Standard Setting, Intellectual Property Rights, and the Role of Antitrust in Regulating Incomplete Contracts

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Abstract:

A large and growing number of regulators and academics, while recognizing the benefits of standardization, view skeptically the role standard setting organizations (SSOs) play in facilitating standardization and commercialization of intellectual property rights (IPRs). Competition agencies and commentators suggest specific changes to current SSO IPR policies to reduce incompleteness and favor an expanded role for antitrust law in deterring patent holdup. These criticisms and policy proposals are based upon the premise that the incompleteness of SSO contracts is inefficient and the result of market failure rather than an efficient outcome reflecting the costs and benefits of adding greater specificity to SSO contracts and emerging from a competitive contracting environment. We explore conceptually and empirically that presumption. We also document and analyze changes to eleven SSO IPR policies over time. We find that SSOs and their IPR policies appear to be responsive to changes in perceived patent holdup risks and other factors. We find the SSOs' responses to these changes are varied across SSOs, and that contractual incompleteness and ambiguity for certain terms persist both across SSOs and over time, despite many revisions and improvements to IPR policies. We interpret this evidence as consistent with a competitive contracting process. We conclude by exploring the implications of these findings for identifying the appropriate role of antitrust law in governing ex post opportunism in the SSO setting.

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I. Introduction

Standard setting organizations ("SSOs") are of growing importance in the modern economy and as an institution for coordinating and facilitating the economic activities of intellectual property rights holders. SSOs thus foster economic benefits of standardization and of commercializing innovation. Market adoption of standards that call for standard-compliant products to use intellectual property rights ("IPRs"), however, raises the potential for the creation of market power. The existence of many independent property rights incorporated into a single standardized product also increases transaction costs and the potential for coordination problems. Strategic behavior exploiting these issues may raise antitrust concerns; however, the various measures SSOs and their members adopt in response to these problems—including SSO contractual provisions—can also raise competition policy concerns.

Many have emphasized the potential for patent holdup involving standard-essential patents ("SEPs") as a necessary cost of the SSO process, leading to higher royalties to licensees that are in turn passed on in the form of higher consumer prices. An increasing number of modern antitrust disputes contemplate a broad role for competition law in supplementing defects in the SSO contracting environment, including the important controversy as to whether and under what circumstances an SEP holder seeking injunctive relief violates the antitrust laws.

SSOs have proven to be dynamic institutions. In response to threats of patent holdup, many have adopted and modified a number of contractual provisions over time to reduce its incidence. Most have also made changes to SSO policies to compete for membership. One major category of SSO contractual innovations to mitigate patent holdup concerns involves patent disclosure rules. A second category is IPR licensing terms. For example, the role of one particular IPR licensing term, the F/RAND commitment, in reducing the risk of patent holdup is well understood. SSO IPR policies that govern the conduct of, and relationships between, SSOs and their members are enforceable contractual commitments. Contract law thus lies at the heart of

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enforcing SSO commitments (Hovenkamp, 2012).[1] The fundamental challenge to identifying the role, if any, that antitrust law should play in regulating SSO contracts is to understand the responsiveness of the SSO contracting process to changes in the threat of patent holdup. In other words, is the SSO contracting process efficient?

Competition enforcement agency officials around the world have already declared SSOs' IPR policies inadequate and contract law insufficient to deter patent holdup. They allege SSO IPR policies are either not strong enough or not clear enough and, in either case, a further regulatory response likely is warranted to cure the resulting inefficiencies.[2] Some competition enforcement agency officials propose specific improvements to current SSO IPR policies—that is, they propose new or modified contract terms to reduce ambiguity or incompleteness. Some academic commentators and practitioners have joined the competition agency officials in calling for an expanded role for antitrust law to deter patent holdup, to facilitate efficient SSO contracting, and to solve the SEP licensing problem.[3] These criticisms and the various policy proposals that flow from them require the premise that SSO contracts are inefficiently incomplete rather than an efficient outcome reflecting the costs and benefits of adding greater specificity to SSO contracts.

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[1] On the role of equity in solving problems of opportunism in the SSO context, including the doctrine of equitable estoppel and granting of injunctions, see Smith (2013).

[2] *See, e.g.*, Kai-Uwe Kuhn, Fiona Scott Morton & Howard Shelanski, *Standard Setting Organizations Can Help Solve the Standard Essential Patents Licensing Problem*, CPI ANTITRUST CHRON., Mar.-Special Issue 2013, at 4-5, *available at* https://www.competitionpolicyinternational.com/assets/Free/ScottMortonetalMar-13Special.pdf; Renata Hesse, Deputy Assistant Attorney Gen., Antitrust Div., U.S. Dep't of Justice, Six "Small" Proposals for SSOs Before Lunch, Remarks as Prepared for the ITU-T Patent Roundtable 9-10 (Oct. 10, 2012), *available at* http://www.justice.gov/atr/public/speeches/287855.pdf; Renata B. Hesse, Deputy Assistant Attorney Gen., Antitrust Div., U.S. Dep't of Justice, The Antitrust Division and SSOs: Continuing the Dialogue, Presentation at ANSI Intellectual Property Rights Policy Committee Meeting 3 (Nov. 8, 2012), *available at* http://www.justice.gov/atr/public/speeches/288580.pdf.

[3] *See, e.g.*, George S. Cary et al., *The Case for Antitrust Law to Police the Patent Holdup Problem in Standard Setting*, 77 ANTITRUST L.J. 913 (2011).

the SSOs' responses to these changes are varied across SSOs, and that contractual incompleteness and ambiguity persist across SSOs and over time, despite many revisions and improvements to IPR policies. We interpret the evidence as consistent with a competitive contracting process and with the view that contractual incompleteness is an intended and efficient feature of SSO contracts. We conclude by exploring the implications of these findings for identifying the appropriate role of antitrust law in governing ex post opportunism in the SSO setting.

II. Standard Setting Organizations and the Economics of IPR Policies

A. SSOs Role in Facilitating Innovation, Commercialization, and Competition

SSOs have long played a crucial role in our innovation-driven economy, and this fundamental role has only intensified over the last few decades. SSOs develop, support, and set interoperability and performance standards, among others, which help to facilitate the adoption of new technologies (DOJ and FTC, 2007). By the early 2000s, hundreds of collaborative SSOs existed worldwide. They are comprised of firms, large and small, and anywhere in between, and include members that contribute as well as members who adopt and implement technology. SSOs also span across a variety of industry and technical categories, including aeronautics, life sciences, telecom, and electronics.[4]

Standards can make products more valuable for consumers and less costly for firms to produce.[5] Interoperability standards, for example, ensure that products manufactured by different companies are

[4] For a list of SSOs and standards in a variety of fields, see *Standard Setting Organizations and Standards List*, CONSORTIUMINFO.ORG, http://www.consortiuminfo.org/links/ (last visited Dec. 29, 2013).

[5] *See, e.g.*, U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, ANTITRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS: PROMOTING INNOVATION AND COMPETITION 33 (2007), *available at* http://www.ftc.gov/sites/default/files/documents/reports/antitrust-enforcement-and-intellectual-property-rights-promoting-innovation-and-competition-report.s.department-justice-and-federal-trade-commission/p040101promotinginnovationandcompetitionrpt0704.pdf; Bruce H. Kobayashi & Joshua D. Wright, *Intellectual Property and Standard Setting*, *in* ABA HANDBOOK ON THE ANTITRUST ASPECTS OF STANDARDS SETTING 95 (2010).

compatible with one another and can also reduce companies' costs of production by making it less costly for them to acquire technical information and simplify product design. For consumers, standards facilitate interoperability from a wide adoption of the standards, which in turn can help to protect consumers from stranding and result in greater realization of network effects.[6] Consumer benefits from product compatibility are particularly large for network industries, where the value of a product or service to an individual consumer increases as the number of consumers that adopt compatible products rise.

When developing and setting standards, SSOs typically require their members to disclose the intellectual property rights they own and ask for a commitment to a F/RAND royalty rate for a license to any IPRs the members contribute that become standard essential (Ratliff & Rubinfeld, 2013). Working groups within SSOs then review and evaluate the various contributed technologies and, through many discussions among engineers and technical experts, determine the best technology or sets of technologies for the standard. IPRs deemed essential to a standard by the working groups are known as SEPs. SSOs' member firms compete vigorously for inclusion into the standard during the evaluation process, in part because owners of SEPs are guaranteed a steady revenue stream from licensing their IPRs to firms that manufacture products that incorporate the standard.

SSOs are not the only way by which standards are set. Standards also may be set through competition in the marketplace whereby firms compete vigorously in a "standards war," and the market eventually tips toward a single product that then becomes the *de facto* standard for an industry.[7] One classic example is the competition between VHS and Beta before the market tipped toward VHS in the 1980s. Either way, firms compete against one another for their technologies to become the standard. The difference is not whether competition takes place but

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[6] *See, e.g.*, Kobayashi & Wright, *supra* note 5; Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, *in* INNOVATION POLICY AND THE ECONOMY 119 (Adam B. Jaffe, Josh Lerner & Scott Stern eds., 2001).

[7] *See, e.g.*, U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, *supra* note 5, at 34; Michael L. Katz & Carl Shapiro, *Systems Competition and Network Effects*, 8 J. ECON. PERSP., Spring 1994, at 93, 107-08; Mark A. Lemley, *Intellectual Property Rights and Standard-Setting Organizations*, 90 CALIF. L. REV. 1889, 1899 (2002); Shapiro, *supra* note 6, at 137-38. It is also possible the market does not tip toward a single product, and multiple, incompatible products prevail in the marketplace.

rather where that competition takes place—through an SSO's standard setting process or in the marketplace. Of course, the standards that would emerge through one versus another mechanism may be different, and thus can have different consequences on efficiency and consumer welfare.

