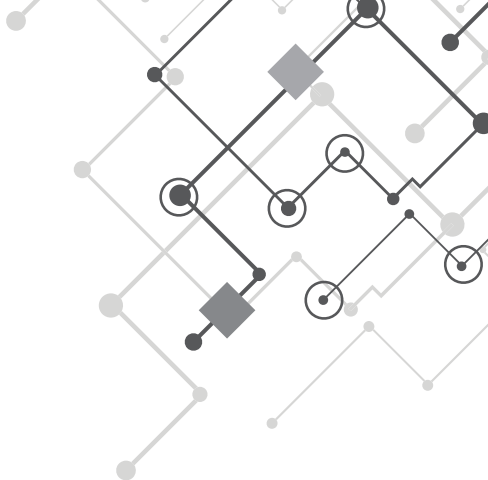
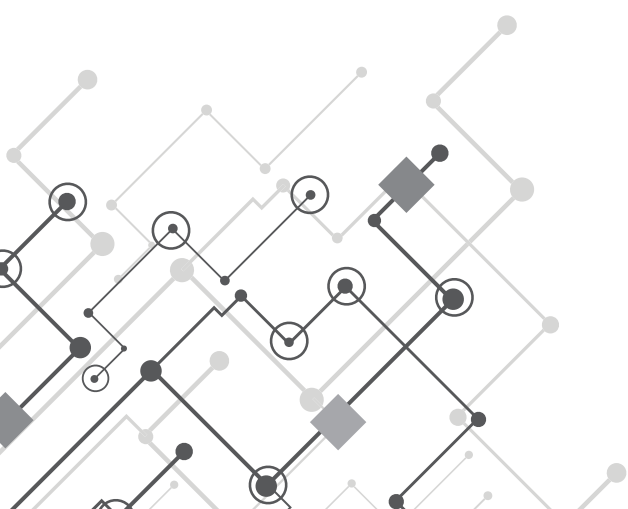
Taking technological infrastructure seriously

Mair, C.S.



CHAPTER 4

OPEN STANDARDS AND THEIR ENEMIES: THE PUBLIC DEMAND-SIDE APPROACH



I. INTRODUCTION

The punch line of this chapter is that public intervention in intellectual property markets to try to ensure the openness of technological infrastructure can sometimes lead to unexpected, and undesirable, effects. In particular, it focuses on the use of Government public procurement policies as a lever to push software suppliers to implement royalty-free open standards in their software products. Rather than focussing on the tool of competition law as discussed in chapters 1 and 2, or rules around the grant of public subsidies as examined in chapter 3, this chapter focuses on the demand-side mechanism of public demand as manifested by public procurement. Unlike the instruments examined in these other chapters, the tool of public demand is argued to alter the strategic behaviour of companies in a different way, one which is less amenable to private-ordering solutions. Instead, as will be examined, sub-optimal strategic behaviour could actually be exacerbated rather than dampened, by the adoption of aggressive 'royalty free' open standards public procurement policies.

Interoperability standards form a key part of the microeconomic infrastructure of today's high-technology ICT industries.[743] By facilitating compatibility between products and systems[744], interoperability standards scaffold the growth and proliferation of networks, both real and virtual[745]: they enable machine-to-machine interaction (as in the case of protocols); permit programs to 'speak' to one another (as in the case of interfaces), and allow information exchange between different applications and platforms (as in the case of document formats or structured data standards).

Since networks are becoming increasingly central to the modern economy[746], the character of the standards which underwrite them have attracted a growing amount of attention due to their role as technological infrastructure.[747] (see chapters 1-3 of this thesis). In particular, the eyes of lawyers, economists and policy-makers have been drawn to the way in which intellectual property rights ('IPR') over interoperability standards can result in technological bottlenecks, leading to reduced competition and the potential for consumer harm.[748] The

743. GM Peter Swann, 'The Economics of Standardization: Final Report for Standards and Technical Regulations Directorate' (*Manchester Business School* 11 December 2000) ("Swann, 'The Economics of Standardization'") 21 and generally.
744. Tim Simcoe, 'Open Standards and Intellectual Property Rights' in Henry Chesbrough, Wim Vanhaverbeke and Joel West (eds) *Open Innovation: Researching a New Paradigm* (OUP 2008) 162-163.
745. 'A 'virtual network' is 'a network in which participants are linked together by their economic complementarity and adherence to common technological standards rather than by physical interconnection.', see Langlois, 'Technological Standards', 4.
746. See generally Benkler, *The Wealth of Networks.*
747. See chapters 1-3 of this thesis for greater elaboration of this concept. For the sake of a more targetted analysis, this chapter will continue to use the term 'interoperability' or 'technological' *standard* rather than *infrastructure* , as the grain of analysis of this chapter is on the differences between two different licensing approaches to these standards.
748. See generally Lemley, 'Intellectual Property Rights', 1900 ("[w]hile standardization has great economic value in

root of this concern stems from the uneasy reconciliation of two aspects of interoperability standards: that they should both incorporate leading-edge technology[749] as well as be generally available and accessible for implementation. The aspects fit uncomfortably together because the technological frontier is often occupied by intellectual property: 'inventive' and 'novel'[750] technological features which are attractive to standard-setting organizations (SSOs) may be covered by IPR such as patents, which provide their holders with the right to exclude.[751] Although the European Union (EU) issued a revised set of *Horizontal Guidelines*[752] in 2011, which aimed to encourage SSOs to adopt IPR policies that mandate licensing on Fair, Reasonable and Non-Discriminatory (FRAND) terms, a number of European stake-holders (including governments) have advocated a further opening up of interoperability standards in the form of mandatory royalty-free (RF) licenses.[753] This tendency to require RF licensing of essential[754] IPR over interoperability standards has provoked condemnation by some powerful private sector software vendor lobbying groups[755] as well as by some traditional formal SSOs.[756] Despite already been reasonably wide-spread in certain technology markets (see chapter 1), the critics of RF licensing argue that the mandatory applicability of this licensing regime in

---

many markets, group standard setting also poses some potential threats to competition").

