard setting process. Their rationale is usually that discussions about price will expose the organization to antitrust liability—particularly through private lawsuits. Antitrust policy-makers should provide some clear guidance on this issue in order to eliminate any confusion.

The Standards Development Act of 2004 exempted SSOs from treble-damages under antitrust law. This legislation also made it clear that their activities would be evaluated under a Rule of Reason. It seems highly unlikely that allowing SSO participants to discuss IPR licensing would be found anticompetitive—much less *per se* illegal. However, the DOJ should go further by issuing some type of statement *encouraging* more *ex ante* discussion of licensing terms in the context of technical deliberations within SSOs. The goal is to produce an affect similar to that of the 1995 “Guidelines for Licensing Intellectual Property” on the formation of patent pools. The benefits would be a more efficient and transparent standard setting process, and quite possibly greater competition between substitute technologies prior to any lock-in through the standards process.

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