An initial industry-wide standard can have significant benefits, including a higher success rate of launching a new network and introducing important technologies to the marketplace, greater realization of network effects, increasing protection afforded buyers from being stranded, and enabling competition within an open standard.[8] An SSO-set standard also avoids a standards war, where firms may have to incur significant costs in order to establish an installed base of users. Consumers may also delay purchasing until the *de facto* standard is established to avoid the costs of choosing a losing standard.[9] SSO-set standards, on the other hand, may impose costs upon consumers by reducing *ex ante* competition and consumer choice, and by promoting proprietary control over a closed standard.[10] Critical to the tradeoffs inherent between SSO and *de facto* standards, and to their respective effects upon competition and consumer welfare, are incentives to participate in the SSO process and, in turn, SSO contracting and IPR policies.

B. SSO IPR Policies

There is a modest but growing literature on SSOs and their IPR policies including a small number of empirical examinations of SSOs' contract terms. Lemley (2002) offers an early and comprehensive study of SSOs and their contract terms, concluding that SSO IPR policies fundamentally change the way in which IPRs are used in practice and incentives to develop and commercialize IPRs in different industries. Lemley emphasizes the significant diversity among SSO IPR policies and examines how antitrust rules can restrict SSOs from engaging in some important procompetitive activities.

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[8] *See, e.g.*, Marc Rysman & Timothy Simcoe, *Patents and the Performance of Voluntary Standard-Setting Organizations*, 54 MGMT. SCI. 1920 (2008); Shapiro, *supra* note 6, at 138.

[9] *See, e.g.*, Jeffrey Church & Roger Ware, *Network Industries, Intellectual Property Rights and Competition Policy*, *in* COMPETITION POLICY AND INTELLECTUAL PROPERTY RIGHTS IN THE KNOWLEDGE-BASED ECONOMY 230 (Robert D. Anderson & Nancy T. Gallini eds., 1998).

[10] *See, e.g.*, Shapiro, *supra* note 6, at 138.

SSO IPR policies exhibit rich variation across a number of dimensions. This heterogeneity could suggest the contract terms respond and adapt to changes in the competitive environment and to the specific needs of each SSO to design, incorporate, and attract the IPRs that yield the best standard for the organization. Although some SSOs have no policies at all, others have well-developed IPR policies.[11] For those SSOs with IPR policies, SSO rules governing the scope of disclosure, licensing arrangements, and whether members' ownership of IPRs within a standard is prohibited, all vary considerably.

Some SSOs require royalty-free licensing before incorporating the IP into a standard, while others require "reasonable and nondiscriminatory licensing."[12] Other SSOs specifically compel members to license worldwide to everyone using the standard, not just to other members of the SSO. Certain SSOs provide guidance upon the meaning of "reasonable" and specify a mechanism for dispute resolution, while others do not. The F/RAND commitment itself can also take a variety of forms—it may be implicit from the patentees' participation in a standard-setting process (per the SSOs' bylaws), or it may be an explicit written acknowledgement of such obligations to the SSOs.[13] SSOs may require an IPR holder to make a uniform and specified F/RAND assurance, or may allow the IPR holder the freedom to express its willingness to license on its own terms. For example, IEEE considers the letters of assurance from four different owners of SEPs for the wi-fi standard. One patent holder promises that the technology "will be made available at nominal costs to all who seek to use it for compliance with an incorporated standard," while another agrees to "non-discriminatory basis and on reasonable terms including its then current royalty rates."[14] A third patent holder provides no

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[11] *See, e.g.*, U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, *supra* note 5, at 47; Benjamin Chiao, Josh Lerner & Jean Tirole, *The Rules of Standard-Setting Organizations: An Empirical Analysis*, 38 RAND J. ECON. 905, 916-18 (2007); Lemley, *supra* note 7, at 1904-6, 1973-1980.

[12] *See, e.g.*, U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, *supra* note 5, at 47; Chiao et al., *supra* note **Error! Bookmark not defined.**; Lemley, *supra* note 7, at 1904-6, 1973-1980..

[13] *See* James Ratliff & Daniel L. Rubinfeld, *The Use and Threat of Injunctions in the RAND Context*, 9 J. COMP. L. & ECON. 1, 10-11 (2013).

[14] *Id.* (citing Kamilo Feher, Dir. Digital Commc'ns Research Laboratory, Univ.. of Cal., Davis, Notice of Patent Applicability (Sept. 20, 1993, rev. June 29, 1994), *available at* http://goo.gl/F0djs; Letter from Walter L. Willigan, Program Dir., Licensing, IBM, to Vic Hayes, Chairman, IEEE P802.11 (Oct. 10, 1995), *available at* http://goo.gl/ioCp4).

benchmark at all to roughly estimate the royalty rates it would charge. In short, SSO contract terms exhibit remarkable heterogeneity quite consistent with the variation in market forces faced by their remarkably varied members and associated technologies.

Lerner and Tirole (2006) address the question of how firms choose between competing SSOs. They introduce competition between SSOs and IPR policies in that competition. Specifically, Lerner and Tirole demonstrate the incentives for forum shopping technology contributors to respond to "sponsor friendly," and less rigid, IPR policies, resulting in higher quality standards. Chiao, Lerner and Tirole (2007) test these predictions by examining SSO IPR policies and find that user-friendliness is positively correlated with concessions. They also show that royalty-free licensing tends be associated with no disclosure requirements, while RAND licenses are associated with disclosure requirements.

Layne-Farrar (2013) is the only paper we are aware of that assesses the changes of SSOs' IPR policies over time in response to antitrust enforcement policy changes and enforcement actions. Layne-Farrar illustrates that most SSOs have responded specifically to changes in the risk of antitrust exposure by altering their IPR policies. We focus more broadly upon the relationship between incompleteness and ambiguity in SSO IPR policies and efficiency. We also examine empirically the responsiveness of IPR policies to all environmental changes, including, but not limited to, increased antitrust exposure.

III. SSO IPR Policies and the Economics of Incomplete Contracts

A. Incomplete Contracts and Efficiency

The threat of holdup is a generally well-understood economic phenomenon. In the SSO setting, after a standard is adopted, and switching to an alternative standard would require significant additional investment, the holder of the IPR that is part of the standard can exploit its position to extract higher royalties when F/RAND terms are vague. There is no doubt SSO contracts are incomplete in the economic sense. That is, the contracts omit terms governing some contingent states that may arise over the future life of the contractual arrangement. Other alleged imperfections involve contractual ambiguity, such as the adoption of flexible terms subject to *ex post*

interpretation.[15]

The seminal example of intentional contractual incompleteness is the F/RAND commitment common in many SSOs' IPR policies. The level of precision of the F/RAND term is a choice made by sophisticated parties informed by a number of tradeoffs. Most importantly, there is considerable uncertainty concerning the ultimate value of the technology, if adopted, especially in dynamic markets. Contractual flexibility *ex post* can be an important source of economic value. There are additional reasons parties might favor less precision or more incompleteness. Fear of antitrust liability imposes some costs of additional precision as such specificity with respect to prices, marketing, and distribution terms may be construed as unlawful price-fixing.[16] Additional precision in the form of well-defined licensing commitments could also raise the costs of SSO participation (Froeb, Werden, Ganglmair, 2012).

The standard economic view recognizes contractual incompleteness alone is not sufficient to conclude that individual contracts are inefficient, much less indicative of market failure in the SSO process. Neither is the mere empirical observation of contracts that trade additional contractual precision—and the rigidity that necessarily arises from more precise language—for greater *ex post* flexibility, a particularly unique economic phenomenon in modern contracting. Unfortunately, much of the policy discussion involving SSO contracting appears to presume contractual incompleteness alone is sufficient to

[15] A classic example of contractual ambiguity is the "best efforts" clause in contracts. *See, e.g.*, Charles J. Goetz & Robert E. Scott, *Principles of Relational Contracts*, 67 VA L REV. 1089, 1114–17 (1981). On the efficiency of *ex post* contractual flexibility generally, see Keith J. Crocker & Scott E. Masten, *Pretia ex Machina? Prices and Process in Long-Term Contracts*, 34 J. L. & ECON. 69 (1991); Victor P. Goldberg, *Price Adjustment in Long-Term Contracts*, 1985 WIS. L. REV., 1985 527; Benjamin Klein, *Contract Costs and Administered Prices: An Economic Theory of Rigid Wages*, 74 AM. ECON. REV. 332 (1984); Ian R. Macneil, *Contracts: Adjustment of Long-Term Economic Relations under Classical, Neoclassical, and Relational Contract Law*, 72 NW. U. L. REV. 854 (1978); S.E. Masten, *Long-Term Contracts and Short-Term Commitment: Price Determination for Heterogeneous Freight Transactions*, 11 AM. L. & ECON. REV. 79 (2009); S.E Masten & K J. Crocker, *Efficient Adaptation in Long Term Contracts: Take or Pay Provisions for Natural Gas*, 75 AM. ECON. REV. 1083 (1985); Robert E. Scott, *Principles of Relational Contracts*, 67 VA. L. REV. 1089 (1981).