749. Janice M. Mueller, 'Patent Misuse Through The Capture of Industry Standards' (2002) 17 Berkeley Technology LJ 623, 649 ("[i]ndustry standards often encompass proprietary technology, including technology already patented or the subject of pending patent applications. This is not surprising because one would expect an industry standard to be built upon novel and nonobvious advances in technology rather than upon whatever is available in the public domain.")

750. For the patentability of inventions in Europe (and some other third countries) according the European Patent Office, see European Patent Convention, arts 52-57 <http://www.epo.org/law-practice/legal-texts/html/epc/2010/e/ma1.html> accessed 14 October 2016.

751. Deriving from the so called 'property rule' of IPR. The rule relating to actual damages for infringement of IPR is called the 'liability rule'. See Fred Scott Kieff, 'On the Economics of Patent Law and Policy' in Toshiko Takenaka (ed), *Patent Law and Theory: A Handbook of Contemporary Research* (Edgar Elgin Publishing Ltd 2008) 5.

752. See Commission, 'Guidelines on the Applicability of Article 101'.

753. In particular, during the consultation over the revised European Interoperability Framework, where the *European Committee for Interoperable Systems* (ECIS) advocated a RF licensing regime for 'open standards ', see infra, note 44

754. See the definition of 'essentiality' according to the European Telecommunications Standard Institute ('ETSI') Rules of Procedure (19 November 2014) art 15(6). ""ESSENTIAL" as applied to IPR means that it is not possible on technical (but not commercial) grounds, taking into account normal technical practice and the state of the art generally available at the time of standardization, to make, sell, lease, otherwise dispose of, repair, use or operate EQUIPMENT or METHODS which comply with a STANDARD without infringing that IPR…"

755. See the leaked letter from the Business Software Alliance (composed of, inter alia, Microsoft , Apple, Adobe) in the context of the revision of the *European Interoperability Framework*: (Brussels, 7 October 2010) <http://fsfe.org/projects/os/bsa-letter-ec.pdf> accessed 14 October 2016 ("[w]e urge you to vigorously advocate the language be amended to include an express endorsement of technologies made available on...FRAND terms, which will allow European innovators who own patents and other...IP...to participate in standards setting...")

756. Juan Carlos López Agüí, chairman of the Joint Presidents' Group (JPG) of European ICT and electronics standards bodies CEN, CENELEC and ETSI, reportedly wrote the UK cabinet in response to their new procurement policy which mandated use of RF interoperability standards. ("The definition of 'open standards '...used by the UK government, is on a road towards excluding standards from the majority of the most important standards bodies... from being used in UK public procurement ."). See Mark Ballard, 'International Alarm Rings Over UK ICT Policy' (*ComputerWeekly* 13 May 2011) <http://www.computerweekly.com/blogs/public-sector/2011/05/international-alarm-rings-over.html> accessed 14 October 2016.

public procurement fails, inter alia, because by taking the reward component out of the IP regime, the result will be interoperability standards which are less innovative and less widely-used than standards adopted accorded to a FRAND IPR policy.[757] Conversely, RF licensing policy supporters argue that although essential IPR-holders will lose the ability to appropriate value directly from their IP under an RF regime, they may nevertheless still benefit indirectly via harnessing the immense network effects associated with getting technology to read onto a standard, which can be leveraged to drive demand for complementary assets.[758] In addition, RF licensing supporters argue that an RF regime enables the fuller participation of open source software suppliers[759] in the market for implementers, which will increase competition and the uptake of the standard.[760]

At least part of the debate over IPR and interoperability standards centres around which approach to IP licensing deserves to wear the epithet, 'open standards'- a 'slogan' with no fixed meaning, but which carries strong political force.[761] While it is not the purpose of this chapter to vindicate a definition of 'open standards' which is royalty-free, this chapter aims to apply pressure to one key argument of FRAND licensing supporters against RF interoperability standards: that RF standards are necessarily less innovative than their royalty-bearing equivalents. However, at the same time as supporting the notion that RF standards may be as innovative as their FRAND equivalents, this chapter will also highlight their increased vulnerability to patent litigation from companies excluded by a royalty-free IPR licensing policy, such as pure IP companies. This chapter will conclude that 'openness' comes at a cost and that stake-holders must be prepared to fight both strategically in terms of IP management and perhaps also on a policy-level for changes to the patent system generally.

These arguments will be structured in the following framework. Part II will begin by providing a brief background to the issues, including a short summary of the positions of SSOs, Member

757. For example the Business Software Alliance ('BSA') argued against the UK government's RF open standards definition in their new procurement guidelines: "BSA strongly supports open standards as a driver of interoperability; but we are deeply concerned that by seeking to define openness in a way which requires industry to give up its intellectual property, the UK government's new policy will inadvertently reduce choice, hinder innovation and increase the costs of e-government ." quoted by Andy Updegrove, 'Do Royalty-Free Standards Stifle Innovation?' (ConsortiumInfo, 4 March 2011 ("Updegrove, 'Do Royalty-Free Standards Stifle Innovation?'")<http://www.consortiuminfo.org/standardsblog/article.php?story=20110304122357355> accessed 14 October 2016

758. Such as e.g. compatible software and hardware sold by the standard owner. See ibid; Dolmans, 'Standard Setting'.

759. Throughout this article, 'open source' will be taken to refer to 'free software' as well. Technically, the distinction between the two is that the latter utilises only so-called 'copyleft' licensing practices and must meet the strict requirements promulgated by the Free Software Foundation ('FSF'), see the definition here <http://www.gnu.org/philosophy/free-sw.html> accessed 14 October 2016.