[16] *See, e.g.*, U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, *supra* note 5, at 49; Shapiro, *supra* note 6, at 128, 140.

demonstrate inefficiency and to justify legal regime change or other regulatory solutions.[17]

Rendering a verdict upon the efficiency of SSO contracts requires an analysis of the costs and benefits of greater specificity relative to the status quo and other feasible alternative arrangements. Some commenters and competition agency officials contend that requiring IPR holders to commit to more specific licensing terms before a technology is selected to become part of a standard, making more precise F/RAND commitments, and otherwise more comprehensive and complete SSO contracts would further minimize the risk of holdup and enhance efficiency.[18]

This approach of "solving" contractual incompleteness by requiring certain contract terms—or by recommendation by a regulatory agency supported by threat of law enforcement—is not economically sound in the absence of some reliable indication the incompleteness is demonstrably inefficient and can be improved upon by greater specificity. To our knowledge, there is no empirical evidence capable of providing the economic foundation for such a regulatory approach.

To perfectly prevent opportunism, much costly effort would be required to anticipate all contingencies and to negotiate and draft responsive terms. Indeed, in some cases, drafting enforceable terms perfectly covering all aspects of contractual performance likely is impossible. Transactors' reputational capital can also efficiently reduce the need for court-enforced, written terms. The efficiency rationale for incomplete contracts identifies an intuitive tradeoff between more complete contractual specification which may generate benefits in the form of reducing the expected value of holdup costs and the additional costs of precision both in terms of additional negotiation and rigidity of

[17] The economics literature has long recognized that nearly all contracts are, in practice, incomplete. *See, e.g.*, OLIVER HART, FIRMS, CONTRACTS AND FINANCIAL STRUCTURE 21-23 (1995); JEAN TIROLE, THE THEORY OF INDUSTRIAL ORGANIZATION 29 n.48 (1997).

[18] *See, e.g.*, U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, *supra* note 5, at 36, 46-47 (citing November 2002 hearing transcript of Vishny, Peterson, Shapiro, and others); Kuhn et al., *supra* note 2; Lemley, *supra* note 7, at 1906, 1954.

court enforcement as compared to self-enforcement.[19] These costs are likely to be substantial in the SSO context. For example, additional negotiations could also slow down the standard setting process, further causing inefficiencies and delay in terms of bringing the technology to market, the commercialization of IPRs, and rewarding the inventors to continue to stimulate innovation.[20]

Of course, the inherent uncertainty in anticipating future contingencies—most important among them being changes in technology and its commercialization over time—renders contracts necessarily imperfect and incomplete. One implication of this observation is that attempts to increase specificity may not bear fruit: the probability of holdup will not be reduced to zero. This point highlights why focusing upon incompleteness and individual terms rather than the contracting process itself is a troublesome approach. The relevant question is not whether one can point to contractual incompleteness in the abstract, but whether there is reason to believe—based upon economic theory and evidence—alternative contracts would improve efficiency as compared to those observed in the real world. Another useful way to ask this question, to which we will now turn, is whether there is persuasive reason to believe that IPR holders and SSOs systematically err in making the tradeoffs already discussed between greater precision at greater cost on the one hand, versus increased contractual flexibility on the other.

B. *Ex Post* Opportunism and Identifying the Alleged Market Failure in SSO Contracting

A reasonable starting point for understanding the SSO contracting process is the SSO contracts themselves. The significant variation in SSOs' IPR policies is what one expects to see in competitive contracting

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[19] The additional negotiation costs to attempt to cover all contingencies are wasteful and inefficient because they involve only wealth transfers between the parties and because most future events can be accommodated at lower cost after the relevant information is revealed. Benjamin Klein, *Why Hold-Ups Occur: The Self-Enforcing Range of Contractual Relationships*, 36 ECON. INQUIRY 444 (1996) [hereinafter Klein, *Why Hold-Ups Occur*]; *see also* Benjamin Klein & Keith B. Leffler, *The Role of Market Forces in Assuring Contractual Performance*, 89 J. POL. ECON. 615, 616 (1981) (noting that "economists . . . have long considered 'reputations' and brand names to be private devices which provide incentives that assure contract performance in the absence of any third-party enforcer").

[20] U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, *supra* note 5, at 49.

process in a diverse ecosystem of technologies and SSOs.[21] The diversity in contract terms also reflects the many different ways SSOs seek to attract valuable technology contributors as well as adopters to their standards. Although some technology companies join more than one SSO, complying with differing disclosure rules and other policies in different SSOs can be very costly to companies with IPRs, especially for those with large patent portfolios.[22] Lerner and Tirole (2006) examined competition among SSOs to better understand how IPR contract terms are used to attract technology contributors, and demonstrated that forum shopping technology contributors respond to "sponsor friendly," less rigid, IPR policies, resulting in higher quality standards.[23]

Competition to attract contributors does not imply SSOs would always craft IPR policies that favor contributing members, possibly leading to higher probability of holdup. SSOs are also constrained to have policies that are attractive to adopter members and, all else equal, an SSO is more attractive to technology contributors with a larger base of adopters. SSOs thus have the features of a two-sided market, where they serve as platforms to join together contributors and adopters. As a platform, a successful SSO needs to attract members on both sides of the platform, by striking a balance for the two sides with respect to their rules and policies. The contract terms optimizing this balance will vary between and within SSOs as technological, regulatory, and market conditions facing the organization change over time.

Again, the relevant regulatory question is not whether SSOs, contributors, and adopters face tradeoffs in terms of balancing IPR policy completeness and precision—they certainly do—but whether there is reason to believe the sophisticated parties get the balance

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[21] *See e.g.*, Michael J. Schallop, *The IPR Paradox: Leveraging Intellectual Property Rights to Encourage Interoperability in the Network Computing Age*, 28 AIPLA Q.J. 195, 234 (2000) (suggesting that the variance in IP policies creates a sort of competition, with the most efficient IP rule likely to prevail).

[22] U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, *supra* note 5, at 43; Lemley, *supra* note 7, at 1907.

[23] *See, e.g.*, Josh Lerner & Jean Tirole, *A Model of Forum Shopping*, 96 AM. ECON. REV. 1091 (2006).

systematically wrong as the result of some market failure.[24] The concerns with SSO contracts and market failure center around two possibilities. The first involves the possibility of externalities imposed upon third parties as a result of the SSO contracting process—that is, SSOs do not take into account the costs imposed upon third parties when selecting contract terms. In general, this possibility appears unlikely, as most if not all SSOs include both contributing and adopter members (licensees), and as Tirole and Lerner (2006) emphasize, SSOs have incentives to strike a balance between the interests of both member groups in order to attract both groups and increase the value of the organization as a platform.

A specific example of the concern with SSO contract externalities is the assertion that licensees do not care about increased royalty rates, for example, because the increased rates are simply passed on to end-user customers (Farrell, Hayes, Shapiro, and Sullivan, 2007). The economic logic underlying this assertion is based upon the argument that direct buyers of technology do not bear the cost of a royalty rate increase imposed upon both the buyer and his rivals. This is not likely to be the case. Significant bargaining over royalty rates and frequent litigation involving licensee claims to enforce SSO contract terms suggest licensees do have incentives to protect against holdup. Further, licensees are not likely to pass on the full increased cost of a royalty rate increase. Very few end-use products, and in particular those that incorporate standardized technology, face a completely inelastic demand curve where manufacturers are able to completely pass on higher royalty rates to consumers. Additionally, we are not aware of any reliable evidence that indicates royalty rates and final end-use prices are higher for standardized technologies.

The second possibility is that, because SSOs include competitors, they are ripe for collusive interaction. The economic logic of this claim as it relates to SSO contracts' ability to protect against patent holdup is that technology contributors collude to ensure inadequate protections.

[24] Reputational costs are another important element of the tradeoffs facing SSOs and their members. Most firms and IPR holders are repeat players that hope both to license SEPs and to have their technology incorporated in subsequent standards. A reputation for engaging in patent holdup would make it more difficult to convince SSOs and their members to adopt a firm's technology in the future, which would reduce the firm's ability to earn licensing revenue in the future. In addition, for firms that contribute patents to SSOs and implement standards in products, a reputation for holdup as a licensor could affect the firm's position when operating on the other side of the bargaining table as a licensee.

This logic presumes that, against evidence, technology contributors dominate the SSO process and discounts the nature of SSO competition and balancing of member interests. Nonetheless, this argument is a non-sequitur as it relates to calls for greater regulation of SSO contracts because the antitrust laws already prohibit naked price-fixing or abuse and manipulation of the standard setting process to exclude competitors from the market, such as in *Allied Tube & Conduit Corp. v. Indian Head, Inc.*[25] and *American Society of Mechanical Engineers, Inc. v. Hydrolevel Corp*.[26]

Both views of market failure involving SSO contracts, however, generate some testable implications. Most importantly for present purposes is that either variety of market failure contemplates (collusively or otherwise inefficiently) little if any contractual protections for implementers and adopters. That is, the view that SSO contracts are the product of market failure contemplates an inefficiently low level of protection for technology licensees. In addition to low levels of contractual protections for technology licensees, this view also implies the SSO contracting process is not likely to result in contract *changes* that increase protections for the potential victims of patent holdup either because they are the victims of a collusive scheme by technology contributors (facilitated by the SSO), or because the interests of licensees are not adequately taken into account during the contract process because royalty rate increases will be passed on to final consumers. We explore these predictions in Part IV.

IV. Empirical Examination of SSO IPR Changes

In order to better understand the process by which SSOs shape their IPR policies, the role of incompleteness and ambiguity in the policies, and the incentives different legal and regulatory regimes will have upon that process, we examine the ways in which terms are specified in the policies, in particular as they relate to SEPs. Of particular interest is the specificity of the terms, whether those terms have or have not changed over time to respond to the risk of holdup and controversy involving SEPs, the manner in which they have changed, and whether the terms and the changes are dependent on characteristics of the SSO.

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[25] 486 U.S. 492 (1988).

[26] 456 U.S. 556 (1982).

A. Testable Implications

As discussed above, incomplete contracts are a predictable result given the costs associated with identifying all contingencies that might arise during the life of the contractual relationship. With respect to licensing terms in particular, F/RAND terms as written may well reduce the probability of future hold-up without excluding the possibility altogether by driving the probability to zero. Contractual incompleteness in this context is consistent with efficiency. Conclusions about the efficiency consequences of greater contractual specificity relative to the status quo requires further analysis of the costs and benefits of the additional precision. Such analysis would include balancing the perceived risks of holdup, the impact upon the incentives to participate in the standard setting process, and any costs that might arise due any delays in the standard setting process as a result of the further specificity.

The efficiency rationale for incomplete contracts identifies an intuitive tradeoff between more complete contractual specification, which may generate benefits in the form of reducing the expected value of holdup costs and the additional costs of precision both in terms of additional negotiation and rigidity of court enforcement as compared to self-enforcement.[27] In addition, in the case of SSOs, the terms need to apply to many different parties, with varying incentives and situations, across different technical standards, with varying levels of complexity and technical requirements, making the application of rigid terms across all parties and standards even more difficult.

To determine all *ex post* contingency states can take time and cause delays. SSOs appear to recognize that and choose to impose a mandatory or encouraged requirement with respect to licensing information. For example, IEFT has stated that: "The inclusion of licensing information in IPR disclosures is not mandatory but it is encouraged so that the working groups will have as much information as they can during their deliberations. If the inclusion of licensing information in an IPR disclosure would significantly delay its submission it is quite reasonable to submit a disclosure without

[27] See *supra* note 20 and accompanying text.

licensing information and then submit a new disclosure when the licensing information becomes available."[28]

Absent some kind of persistent market failure, we would expect to see that SSOs considers and implement IPR policy changes and adjustments in response to new information and changes in perceived risks. We would also expect responses to changes in the environment to vary across SSOs, each participating in its own competitive contracting process involving a diverse ecosystem of technologies, SSOs, adopters and contributors.

B. Data and Methodology

We were able to obtain current and past IPR policies for eleven SSOs.[29] A summary of the SSOs and their basic characteristics are in Table 1. All of these SSOs have IPR policies and issue standards. The sample includes SSOs across a variety of technology industries and of varying size, both in terms of their membership as well as the number of standards they have issued. Several of the SSOs set and publish standards across a multiple industries. The SSOs also vary in terms of their age. The oldest SSOs in the sample are ITU and ANSI, which were established in 1865 and 1918, respectively. Others originated anywhere from the 1940s to the 1970s, while the younger SSOs in the sample were established over the last thirty years.

The largest SSO in our sample in terms of membership is IEEE, with over 400,000 members.[30] CEN is the SSO with the fewest – only 60 – members. In terms of number of standards, ISO has issued nearly 20,000 since its inception in 1947, while another SSO in our sample, JEDEC, has only issued 334 standards since its inception in 1958.[31] Significantly younger SSOs, such as VITA (established in 1984), and

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[28] IETF 2004 Policy.

[29] We are grateful to Anne Layne-Farrar for sharing the SSO policies that she has collected with us. While there are hundreds of SSOs worldwide, not every SSO has IPR policies, and archives of past IPR policies have proved to be challenging to locate and obtain in many instances. With the exception of ITU, none of the eleven SSOs we examine here make readily available their archive of past IPR policies online.

[30] The size of an SSO's membership is based upon information published on each SSO's website. Members of different SSOs may have different responsibilities, privileges, or levels of participation across SSOs.

[31] Of course, the complexity and the composition of the standards at each SSO can vary significantly.

OASIS (established in 1993) have issued 214 and 105 standards, respectively.

It also appears to be the case that there is not a consistent relationship between the size of the membership base and the number of standards an SSO has approved and issued. Several SSOs have a large base of members relative to the standards they have issued. For example, OASIS has 5,000 members and 105 standards, and IEEE has over 400,000 members and 1,400 standards. On the other hand, CEN appears to only have 40 members and nearly 14,000 standards, and ISO has 164 member countries and nearly 20,000 standards.

Table 1 also shows the coverage of IPR policies in our sample. The earliest IPR policy we have is from ANSI, dated 1974. However, most of the IPR policies in our sample are dated in the 1990s and the 2000s. IEEE, with the highest number of members in our sample, appears to have revised their policies most frequently between 1995 and the present, including multiple revisions in 1999, 2006, and 2007. CEN, on the other hand, appears to have only revised its policies three times since 2001.

We conducted a systematic review of each of the SSOs' past IPR policies we obtained for contract terms and changes involving the following provisions: (1) The inclusion of IP in standards; (2) Licensing rules; (3) IP disclosure rules and requirements; (4) Dispute resolution mechanism; and (5) Injunctive relief. Each IPR policy introduction or revision in these areas was recorded over time for the years specified in Table 1.

C. Findings and Discussion

Most SSOs change their IPR policies at a frequency of once per year. Others, such as IEEE, have revised their policies as frequently as a few times a year. In either case, each SSO in our sample has had multiple opportunities to revise its IPR policy.

Overall, we find that contractual incompleteness and ambiguity of IPR policies for some terms persists over time, despite many revisions, refinements, and adjustments to IPR policies. In particular, although we observe considerable changes to some IPR policy terms,

ambiguity, especially with respect to F/RAND licensing terms, tends to persist across SSOs and within an SSO over time.

Further, SSOs appear to consider and implement adjustments in their IPR policies over time as new information and perceived risks becomes available. We also find SSOs' responses are varied, which is what one expects to see in competitive contracting process involving a diverse ecosystem of technologies, SSOs, adopters and contributors. Different SSOs responded differently to changes in perceived patent holdup risk. Heterogeneous responses follow logically from different needs arising from variation in SSO size, membership, number of standards, type of standards, and technology required. This rich variation may also imply that different approaches to licensing and disclosure rules are necessary in response to perceived holdup risks as each SSO evaluates the net costs and benefits of IPR policy changes.

The data show SSOs are quite willing to change IPR policies, refining or reducing ambiguity for some terms while choosing to maintain incompleteness or ambiguity for other IPR policy provisions. It is difficult to escape the conclusion that SSOs and their members have determined the benefits from some IPR policy changes outweigh their costs while others are not economically sound. This calculation is likely to vary across SSOs and by IPR policy provision. Below we discuss our findings in greater detail for each of the IPR policy terms examined.

i. Inclusion of IP in Standards

Each of the SSOs studied allows standards to include patented inventions for all of the years for which we have IPR policies. All of the SSO policies in our possession specifically indicate that there is no

objection in principle to include patented items in the standard where justified.[32]

No SSO has modified their policies to prohibit incorporating patented items into their standards, despite the publication of many versions of IPR policies, during our sample period. The SSOs choose to include patented technology despite the possible increased cost, both in terms of a non-zero royalty rate and risks of patent holdup. This could suggest that, for at least some standards, it would not be workable to exclude patented inventions all together. Despite the higher cost of incorporating patented technology into a standard, SSOs still allow and do incorporate IPRs, suggesting that the marginal benefit of doing so outweighs any costs.

Instead, SSOs appear to choose to minimize the cost of holdup risk and associated supra-competitive royalty rates by requiring assurances from patent holders on licensing terms and disclosure rules. That is, SSOs generally declare a patent is prohibited from inclusion into a standard unless F/RAND terms are agreed to and/or approved—though, as we have noted, there is substantial variation in the form of the F/RAND commitment. For example, as early as 1974, ANSI's IPR policy states: "The terms and conditions of any license shall be submitted to ANSI for review by its counsel, together with a statement of the number of independent licensees, if any, which have accepted or indicated their acceptance of the terms and conditions of the license... Council shall determine, prior to approval, whether or not the patent situation would disqualify the standard for consideration."

[32] See, e.g., IEEE's 1994 policy – (Standards can include patents "if there is no equivalent, noninfringing way of achieving the objectives of the standard, if it is justified for technical reasons, and if the patent holder agrees to nondiscriminatory licensing at reasonable rates."); CEN's policy in 2001 indicates that "any use of IPR by a standard is an anomaly, sometimes an unavoidable one" … "[i]f in exceptional cases, technical reasons justify the preparation of a European Standard in terms which include the use of a patented item, there is no objection in principle to such a step, even if the terms are such that there are no alternative means of compliance."; TIA's 2001 policy – ("There is no objection in principle to drafting a TIA publication in terms that include the use of a patented item, if it is considered that technical reasons justify this approach."); JEDEC's 1993 policy – ("no restriction against drafting a proposed standard in terms that include the use of a patented item if technical reasons justify the inclusion…").

Similarly, ISO's 1989 policy states: "If the patent holder does not provide such a statement, the technical committee shall not proceed with the inclusion of the patented item unless the respective Council gives permission." Further, the policy asserts that "[s]hould it be revealed after publication of the International Standard that licences under a patent and like rights cannot be obtained under reasonable terms and conditions, the International Standard shall be referred back to the technical committee for further consideration." These policy terms last until the present day.