760. See Updegrove, 'Do Royalty-Free Standards Stifle Innovation?'

761. The term 'open standards ' is used frequently in political discourse, but seldom defined in a consistent way, if at all. For its use in 'political' discourse, for example, Neelie Kroes, then European Commissioner for Competition Policy, see Commission, 'Being Open About Standards' (10 June 2008) Press Release SPEECH-08-317.2008.Web. 19 July 2011.

State public procurers, and the open source software community. Part III will then attempt to show how SSOs with an RF IPR licensing policy can still attract participants, including significant holders of relevant IP, in order to produce innovative standards. Part IV will outline the risks associated with a RF IPR policy, focusing mainly on the challenges brought about by decreased participation in standard-setting. Part V will briefly outline some potential remedies to these challenges, as well as some policy considerations. Part VI will conclude.

II. BACKGROUND

From a competition policy perspective, an interoperability standard is simply a technological feature- or set of features- which competitors have agreed not to compete on in order to share in the 'network effects'[762] and economies of scale associated with the existence of a single dominant standard.[763] The benefits of a single dominant standard accrue on both the demand and supply sides simultaneously[764]: software suppliers reduce costs by focusing their production on a single platform[765] meanwhile consumers benefit 'from a large installed base that generates lots of software and other complementary goods and services'.[766] While fragmented standards have been shown to retard innovation[767], cooperatively-set interoperability standards are key innovation-enablers in today's high-technology industries by, inter alia, giving companies' R&D expenditures an important degree of certainty in what is otherwise a highly uncertain and dynamic world.[768]

Given their pivotal role as technological infrastructure, interoperability standards have the potential to become innovation choke-points if IPR over them are abused in order to exclude competitors or to charge 'excessive prices'. To this end, both SSOs and public sector procurers aim to regulate the exercise of IPRs in some way. SSOs do this by requiring their members

762. These effects are divided into two categories: 'direct' and 'indirect'. Direct network effects are predominantly a feature of real networks , and occur when users are identified with components', and simply means that the utility any adopter derives from a network is an increasing function of the number of adopters. Indirect network effects are simply the positive effects which the development of the downstream markets for complementary products (and services) have on the upstream technical platform. See generally Nicholas Economides, 'Competition Policy in Network Industries: An Introduction' in Dennis W. Jansen (ed), *The New Economy and Beyond: Past, Present Future* (Edward Elgar Publishing Ltd 2006).

763. According to Tom Cottrell, the Japanese computer software industry's failure to settle on a single standard (as compared to the dominant 'Wintel' standard of the US and Europe) contributed towards its slow pace of innovation in the 1980s-1990s, see Cottrell, 'Fragmented Standards', 143-174.

764. See Langlois, 'Technological Standards', 37.

765. According to Annabelle (quoting West), a 'platform is an architecture of related standards…'. See Annabelle Gawer, Towards a General Theory of Technological Platforms' (DRUID Summer Conference, 16 June 2010), 13.

766. See Langlois, 'Technological Standards', 37.

767. See the already mentioned example of the Japanese software industry in 1980s-1990s, See generally Cottrell, 'Fragmented Standards'.

768. Swann, 'The Economics of Standardization', 21.

to sign up to their IPR policies.[769] These policies usually include a duty to declare ex ante during standard formation any essential IPR over a standard as well as either mandating or requesting commitments on how the IPR will be exercised ex post in the market.

A. Formal and Informal SSOs IPR policies

In the case of formal SSOs, these commitments usually entail FRAND licensing of essential IPR, which may either be binding[770] or simply a request to do so[771], as discussed briefly in chapter 1. Some formal SSOs have publicly repudiated the notion that standards should be mandatorily licensed on a royalty-free basis.[772] The *Global Standards Collaboration* (GSC) - an international body comprised of the major SSOs from all over the world[773]- adopted a resolution (*Resolution GSC-13/22*) condemning mandatory RF IPR licensing. The GSC observed, 'that there is a trend in some user communities and some standards development organizations in support of patent policies which enforce compensation-free provisions for standards implementers with respect to SSO IPR policies'. The GSC then *resolved* to:

> strongly voice their opposition to policies that mandate compensation-free licensing provisions.

In contrast to formal SSOs, informal SSOs such as fora and consortia, however- and mainly in the context of the Web and the Internet- tend to adopt either non-proprietary standards or standards adopted according to policies mandating RF licensing.[774] According to Tim Berners-Lee, the current head of the World Wide Web Consortium (W3C), and inventor of the Web[775]:

---

769. Although the term 'policies' is used here as a catch-all, there are significant differences in the legal forms of these commitments. For a summary and comparison of these policies in a number of dominant SSOs, see Contreras, 'Market Reliance', 516.

770.For example, VITA (VMEbus International Trade Association) has a mandatory (F)RAND IPR policy combined with compulsory essential patent disclosures http://www.vita.com/home/VSO/Disclosure2011.html (last accessed 19 July 2011).

771.ETSI 'encourages' FRAND licensing of essential IPR: see ETSI 6.1; ETSI Guide on IPRs, January 25, 2007, available at http://www.etsi.org/WebSite/document/Legal/ETSI_Guide_on_IPRs.pdf, section 2.1.1. ('Members are encouraged to make general IPR undertakings/declarations that they will make licenses available for all their IPRs under FRAND terms and conditions related to a specific standardization area and then, as soon as feasible, provide (or refine) detailed disclosures.')