ITU's 1999 IPR policy stated "If the patent holder is unwilling to license or waive its rights, the Recommendation will need to be revised or withdrawn and its publication suspended. In such a case, the TSB Director will promptly advise the Study Group responsible for the affected Recommendation so that appropriate action can be taken." In 2000, OASIS's policy stated: "Where any patents, patent applications, or other proprietary rights are known, or claimed, with respect to any specification developed within the OASIS process, and are formally brought to the attention of the OASIS Board of Directors, the OASIS Board of Directors shall not advance the specification without including in the document a note indicating the existence of such rights, or claimed rights."

On the other hand, IETF's policy in 2004 appears to be more lenient with respect to the licensing commitment required for essential IPRs. IETF's policy states that, "In general, IETF working groups prefer technologies with no known IPR claims, or, for technologies with claims against them, an offer of royalty-free licensing." However, "IETF working groups have the discretion to adopt technology with a commitment of fair and non-discriminatory terms, **or even with no licensing commitment, if they feel that this technology is superior enough to alternatives with fewer IPR claims or free licensing to outweigh the potential cost of the licenses**" (emphasis added).

ii. Licensing Rules for SEPs

Each SSO studied imposes licensing rules for any and all patented inventions that are included into SSOs' standards to attempt to minimize the cost and risks arising from the inclusion of those inventions. Licensing rules typically comprise of a version of a royalty-

free rate and/or F/RAND rate earlier in time, in the pre-2000 period. Since then, licensing rules and obligations for SEPs have evolved for some SSOs but not for others.

In order to understand the changes SSOs have made to their licensing rules over time, and in particular whether the changes increase or decrease incompleteness or ambiguity, we assigned numerical values to the licensing rules on a scale based upon the relative precision of the IPR policy rules. Most of the SSO IPR policies in our sample began with a F/RAND term. Thus, we assigned a 5 on a scale of 0 to 10 for policies that specify a basic F/RAND commitment. When additional specificity is included in later IPR policies, we assign a value that is higher than a 5 to for those years. Conversely, if for a particular year a policy eliminates language or reduces requirements, thereby reducing the level of specificity, a lower numerical value is assigned for that year. In other words, higher numeric values indicate less ambiguity, or higher specificity in terms of the commitment, and lower numeric values indicate higher ambiguity, or lower specificity. The magnitude of the numerical values alone is somewhat arbitrary, and is not designed to measure the size or practical importance of changes in either direction. Rather, the changes in numerical values are used merely as a tool to depict simply the directions of the changes. We also made an effort to synchronize the specificity of the terms across SSOs. However, given the complexity and the incongruence of the licensing language across SSO IPR policies, the specificity levels may not be perfectly comparable across SSOs and are more reliable when compared within an SSO's IPR policy over time than across SSOs.

Figure 12 plots all of the SSOs' rule changes over time and shows that most of the more drastic changes with respect to licensing rules by SSOs appear to have occurred from 2004 onward. Four of the SSOs in our sample—CEN, ETSI, TIA, and JEDEC—have elected to maintain a constant F/RAND commitment for licensing. That is, the specificity of their licensing commitments to which SEP holders must abide to have not changed.

JEDEC's faithfulness to a RAND format is particularly interesting in light of the fact that ambiguity of the RAND obligation was implicated in *Rambus*, where Rambus was alleged to have

deceptively failed to disclose its SEPs.[33] Of course, a more targeted response to the alleged behavior in *Rambus* may be to modify IPR disclosure policies rather than licensing terms. In fact, we observe precisely such changes in in JEDEC's IPR disclosure rules after 2007.

The remaining SSOs made changes to the licensing rules in their IPR policies. Five SSOs increased the specificity of their licensing terms. The most dramatic of these changes involves VITA, which had royalty-free or RAND terms from 1994 through 2006. In 2009, VITA published a new policy that includes a mandatory declaration of the maximum royalty rate, and encourages the patent holder to include a draft licensing agreement. This policy is still effective today.

From 1994 to 2007, IEEE's policies had royalty-free or RAND commitment in the licensing rules. In 2007, IEEE added specificity to its licensing commitment, including encouraging patent holders to provide a "not-to-exceed license fee or rate commitment" or a sample license agreement.[34]

Between 2000 and 2009, and in two stages (in 2005, then in 2009), OASIS established technical committees empowered to set standards involving SEPs that are declared to abide by commitments on a one of the following modes: royalty-free, royalty-free on RAND, a Royalty-free on limited, or non-assertion.[35]

Interestingly, two SSOs, IEFT and ANSI, changed their IPR policies in favor of increased ambiguity of licensing rules. In 1992, IETF's policies required assurances of a royalty-free or RAND rate, that

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[33] Rambus, Inc. v. FTC, 522 F.3d 456 (D.C. Cir. 2008) (setting aside the Commission's decision and order); cert. denied, 129 S. Ct. 1318 (2009); Rambus, Inc., FTC Docket No. 9302, File No. 110017 (Aug. 2, 2006), http://www.ftc.gov/sites/default/files/documents/cases/2006/08/060802commissionopinion.pdf.

[34] "At its sole option, the Submitter may provide with its assurance any of the following: (i) a not-to-exceed license fee or rate commitment, (ii) a sample license agreement, or (iii) one or more material licensing terms." IEEE 2007 Policy.

[35] The non-assertion mode declares that: "Each Obligated Party in a Non-Assertion Mode TC irrevocably covenants that, subject to Section 10.3.2 and Section 11 of the OASIS IPR Policy, it will not assert any of its Essential Claims covered by its Contribution Obligations or Participation Obligations against any OASIS Party or third party for making, having made, using, marketing, importing, offering to sell, selling, and otherwise distributing Covered Products that implement an OASIS Final Deliverable developed by that TC." OASIS 2008 Policy.

the terms and conditions of any license to be submitted for review—along with a statement of the number of independent licenses, if any, that have accepted or indicated their acceptance of the terms and conditions of the license.[36] In 1994, IETF maintained its requirements of assurances of a royalty-free or RAND rate, but eliminated mandatory submission of terms and conditions for review and disclosure of the number of independent licenses.[37] In 2004 IETF once again shifted IPR policy from mandating disclosure of licensing terms to merely encouraging the disclosure of licensing information (royalty-free, RAND, or no license needed).[38] ANSI also removed the requirement on submitting licenses for review and the statement of the number of independent licenses in 1997.[39]

Table 2 summarizes the changes in ambiguity in licensing rules across the sample of SSOs, along with the SSOs' basic characteristics. There does not appear to be a systematic relationship between the characteristics of the SSO and the changes they have made to their licensing rules. VITA, which has a relatively smaller base of members and number of standards, made the most significant reduction in ambiguity to its licensing rules. On the other hand, IEEE, one of larger SSOs, also has managed to reduce significantly the ambiguity to its licensing terms, while ANSI, another larger SSO, appears to have increased the ambiguity in its licensing rules. Further, the group of SSOs that made no changes to the level of ambiguity in their licensing rules includes SSOs of different industries and varying sizes.

It makes economic sense that different SSOs responded differently to patent holdup risk, and the perception of it in light of some very well-publicized litigation and investigations related to SEPs. Different needs arising from different sizes, memberships, standards, type of standards, and technology required, may very well mean that different approaches to licensing rules are necessary in response to the perceived holdup risks. Each SSO can for itself evaluate the relative cost and benefits of changes in their IPR policies—and, as the data have shown, at different times different SSOs have chosen to impose more

[36] IETF 1992 Policy.
[37] IETF 1994 Policy.
[38] IEFT 2004 Policy.
[39] ANSI 1997 Policy.

rigid terms, others to maintain the level of ambiguity in the licensing rules, and some to increase the level of ambiguity.

As ITU has explicitly stated in its policies, it "should not engage in settling disputes on patent rights," and that the disputes "should be left… to the parties concerned." ITU states that "[t]here are several sound reasons for such a firm position…" including (1) "direct involvement of the standardization organization in patent right issues would be costly; either they would require additional, specialized staff or they would have to contract out such work to patent attorneys…," and (2) even if he costs did not matter, standardization organizations will most probably not be in a position to act as genuine arbitrators in patent rights disputes, for the simple reason that the disputing patent rights holders will never disclose all the information they need to act as a fair judge in a patent rights controversy. For example, in order to define what is fair and 'reasonable' in a given case, one needs to know development and manufacturing costs, profits, etc. This kind of information is normally not disclosed to a third party with which no legal relationship has been established…"[40]

Although the handful of antitrust enforcement actions involving patent holdup are highly publicized, taken in context of thousands of standards upon which technologies read, there is no evidence that SSO deliberations fail to appropriately and optimally balance the costs and benefits of various IPR policy changes.

iii. Disclosure Requirements

All SSOs in our sample have some IPR disclosure requirements. For some SSOs, disclosure requirements expanded over time to help minimize the risk of patent holdup. For others, no changes were made to expand the scope of the disclosure requirements.

We assigned numerical values to disclosure requirements in a manner similar to that implemented for licensing rules—that is, based upon the relative specificity of the rules. Because most SSO IPR policies in our sample began with a requirement to disclose patent rights prior to the approval of the standard, we assigned a 5 on a scale of 0 to 10 for

[40] *See, e.g.*, ITU 2000 Policy; ITU 2002 Policy.

policies that specify such a requirement. When an IPR policy adds greater specificity to its disclosure requirement, such as specifying the timing of the required disclosure, we assign a value that is higher than a 5 to for those years. Conversely, if for an IPR policy eliminates or reduces ambiguity in a disclosure requirement, a lower numerical value is assigned. Similar to our approach of assigning values to licensing rules, the magnitude of the numerical values alone is somewhat arbitrary, and is used merely as a tool to understand and depict simply the directions of the changes. We also made an effort to synchronize the specificity of the disclosure rules across SSOs. However, given the complexity and the incongruence of the IPR policies across SSOs, the numerical values are not perfectly comparable across SSOs and are more reliable when compared within an SSO over time rather than across SSOs.