772. ETSI, Resolution GSC-13/22, 23-25, (IPRWG) *Intellectual Property Rights Policy* September 2008.

773. Including most of the national standardisation bodies from Asia, North America and the EU.

774. See the W3C Patent Policy (5 February 2004) <http://www.w3.org/Consortium/Patent-Policy-20040205/> accessed 14 October 2016. See also the IETF IPR Policy, 'Intellectual Property Rights in IETF Technology' (March 2005) <http://www.ietf.org/rfc/rfc3979.txt> accessed 14 October 2016.

775. Tim Berners-Lee (head of *W3C* and inventor of the Web). Tim Berners-Lee, 'Long Live the Web: a Call for Continued Open Standards and Neutrality,' (*Scientific American* 22 November 2010) <http://www.scientificamerican.com/article.cfm?id=long-live-the-web> accessed 14 October 2016.

> Open, royalty-free standards that are easy to use create the diverse richness of Web sites…Openness also means you can build your own Web site or company without anyone's approval. When the Web began, I did not have to obtain permission or pay royalties to use the Internet's own open standards, such as the well-known transmission control protocol and Internet protocol (TCP/IP). Similarly, the Web Consortium's royalty-free patent policy says that the companies, universities and individuals who contribute to the development of a standard must agree they will not charge royalties to anyone who may use the standard.

Berners-Lee's model of the bottom-up, decentralised dispersion of control over the innovative process has strong analogies to the desired end-point of the 'infrastructural approach', as developed in chapters 1-3, and in particular, chapter 5 of this thesis (which also provides a way of visualising this model). Unlike formal SSOs in telecommunications (which are the main constituents of the GSC), Web and Internet-related standards fora and consortia often have strong cultural and historical reasons for adopting RF licensing models.[776]

B. Member State Public Procurement IPR Policies

In the context of public procurement, Member States often set criteria for what standards can be accepted as part of the software they procure. Increasingly, Member States are opting for standards which are licensed on a RF basis, as the highly controversial example of the United Kingdom procurement policy demonstrates.[777]

The reasons for Member States to adopt RF IPR licensing policies with respect to the standards implemented in the software they procure generally relate to the following concerns: [778]

776. See generally, Contreras 'A Tale of Two Layers'

777. See the 2015 UK Open Standards Principles Policy Paper ("…rights essential to implementation of the standard, and for interfacing with other implementations which have adopted that same standard, are licensed on a royalty free basis that is compatible with both open source"). See also UK Cabinet, 'Procurement Policy Note – Use of Open Standards when specifying ICT requirements', Action Note 3/11 31 January 2011
http://www.cabinetoffice.gov.uk/sites/default/files/resources/PPN%203_11%20Open%20Standards.pdf (last accessed 29 July 2011)
However, this policy was withdrawn in November 2011; see
http://www.cabinetoffice.gov.uk/sites/default/files/resources/20111130_PPN%2009_11%20Open%20Standards.pdf 14 October 2016.

778. See the withdrawn UK Cabinet 'Procurement Policy Note', ibid, 'Background', at point 4

> Government assets should be interoperable and open for re-use in order to maximise return on investment, avoid technological lock-in, reduce operational risk in ICT projects and provide responsive services for citizens and businesses.

The three most important goals are interoperability (in the sense of data exchange between citizens, businesses and other government departments); re-use (i.e. that the standard will continue to be supported in the future); and the avoidance of lock-in (i.e. that there are a diversity of software suppliers able to implement the standard). The last issue of lock-in has been one of real concern for Member State government departments who have often found themselves unable to switch from their current (usually Microsoft-based) information systems to competing systems (often open source), due to lack of interoperability.[779] Indeed, many Member State procurement policies expressly mention that royalty-free 'open standards' are required in order to permit open source software suppliers to make use of them as well.[780]

C. Interoperability Standards and Open Source Software Implementation

The inability of some[781] open source software to implement royalty-bearing interoperability standards derives from restrictive licensing terms in certain open source licenses. In particular, the GNU General Public License (GPL) family of licenses are incompatible with any royalty-bearing conditions which attach to interoperability standards. The specific clause is found at section 7 of the GPL v2, and has been nick-named, the 'Liberty or Death clause'.[782] For good reason: any extra restrictions such as patent royalties which prevent users from exercising the freedoms in the license remove the right to continued distribution of the software.[783]

779. As in the case of the German foreign office, which was 'forced', after some experimentation with some open source software providers, to revert back to Microsoft due to 'interoperability problems', see http://www.osor.eu/news/de-interoperability-forces-foreign-office-to-proprietary-desktop (last accessed 19 July 2011.

780. See *The Netherlands in Open Connection: An action plan for the use of Open Standards and Open Source Software in the public and semi-public sectors*, available at 'The Netherlands in Open Connection' (Ministry of Economic Affairs) <http://www.whitehouse.gov/files/documents/ostp/opengov_inbox/nl-in-open-connection.pdf> accessed 14 October 2016, 6

781. Not all, for example the permissive BSD and MIT licenses would have no such conflict

782. See Fsfe, 'Transcript of Richard Stallman at the 2nd International GPLv3 Conference' (21 April 2006) <http://fsfe.org/projects/gplv3/fisl-rms-transcript.en.html#liberty-or-death> accessed 14 October 2016.

783. GPL v2, section 7: 'If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you… they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.'

The GPL-style family of licenses covers around 65% of all open source projects currently on the market.[784] Furthermore, if we review the main types of software packages- both proprietary and open source- available on the market, often the main rival to the commercial software product is an open source product covered by a GPL-style license.[785] For instance, the main alternatives to the dominant MS Office suite, are the two office suites, OpenOffice.org[786] and LibreOffice (covered by the LGPL). One of the main alternatives (in terms of market share[787]) to the dominant Microsoft Windows PC operating system is Linux (covered by GPL v2). Likewise MySQL (covered by the GPL) is a popular open source database which competes with Oracle's commercial offering.[788]

III. RF INTEROPERABILITY STANDARDS AND INNOVATION

Although the open source community has been among the most vocal supporters of RF interoperability standards, strong supporters also exist among traditional ICT companies. In particular the *European Committee for Interoperable Systems* (ECIS) is composed of members 'such as IBM, Oracle and Nokia, [and] are among the most innovative information and communications technology (ICT) companies on the planet and include owners of some of the largest patent portfolios in the ICT sector'.[789] During the consultation for the revised *European Interoperability Framework*[790] v2, the ECIS supported an open standards definition which included an RF IPR policy:

> to be fully open, a software interoperability specification may not be encumbered with running intellectual property ("IPR") royalties.

784. Although the percentage of open source projects licensed under the GPL-family of licenses is currently in decline, as much as by 24% in previous years in the popular open source respoitory GitHub, http://www.zdnet.com/article/the-fall-of-gpl-and-the-rise-of-permissive-open-source-licenses/

785. Rishab A Ghosh, 'Open Standards and Interoperability Report: An Economic Basic for Open Standards'(FLOSS-POLS MERIT University of Maastricht 2005), 8-9.

786. However it should be noted that Openoffice.org's transfer from Oracle to the Apache Foundation may mean the next release will be under the Apache 2 license rather than the LGPL.

787. See NetMarketshare, 'Analytics Without the Bots' <http://marketshare.hitslink.com/operating-system-market-share.aspx?qprid=8&qpcustomd=0> accessed 14 October 2016.

788. *i.e.,* Oracle pursues an 'open core' model in relation to MySQL.

789. See ECIS, 'ECIS Statement on the Proposed New European Interoperability Framework' (13 October 2010) <http://ecis.eu/documents/ECISStatementreEIF13.10.10.pdf> accessed 14 October 2016.

790. The purpose of the (non-binding) *EIF* is to provide an 'overarching set of policies, standards and guidelines which describe the way in which organizations have agreed, or should agree, to do business with each other' under the heading of eGovernment.

Admittedly, some of the companies which make up the ECIS rely on peripheral services associated with open source software as a lucrative revenue stream.[791] However, many do not.[792] What incentives do these companies have to contribute technology to RF standards?

Before this question can be properly answered, it is important to distinguish between categories of potential participants in standard-setting, each of whom have different incentives.

A. Participants in Standard-Setting

This chapter follows Damien Geradin's identification of three main participants in standard-setting.[793] These are pure IP companies, vertically-integrated companies and pure downstream companies (standard implementers). Pure IP companies do not engage in production (of either hardware or software), but merely produce IP which is licensed to produce revenues. Vertically-integrated companies engage in R&D yielding IP as well as producing downstream products making use of IP. Pure downstream companies only produce the final product, which may implement the IP produced by both pure IP companies and vertically-integrated companies.

In a standards context, a vertically-integrated company has incentives to get its IP to read onto standards for two reasons. First, in order to tap into the potentially lucrative revenue streams of IP licensing from other companies making use of its IP. Second, by getting its IP to read onto a standard, a vertically-integrated company can raise the relative costs of implementation for its competitors in the downstream market for implementation. Even in the case where a vertically-integrated company fails to get its IP included in the eventual standard, it can still lower its implementation costs vis-à-vis pure downstream companies by concluding cross-licenses with other vertically-integrated companies which were successful in getting their IP included.[794]

Pure IP companies on the other hand would seem to only have incentives to get their IP included in a standard in so far as they can monetise that IP directly into licensing fees, although there may also be some weaker incentives to benefit indirectly through complementary assets not essential to the standard.[795] Unlike vertically-integrated companies, a pure IP company

791. For instance IBM receives around USD 2 billion annually from open source related revenue. See Benkler, *The Wealth of Networks,* 47-48

792. For example, *Nokia* and *Oracle.*

793. See generally Geradin, 'What's Wrong with Royalties in High-Technology Industries?' the same distinctions are also used in Lim, 'Standard Essential Patents'.

794. Ibid, 472.

795. See, *inter alia*, Teece, 'Profiting From Technological Innovation'.

would not be interested in cross-licensing.[796] The special threat that these companies present to RF interoperability standards will be assessed in Part IV, Section A.

Pure downstream companies which do not have any IP clearly have incentives to lower their standard implementation costs as much as possible in order to maximise their final product margins (such as by pushing standards towards areas without IP rights) in so far as this drive does not affect the technological quality to the extent consumers are put off.[797]

In the following assessment of the incentives for participation in royalty-free standard-setting, it is important to keep these categories of participants in mind.

B. Fast Adoption Rates and Network Effects

One obvious advantage of RF standards from the point of view of a technology contributor is fast adoption rates.[798] All things being equal, zero licensing fees over a standard encourage that standard's adoption by pure downstream companies, and thus increases its foothold in a market vis-a-vis competing standards. If the vertically-integrated company owning the IP already has a downstream product on the market, then it can expect its market share to increase due to first-mover advantages and the natural monopoly characteristics and network effects often associated with standards.[799] As Andy Updegrove has argued, these network effects[800]:

> are so enormous that having even a slight advantage or head start, such as having your technology rather than a competitor's included in a new standard, can greatly outweigh any royalties that might have been obtained under the old regime. Companies are therefore quite happy to compete to get their technology included for free.

Clearly this model of indirect appropriation of the value from essential IPR requires that the company contributing the technology is also a manufacturer of downstream products. This argument would not apply to pure IP companies.

---

796. See Geradin, 'Royalties in High-Technology Industries', 469.
797. Clearly there is a compromise between quality and price such that consumers still demand leading-edge technology, but are not always willing to pay top dollar. The concept is that pure downstream companies wish to pay as little for implementation as they can get away with in the *market conditions*.
798. Fast adoption rates can help companies and technologies entrench their technologies as successful standards, see Arthur, 'Competing Technologies'; Arthur, 'Increasing Returns and the New World of Business'; Farrell and Klemperer, 'Coordination and Lock-In'.
799. A 'first mover' in the literature analysing the 'increasing returns to scale' is William Brian Arthur, *Increasing Returns and Path Dependence in the Economy* (University of Michigan Press 1994).
800. See Updegrove, 'Do Royalty-Free Standards Stifle Innovation?'