Figure 24 plots all of the SSOs' rule changes over time and shows that most of the more drastic changes with respect to licensing rules by SSOs appear to have occurred from 2007 onward.

These figures indicate that three of the SSOs in our sample—ANSI, TIA, and OASIS—chose not to expand or make more specific their disclosure requirements over time. ANSI and OASIS elected to maintain a basic disclosure rule that requires disclosure of patent rights reasonably known by the contributor prior to the approval of the standard. TIA, on the other hand, chose a disclosure rule encouraging, but not requiring, disclosure of any patents or published pending patent applications.

The rest of the SSOs made various changes to their disclosure rules. All eight made changes that increased the specificity of their disclosure rules. The most dramatic change came from VITA, which did not appear to have a disclosure requirement between 1994 and 1995. VITA added a rule requiring disclosure of IPRs prior to the approval of the standard after 1995. In 2009, VITA adopted a new policy that further required the disclosure of all patents and patent applications owned, controlled, or licensed before the working group adopts a proposed specification. The disclosure must also include patent number, country, and portions of specification that covers the patents. In addition, the 2009 IPR policy specifies that if the patent

holder fails to adequately and timely disclose, the holder must license on royalty-free basis.

IEEE IPR policies make no mention of disclosure requirements from 1994 to 2007. In 2007, IEEE added language to require members to disclose IPRs based upon a reasonable and good faith inquiry.[41] ETSI similarly required its members to make a "good faith inquiry and reasonable endeavors to timely inform ETSI of essential IPRs" before the standard goes public for most of the 1990s and 2000s. In 2007, ETSI added the provision that its IPR disclosure requirement could be fulfilled with respect to "all existing and future members of a patent family" by informing ETSI "of a member of this patent family in a timely fashion."[42]

As discussed earlier, JEDEC also implemented a change to its policy in 2011, adding a new detailed disclosure policy for SEPs, and specifying that the disclosure "shall be made as early as reasonably possible." Prior to 2011, JEDEC's disclosure policy simply stated that all participants have an obligation to "inform the meeting of any knowledge they may have of any patents, or pending patents, that might be involved in the work they are undertaking."[43]

Table 3 summarizes the changes in ambiguity in disclosure rules across the sample of SSOs, along with the SSOs' basic characteristics. There does not appear to be a consistent relationship between the characteristics of the SSO as compared to the changes they have made to their disclosure rules. VITA, which has a relatively smaller base of members and number of standards, made the most significant reduction in ambiguity to its disclosure rules relative to other SSOs. On the other hand, IEEE, one of larger SSOs, also significantly reduced the ambiguity of its disclosure requirements relative to its earlier policies. ANSI, another larger SSO, does not appear to have reduced the ambiguity of its disclosure rules. Further, the group of SSOs that made moderate reductions in ambiguity for their disclosure rules includes SSOs of different industries and varying sizes.

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[41] "At its sole option, the Submitter may provide with its assurance any of the following: (i) a not-to-exceed license fee or rate commitment, (ii) a sample license agreement, or (iii) one or more material licensing terms." IEEE 2007 Policy.

[42] ETSI 2007 Policy.

[43] *See*, *e.g.*, JEDEC 1993 Policy.

As with licensing rules, it is conceivable that different SSOs responded differently to patent holdup risk, and the perception of it in light of some very well-publicized litigation and investigations related to SEPs, based upon their different needs. The different needs arise from different sizes, memberships, standards, type of standards, and technology required, may very well mean that different approaches to disclosure rules are necessary in response to the perceived holdup risks.

iv. Dispute Resolution Mechanism

Most of the SSOs and IPR policies we have reviewed do not explicitly contain a dispute resolution mechanism associated with its SEPs. Only two SSOs, ETSI and VITA, appear to have included some type of dispute resolution mechanism in their IPR policies.

In particular, ETSI included an arbitration clause covering essentiality of patents in 1993, but the clause did not extend to disputes over infringement or validity of the patents.[44] Since then, ETSI's policies have not specified mechanisms for dispute resolution with respect to essentiality, infringement, or validity of the patents.

VITA, on the other hand, included a fairly specific arbitration procedure in its 2009 IPR policy. Section 10.5 of VITA's policy states that "[a]ny VSO member who believes a WG Member or the VITA Member Company that the WG Member represents has not complied with his/her or its obligations under this Patent Policy, including but not limited to obligations under Section 10.3 to grant licenses on terms that are fair, reasonable and nondiscriminatory, may submit his/her claim in this respect to the applicable WG Chairperson," and that if the claim is not resolved on an informal basis within 15 days, the Working Group Chairperson will commence an arbitration procedure.[45] The procedure involves an arbitration panel that will consist of three persons, one selected by the party asserting noncompliance, one selected by the party whose compliance or noncompliance is at issue, and a third person selected jointly by the two parties, with the VITA Technical Director acting as the non-voting administrator and the VITA General Counsel advising on the procedures to be followed.

[44] ETSI 1993 Policy.

[45] VITA 2009 Policy.

v. Injunctive Relief

None of the SSOs IPR policies in our sample include explicit policies on the ability of IPR holders to seek injunctive relief, with the exception of ETSI's policy in 1993.

Specifically, ETSI's 1993 IPR Undertaking included clauses that required SEP owners "to refrain from taking legal action for infringement of the IPR against the [party requesting a grant of license] during negotiations."[46] Further, the Undertaking requires owners to "not seek an injunction against a PARTY in respect of any ESSENTIAL IPR in respect of: offers for sale of Equipment and METHODS or parts thereof to a customer in any country by a PARTY, or the supply of EQUIPMENT and METHODS or parts thereof by a PARTY to a customer in any country and the use thereof by the customer in any country," provided that they are for purposes associated with seeking the adoption of a standard in that country.

Aside from the policy in 1993, the IPR policies we have obtained from ESTSI do not mention any procedures or prohibitions against injunctions. We understand that there are ongoing discussions by certain SSOs over whether specific languages pertaining to injunctions should be included in their IPR policies.[47] We are unaware of any SSOs in our sample that have implemented an explicit rule with respect to injunctions.

V. The Role of Antitrust in Regulating SSO Contracting Processes and their Outcomes

The important policy debate over the role of antitrust law in governing SSO contracts turns in large part upon the sufficiency of SSO contracting, reputational sanctions, contract law, and other private law remedies to deter patent holdup without deterring SSO participation at the cost of sacrificing the benefits of standardization. The debate is not

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[46] ETSI 1993 Policy. "Methods" are "any method or operation fully conforming to a STANDARD." "Equipment" is "any system, or device fully conforming to a STANDARD."

[47] It appears that ITU and ETSI have been considering such proposals. *See, e.g.*, Anne Layne-Farrar, Proactive or Reactive? An Empirical Assessment of IPR Policy Revisions in the Wake of Antitrust Actions (Dec. 9, 2013) (unpublished manuscript) (citing Matthew Newman & Lewis Crofts, *Comment: Standards Setters Push Smartphone Makers to Reach Consensus on Patent Injunctions*, MLEX (Sept. 20, 2013)).

theoretical. Based upon the logic that these alternative institutions are inadequate, competition agencies in the United States have already brought enforcement actions based upon the premise that a breach of an SSO contract – whether by charging a non-FRAND royalty rate or seeking an injunction on a FRAND-encumbered SEP –constitutes an antitrust violation (Ginsburg & Wright, 2013).

This expansion of conventional antitrust principles represents a significant change in the approach to regulating actual or threatened opportunistic behavior. To be sure, the Supreme Court's *Kodak* decision contemplates the possibility of providing an antitrust remedy for contractual opportunism in very narrow circumstances. However, *Kodak* should give little comfort to those looking for legal support for an expanded role for antitrust in regulating SSO contracts. Courts have not been willing to extend Kodak beyond tying arrangements and further blur the line between antitrust law and contract law. Further, lower federal courts have overwhelmingly rejected to apply *Kodak*-based opportunism theories of antitrust harm when given the opportunity.[48]

The refusal to extend antitrust law to provide a remedy for holdup or breach of contract mirrors the traditional economic approach. Indeed, economists have long viewed the holdup problem and *ex post* opportunism more generally as a problem sounding in contract law with its default substantive rules and remedies rather than in antitrust law.[49] The risk of imposing antitrust remedies in pure contract disputes can have harmful effects in terms of dampening incentives to participate in standard setting bodies and to commercialize innovation (Froeb, Ganglmair, and Werden, 2012; Kobayashi & Wright, 2009, 2010). These effects would be unfortunate consequences of policy

[48] KOBAYASHI & WRIGHT (2009).

[49] *See, e.g.*, OLIVER E. WILLIAMSON, MARKETS AND HIERARCHIES: ANALYSIS AND ANTITRUST IMPLICATIONS 26-30 (1975) ("[T]o prevent opportunism, 'an effort must be made to anticipate contingencies and spell out terms much more fully than would otherwise be necessary. . . . [In addition,] the agreement needs to be monitored.'");Benjamin Klein, *Market Power in Antitrust: Economic Analysis After* Kodak, 3 S. CT. ECON. REV. 43, 62-63 (1993) ("Antitrust law should not be used to prevent transactors from voluntarily making specific investments and writing contracts by which they knowingly put themselves in a position where they may face a 'holdup' in the future . . . . [C]ontract law inherently recognizes the pervasiveness of transactor-specific investments and generally deals with 'holdup' problems in a subtle way, not by attempting to eliminate every perceived 'holdup' that may arise."); *see also* Timothy J. Muris, *Opportunistic Behavior and the Law of Contracts*, 65 MINN. L. REV. 521 (1981).

reforms and enforcement efforts designed to improve the competitive process.