C. Strategic Considerations

Probabilistically it is clear that vertically-integrated companies with larger patent portfolios[801] in the relevant field of standardization may have relatively less incentive to participate in RF licensing since they have a higher chance of getting essential IPR reading onto the eventual standard and benefitting from the resulting licensing revenue stream or cross-licensing agreements (and vice-versa for companies with smaller patent portfolios). However, even large vertically-integrated companies may place a significant weight on using an unencumbered standard, particularly if the standard relevant area of technology has a high concentration of pure IP companies, who are uninterested in cross-licensing, and thus raise implementation costs for all implementers (whether vertically-integrated or pure implementers). If the weight placed by companies participating in an SSO on having an unencumbered standard is significant, then the tendency would be to drive standards towards non-proprietary technology in the technical committee phase of standard-setting.[802] In an SSO with open participation, the 'collective will' is most likely to lead to this outcome where, all things equal[803], among IP contributors: pure IP companies are outnumbered by vertically-integrated companies; and among, implementers: pure implementers outnumber vertically-integrated companies; and where the sum of all implementers is greater than the sum of all IP contributors. Whether the software sector conforms to this structure is an empirical question, but at least one study[804] points to the high potential, if not yet reality, of SMEs- which are usually pure implementers- to attain significant concentrations in this sector. According to Trond Undheim, a past director of Standards Strategy and Policy at the Oracle Corporation, participants in FRAND-based SSOs in the ICT sector largely push for, and adopt, unencumbered or royalty-free technologies as the final standard: [805]

801. Overwhelmingly, the size of a company's patent portfolio is proportional to its size, see Blind *et al*, 'Interaction Between Standards'.

802. See also the dynamics captured in the game theoretical treatment of the 'assurance game ' covered in Part III, Section C of this thesis.

803. *'Ceteris paribus'* here may be an unreasonable assumption since different technologies are more or less appropriate for standards. Indeed, some SSO allow exceptional technology to be adopted as part of a standard even without any licensing commitments at all, *e.g.*, ETSI and IETF.

804. Ghosh, 'Open Standards and Interoperability Report', 9.

805.See Trond Undheim, 'Portugal's New Interoperability Law' (*Oracle Blog*, 13 April 2011), <http://blogs.oracle.com/trond/entry/portugals_new_interoperability> accessed 14 October 2016.

> The interesting thing is that, notwithstanding the fact that the overwhelming number of ICT standards are still created in standards development organizations that allow royalties to be charged, very few standards are ever released that do, in fact, require the payment of royalties – even though those that have developed them often do own patents that would be "necessarily infringed" by a product built to their standards.

If Undheim is accurate in his assessment, this demonstrates that there are forces at work – even if this chapter has incorrectly identified them – which drive IP holders to contribute to royalty-free standardisation even where their IP could potentially yield licensing fees. In other words, innovators (excluding, of course, pure IP companies) voluntarily choose to compete on implementation as opposed to attempting to capture the standard. In fact, examples of RF standards and 'open platforms' are already fairly wide spread, and the list is steadily growing. In addition to the examples of Bluetooth and the OPUS audio codec, mentioned in chapter 1 and the Preface to this thesis, chapter 3 also mentioned Twitter[806], Google[807], Tesla[808] and Toyota[809] as companies who have agreed to license their patents on an RF basis to all comers.[810]

This state of affairs would seem to suggest that direct IPR compensation in the form of FRAND licensing fees may well be assessed by rational companies as less lucrative than harnessing the network effects of wide RF standard implementation and technology use in the downstream market. The existence of these incentives may go some way to ensure that the quality of technology contributed to the standard is of the same value as that contributed to a traditional FRAND licensing regime.

D. Mandatory RF Licensing in Practice

Few formal European and international SSOs contain mandatory RF IPR licensing provisions, though many explicitly provide for the possibility of RF licensing.[811] The greatest concentration of those that do mandate RF IPR licensing is found in the software sector.

806. Adam Messinger, 'Introducing the Innovator's Patent Agreement' (*Twitter*, 17 April 2012) <https://blog.twitter.com/2012/introducing-the-innovator-s-patent-agreement> accessed 14 October 2016.
807. Google , 'Open Patent Non-Assertion Pledge' <https://www.google.com/patents/opnpledge/pledge/>.
808.Elon Musk, 'All Our Patent Are Belong To You' (*TESLA*, 12 June 2014) ("Musk, 'All Our Patent Are Belong To You'")<https://www.tesla.com/blog/all-our-patent-are-belong-you> accessed 14 October 2016.
809. Charlie Osborne, 'Toyota Pushes Hydrogen Fuel Cell Cars With Open Patent Portfoli' (*ZDNet*, 6 January 2015) <http://www.zdnet.com/article/toyota-pushes-hydrogen-fuel-cell-cars-with-open-patent-portfolio/> accessed 14 October 2016.
810. Generally, the RF licensing commitment is made contingent on a reciprocal RF licensing obligation.
811. See the GSC definition of 'open standards ' which explicitly provides for RF licensing. It is stated in *Resolution GSC- 13/24:* 'the standard is subject to RAND/FRAND Intellectual Property Right (IPR) policies which do not mandate, but may permit, at the option of the IPR holder, licensing essential intellectual property without compensation'

In particular, standards relating to the Web and the Internet are almost without exception licensed on an RF basis.[812] By and large, this is due to the historical and cultural forces between these communities[813], such as the W3C, which creates standards for the Web, and the Internet Engineering Task Force (IETF), which creates standards for the Internet back-bone. Outside of the context of the Web and the Internet, RF standards for stand-alone client-side software are less common, though still present. For example, the *Organization for the Advancement of Structured Information Standards* (OASIS) has an RF IPR policy 'track', under which the Open Document Format (ODF) was adopted (now an ISO standard[814]). Microsoft has also adopted an arguably[815] 'open' RF document format, Open Office XML (OOXML).