There is another economic reason—sounding in deterrence theory—to be concerned with the imposition of antitrust sanctions, including the prospect of treble damages and the damages associated with follow-on litigation, to regulate disputes under SSO contracts. The economic analysis of optimal legal sanctions and criminal punishments is built upon the foundational insight that penalties should be sufficient to induce offenders to internalize the full social cost of their crimes (Becker, 1968; Ginsburg & Wright, 2010). The logic of an optimal total sanction greater than the perpetrator's expected gain from the violation, in the antitrust context, is a probability of detection less than one. It is difficult to justify with an economic rationale a damages multiplier, much less layering treble (or more, including follow-on actions) damages over standard contract damages, in the context of patent holdup where the probability of detection approaches one by definition. Because multiple damages are not required to generate optimal deterrence, remedies for breach of contract, or preventing the enforcement of the patent through estoppel, waiver, or other equitable doctrines, can serve to optimally deter undesirable patent holdup if they impose approximately single damages (Kobayashi & Wright, 2012).

Antitrust enforcement remains available in cases of true anticompetitive price-fixing or deceptively manipulating standards. However, in the absence of empirical evidence to suggest SSOs' adaptation of their IPR policies over time have been inadequate in minimizing the probability of holdup, there is little reason to bring to bear the blunt weaponry of antitrust rules and remedies to micromanage the competitive process in the name of improving SSO contracts. The evidence presented in Part V demonstrates that SSOs reduce contractual ambiguity and incompleteness in some areas, increase ambiguity in others, and choose to maintain incompleteness and ambiguity with respect to other contractual provisions. Critically, SSOs do in fact change IPR policies in the direction of providing greater protection against holdup. In sum, the evidence is consistent with the view of a vibrant and competitive contract process rather than one tainted by collusion or inadequate incentives to protect licensees.

Requiring stricter or more complete SSO IPR policies might make it

less attractive for IPR holders to participate in standard setting. The social costs associated with deterring participation in SSOs and reducing standardization are likely to outweigh any potential benefits associated with a marginal decrease in the already low probability of holdup. These welfare losses could include, in the short-term, SSOs more frequently selecting an inferior technology; reduced SSO participation could also lead to a dichotomy between competing technologies, which would defeat the purpose of SSOs and deprive consumers of the obvious and long-recognized benefits of standardization. Over the long-run, these reforms could undermine the very desirable purpose of SSOs which, among other things, facilitate compatibility and interoperability, reduce consumer costs, and advance innovation.

Consider, for example, one specific reform proposal to resolve silence in SSO contracts concerning the conditions under which an SEP holder may pursue injunctive relief by stripping the patent holder of that right upon making a F/RAND commitment. To our knowledge, while some SSOs have considered specifying the terms under which injunctive relief will be available to patent holders contributing technologies to the standard, no single SSO has prohibited injunctions. As we demonstrate in Part V, the fact that SSOs actively change some contract terms and not others should give some pause to some who conclude the failure to adopt a "no injunction rule" or similar restriction is the result of oversight, collusion, or inadequate incentives. Another possibility is that it is not in the SSOs best interests to adopt such a provision. Indeed, such a reform may have the net effect of exacerbating the risk of reverse holdup. That is, by stripping the SEP holder's right to injunctive relief, a potential licensee can delay good faith negotiation of a F/RAND license and the patent holder can be forced to accept less than fair market value for the use of the patent.[50]

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[50] *See, e.g.*, Reply Submission of the Office of Unfair Import Investigations on Remedy and the Public Interest at 12 n.3, Certain Wireless Communications Devices, Portable Music and Data Processing Devices, Computers and Components Thereof, Inv. No. 337-TA-745 (Ct. Int'l Trade July 18, 2012) (addressing "the possibility of a reverse hold-up, whereby the patent-holder is forced to license the patents at less than fair market value"); Prepared Statement of the Fed. Trade Comm'n, Concerning "Standard Essential Patent Disputes and Antitrust Law," Before the United States S. Comm. on the Judiciary Subcomm. on Antitrust, Competition Policy and Consumer Rights 6 n.16 (July 30, 2013), *available at* http://www.ftc.gov/sites/default/files/documents/public_statements/prepared-

The threat of injunction can be a very important part of the bargaining process and is likely part of the benefit of the bargain conceived of by a contributing member of the SSO at the time it decided to participate in the standard. The existence of the threat does not necessarily lead to holdup, as some feared, but rather can encourage an infringing implementer to come to the negotiation table.[51] Undermining this bargaining outcome using antitrust rules runs a significant risk of doing more harm than good.

Conclusion

SSOs face complex tradeoffs in seeking to attract technology contributors and adopters to their standards (Lerner & Tirole, 2006). IPR policies are one important dimension of this competition and are an instrument that allows SSOs to balance both sides of the market – that is, to attract contributors while balancing the needs of adopters. The contract terms optimizing this balance will vary between and within SSOs as technological, regulatory and market conditions facing the organization change over time. The evolution of the eleven specific SSO IPR policies we observe over time is consistent with a competitive contracting process in a diverse ecosystem of contributors and adopters. Further, the resolution of contractual ambiguity and incompleteness for some contract terms and not others suggests SSOs and their members are fully capable of resolving these issues when the costs of incompleteness outweigh its benefits. Together, the available data constitute a *prima facie* case against the presumption underlying some policy proposals that the incompleteness of SSO contracts represents market failure in need of regulatory gap-filling or expanded antitrust enforcement.

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statement-federal-trade-commission-concerning-standard-essential-patent-disputes-and/130730standardessentialpatents.pdf.

[51] *See, e.g.*, Ratliff & Rubinfeld, *supra* note **Error! Bookmark not defined.**, at 14.

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Table 1: Summary of SSOs and IPR Policies Studied

	SSO	Website	Year Established	Industry	IPR Policy	Number of Members	Issues Standards	Number of Standards Issued	Coverage of Past IPR Policies (Year)*
1	**ITU-T**	www.itu.int/ITU-T	1865	Telecommunication	Y	Over 700	Y	4,725	1999, 2000, 2002, 2004, 2005, 2007, 2012
2	**ANSI**	www.ansi.org	1918	Multi-Industry	Y	1,044	Y	10,714	1974, 1977, 1983, 1987, 1993, 1995, 1997, 1998, 2000, 2002-2010, 2012, 2013
3	**ISO**	http://www.iso.org/iso/home.htm	1947	Multi-Industry	Y	164 countries	Y	19,573	1989, 1990, 1992, 1995, 2004, 2008, 2009, 2011, 2012
4	**JEDEC**	http://www.jedec.org/	1958	Microelectronics	Y	291	Y	334	1993, 1997, 1999, 2002, 2006, 2008, 2010, 2011
5	**IEEE**	www.ieee.org	1963	Multi-Industry	Y	425,000	Y	1,400	1994, 1995, 1996, 1998, 1999 (2), 2000, 2002, 2003, 2005, 2006 (3), 2007 (2), 2008, 2009 (2), 2010, 2011, 2012 (2), 2013
6	**CEN**	http://www.cen.eu/cen/pages/default.aspx	1975	Multi-Industry	Y	60	Y	13,885	2001, 2009, 2011
7	**ETSI**	www.etsi.org	1982	Information and Communications Technology	Y	768	Y	3,255	1993, 1994, 1997, 2000, 2001, 2004, 2005, 2006, 2007, 2008, 2009, 2013
8	**VITA*** **	http://www.vita.com/index.php	1984	Computing Systems for Multiple Industry Applications	Y	108	Y	214	2009
9	**TIA**	http://www.tiaonline.org/	1988	Communications	Y	350	Y	Over 1,000	2001, 2002, 2005, 2009
10	**OASIS**	www.oasis-open.org	1993	Information Technology	Y	5,000	Y	105	2000, 2005, 2008, 2009, 2010, 2012
11	**IETF****	http://www.ietf.org/	--	Internet	Y	--	Y	--	1992, 1994, 1996, 2004, 2005

* IEEE revised its policies twice in 1999, three times in 2006, and twice in 2007.

** Information regarding IETF's year of establishment, specific number of members, and standards issued was not available on its website. According to the website, "There is no formal membership, no membership fee, and nothing to sign." *See*, http://iaoc.ietf.org/members.html\.

*** Although we only have the prevailing IPR policy, which has been effective since 2009, VITA indicated that their IPR policies followed IEEE's in 1994-1995, and ANSI's from 1996 to 2006.

Table 2: Licensing Rule Changes (1995 - Present)*

	SSO	Year Established	Industry	Number of Members	Number of Standards Issued
Significant Reduction in Ambiguity	VITA	1984	Computing Systems for Multiple Industry Applications	108	214
	IEEE	1963	Multi-Industry	425,000	1,400
Moderate Reduction in Ambiguity	ITU	1865	Telecommunication	Over 700	4,725
	OASIS	1993	Information Technology	5,000	105
	ISO	1947	Multi-Industry	164 countries	19,573
No Reduction in Ambiguity	CEN	1975	Multi-Industry	60	13,885
	ETSI	1982	Information and Communications Technology	768	3,255
	TIA	1988	Communications	350	Over 1,000
	JEDEC	1958	Microelectronics	291	334
Increase in Ambiguity	ANSI	1918	Multi-Industry	1,044	10,714
	IETF	--	Internet	--	--

* Changes are measured based on the most recent data available on licensing rules and the prevailing licensing rule in 1995.