Given that this chapter aims to assess IPR policies in relation to the ICT sector as a whole, the question arises whether there is an important distinction to be made between Web standards and client-side software standards. It is submitted that the distinction between the two, though easy to support only a few years ago, is of less relevance today. The exponential growth of Web-enabled devices[816] and the advent of cloud computing which permits Web applications to take over most of the functionality of client-side stand-alone software[817], is making the notion of 'stand-alone' computing a thing of the past. This is particularly visible in relation to codecs[818], the software compression programs responsible for encoding and decoding digital audio-visual information. Traditionally, such standards have been licensed on royalty-bearing terms. The MPEG format for example, and which the software vendors' lobbying group, the *Business Software Alliance* (BSA), cites[819] as a successful FRAND standard, is ubiquitous in the ICT sector in both client-side applications and on the Web. However, this situation is changing. In 2011, Google announced development of a new royalty-free audio-visual compression codec, called *WebM* (V8), which Google and others[820] intended as an alternative to the MPEG-4 AVC (H264) codec.[821] In addition to demonstrating a shift towards

812. Some key and recognizable examples are: HTML, CSS, XML, TCP/IP etc.

813. See generally Contreras, 'A Tale of Two Layers'.

814. ISO, 'ISO/IEC 26300' (1 December 2006) < http://www.iso.org/iso/catalogue_detail?csnumber=43485> accessed 14 October 2016.

815. RedHat, and a number of other open source companies, argue that OOXML 'is not fully implementable by non-Microsoft vendors or partners', see RedHat, 'Red Hat's Position on OOXML and Open Standards'<http://www.redhat.com/f/pdf/RedHatOOXMLPosition.pdf> accessed 14 October 2016.

816. By 2050, Cisco projects that this number will reach 50 billion. Cisco, 'Internet of Things' <http://blogs.cisco.com/wp-content/uploads/internet_of_things_infographic_3final.jpg accessed 14 October 2016.

817. Niamh Christina Gleeson and Ian Walden, '"It's a Jungle Out There"?: Cloud Computing, Standards and the Law' (2014) 5(2) Eur J L & Tech 1. There are many examples of this phenomenon, including Google Docs (Word Processing), Spotify and Grooveshark (for music-playing applications).

818. See Wikipedia, 'Codec' <http://en.wikipedia.org/wiki/Codec> accessed 14 October 2016.

819. See Business Software Alliance letter, 2.

820. Supporters of *WebM* include Mozilla Firefox, ARM, ORACLE, AMD, etc.

821. In actual fact, MPGEG-LA and Google began a long drawn-out patent dispute over the royalty-free status of WebM, including a threatened patent lawsuit about anticompetitive use of a patent pool. In 2013, this dispute was eventually resolved. See discussion in Carl Mair, 'Is the Future Open for Web Video?' (*Leiden Law Blog*, 21 March 2013) <http://leidenlawblog.nl/articles/is-the-future-open-for-web-video> accessed 14 October 2016.

RF licensing with respect to codecs, this example also shows the effect Web standards are starting to have on the licensing practices on the client-side. In short, the interpenetration of the Web and client-side software may be leading to a shift in the traditional 'control' approach of the client-side towards the more 'open' culture'[822] and RF licensing models of the Web. But, as discussed below at sub-section A, this interpenetration of Web-based and client-side technologies might be leading to a 'culture clash' between the traditional royalty-bearing models of the client-side and the RF default of Web and Internet standards.

IV. RISKS FACED BY RF INTEROPERABILITY STANDARDS

In many cases even an RF IPR policy might not be enough to guarantee an unencumbered standard. SSOs such as the W3C also make use of provisions granting conditional reciprocal patent licenses, otherwise known as 'non-assertion clauses' (NACs). These provisions, which are prevalent in both technology pools such as the Open Invention Network[823] and wireless standards such as Bluetooth[824], work to solve a possible prisoner's dilemma besetting patents in standards: that essential IPR-holders (from either inside or outside the formal/informal SSO) over a standard may decide to enforce their patents in any case, as discussed in relation to cooperatively-set standards in chapter 1. NACs demand that essential IPR-holders over an RF standard or RF technology grant all other essential IPR-holders free use of their IP on condition of mutual non-assertion.[825] These provisions aim to nudge participants towards the cooperation/cooperation equilibrium of patent non-assertion as opposed to the defection/defection equilibrium of a potential all-out patent war.[826] Such provisions however are only effective if essential IPR-holders actually practice in the industry (i.e. are vertically-integrated). It does not protect against the threat of 'patent trolls'[827] (also known as Non-Practising Entities (NPE)), or legitimate pure IP companies. For example, the *Bluetooth Special Interest Group* (Bluetooth SIG) is a consortium which licenses essential IPR over Bluetooth

822. As described by Andrew L Russell, 'The W3C and its Patent Policy Controversy: A Case Study of Authority and Legitimacy in Internet Governance' (31st Conference on Communication, Information, and Internet Policy, Alexandria, Virginia, 20 September 2013) 18-20, <http://www.arussell.org/papers/alr-tprc2003.pdf> accessed 14 October 2016.