Table 3: Disclosure Rule Changes (1995 - Present)*

	SSO	Year Established	Industry	Number of Members	Number of Standards Issued
Significant Reduction in Ambiguity	VITA	1984	Computing Systems for Multiple Industry Applications	108	214
	IEEE	1963	Multi-Industry	425,000	1,400
Moderate Reduction in Ambiguity	ISO	1947	Multi-Industry	164 countries	19,573
	CEN	1975	Multi-Industry	60	13,885
	ETSI	1982	Information and Communications Technology	768	3,255
	IETF	--	Internet	--	--
	JEDEC	1958	Microelectronics	291	334
	ITU	1865	Telecommunication	Over 700	4,725
No Reduction in Ambiguity	ANSI	1918	Multi-Industry	1,044	10,714
	TIA	1988	Communications	350	Over 1,000
	OASIS	1993	Information Technology	5,000	105

* Changes are measured based on the most recent data available on licensing rules and the prevailing licensing rule in 1995.

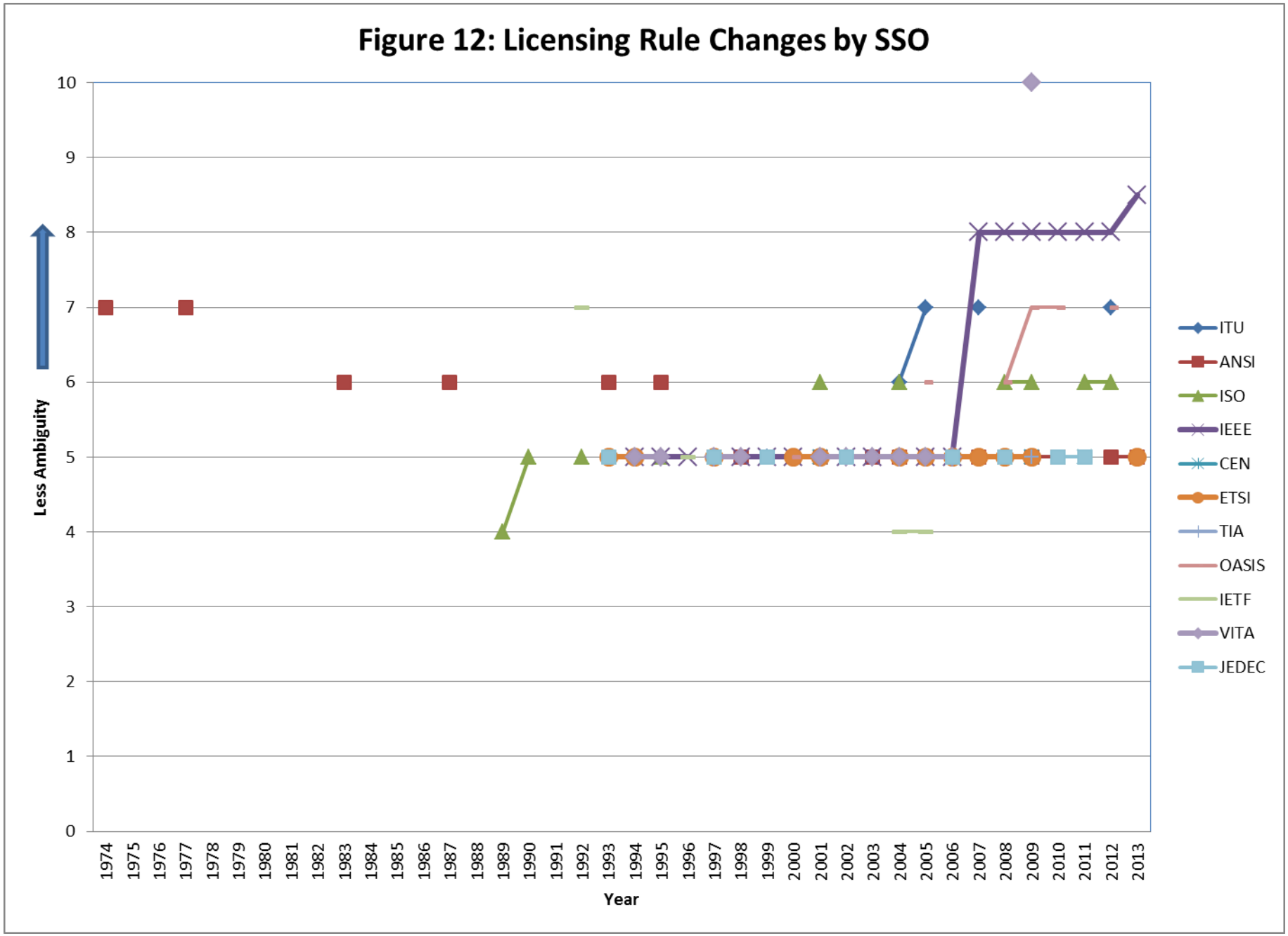
Figure 12: Licensing Rule Changes by SSO
Less Ambiguity
Year
ITU
ANSI
ISO
IEEE
CEN
ETSI
TIA
OASIS
IETF
VITA
JEDEC

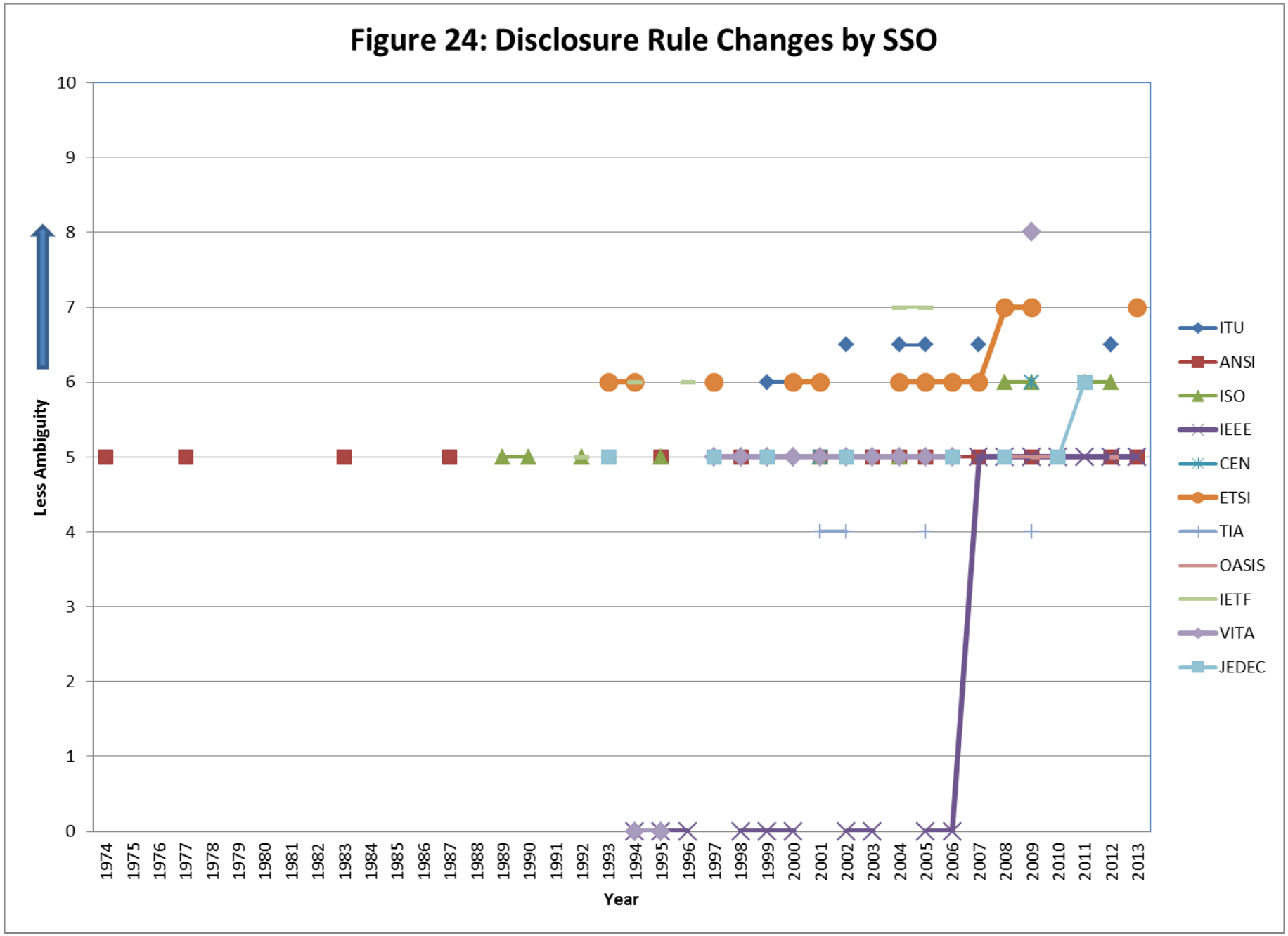
Figure 24: Disclosure Rule Changes by SSO
Less Ambiguity
Year
ITU
ANSI
ISO
IEEE
CEN
ETSI
TIA
OASIS
IETF
VITA
JEDEC