823. See section 1.1 and 1.2 of the OIN license agreement, available at < https://www.openinventionnetwork.com/joining-oin/oin-license-agreement/> accessed 29 April 2017

824. See the Bluetooth Membership Agreement, available at < https://www.bluetooth.com/membership-working-groups/membership-types-levels/membership-agreements> accessed 29 April 2017

825. *i.e.,* NACs have arguably a function like a *de facto* patent pool.

826. Further discussion in chapter 3 of this thesis also presented an alternative game-theoretical model which presented this strategic interaction as an 'assurance game'.

827. Ewing and Feldman, 'The Giants Among Us'; Magliocca, 'Blackberries and Barnyards'; Rantanen, 'Slaying the Troll'. A possible difference between a pure IP company and a patent troll (if we care to make the distinction) is that pure IP companies actually invest in R&D, while patent trolls tend just to acquire patents in company buy-outs or bankruptcy proceedings.

technology to all members on an RF basis, provided the member grants a reciprocal license for any essential IPR it may have over the standard.[828] However, the enticement of a NAC has not prevented the *Washington Research Foundation*[829] and *Rembrandt IP*[830] – third parties to the consortium and pure IP companies- from asserting their patents across the industry. These cases serve as an important reminder that the 'openness' of standards is always under threat, regardless of the character of ex ante IPR policies, even if those policies mandate royalty-free licensing.

Indeed, RF standards may well be even more vulnerable to third party patent infringement claims than if they were adopted under FRAND licensing conditions, as discussed below.

A. The Challenge of IP Companies and Patent Trolls to RF Standards

One unfortunate side-effect of interoperability standards adopted according to a RF IPR licensing policy is that it may exclude pure IP companies from participating in standardisation as well as some large vertically-integrated companies. This risk is enhanced given recent developments in the IP marketplace where vertically-integrated companies transfer or exclusively license their IP to third party pure IP vehicles for enforcement and licensing.[831]

As already explained, pure IP companies follow a business model where licensing fees are the only revenue source. Situations can be imagined where such companies may nevertheless choose to contribute IP to an RF standard- as in where they expect to appropriate value indirectly from licensing complementary assets- but these incentives would be comparatively weak.[832] The majority of pure IP companies would have little incentives to engage in RF standard-setting. By not participating in SSOs, pure IP companies would not be bound by the IPR policies which usually mandate, inter alia, the ex ante disclosure of essential IPR over a standard. In comparison, pure IP companies would have incentives[833] to join SSOs with a FRAND IPR licensing policy and so would be bound by both the duty of disclosure as well

828. See the Bluetooth Membership Agreement, available at < https://www.bluetooth.com/membership-working-groups/membership-types-levels/membership-agreements> accessed 29 April 2017

829. See http://www.wrfseattle.org/about/ (last accessed 19 July 2011)

830. In 2015, Rembrant IP won damages against certain implementers of the Bluetooth standard (i.e Samsung) in an Eastern District of Texas Court Judgment, *Rembrandt IP Wireless Technologies v Samsung Electronics et al* Case No. 2:13-CV-213-JRG, available at < https://cdn.arstechnica.net/wp-content/uploads/2015/02/Rembrandt.Samsung.Verdict.pdf> accessed 29 April 2017

831. For example, Apple transferred many of its crucial SEPs to *Rockstar IP*, which has since been purchased (in 2015) by the patent aggregator, RPX Corporation. See < http://www.rpxcorp.com/rpx-news/rpx-news-releases/rpx-corporation-completes-purchase-of-rockstar-patents/> accessed 29 April 2017

832. The uncertainty of these benefits might not make the overall participation worthwhile

833. However some commentators have suggested that companies which get a significant proportion of their revenue from licensing tend to stay away from standardisation altogether. see generally Blind, Knut, *The Influence of Companies' Patenting Motives on their Standardization Strategies,"* 2010, unpublished

as the duty not to charge excessive fees.[834] At the very least, the existence of RF SSOs may lead to the development of multiple competing standards.[835] More dangerously, though, third party IP companies (both pure and vertically-integrated) may choose to enforce their patents generally against implementers and users after the standard has been adopted.[836]

This risk is non-trivial since the SSO technical committee would not have had the opportunity to 'design around' the IP of IP companies in a royalty-free standard.[837] The risk is far from academic: in 2002, after the 'royalty-free' JPEG was already a well-established image-compression standard, a company called Forgent Networks started enforcing a claimed patent right over technology essential to the standard.[838] Before being declared invalid in 2006, the patent had already been asserted against more than thirty companies, raking in in excess of USD105 million in licensing fees.[839]

Admittedly, the RF standards which underwrite the Web and the Internet have so far escaped much patent litigation, perhaps due to certain historical and cultural features of the standards communities in these technology areas.[840] In addition, the technologies adopted as standards by the W3C and the IETF are highly specialised, pioneering, and relate mainly to the deep infrastructure of the Internet and Web. In contrast, interoperability standards such as, inter alia, document formats, structured data standards and compression codecs are the subject of independent R&D efforts by a number of private companies.[841] For this reason, companies implementing royalty-free standards covering these areas are at higher risk of ex post patent litigation. Furthermore, recent years have seen a marked proliferation of pure IP companies[842]

834. As determined by the so-called *United Brands* test under EU competition law. See *United Brands*.
835. See Anne Layne-Farrar *et al*, 'Payments and Participation: The Incentives to Join Cooperative Standard Setting Efforts' (2014) 23(1) J Econ & Management Strategy 25, 32 ("[a]lso importantly, firms might contribute technology to different SSOs that might create independent or competing standards").
836. Richard Tansey, Mark Neal and Ray Carroll, 'Patent Aggression: High Risk Intellectual Property Strategies in the Semiconductor Industries', (2004) 4 Businessperspectives.org 80 ("Tansey *et al.* "Patent Aggression"); Simcoe, 'Private and Public Approaches'.
837. Of course participants to an SSO adopting a royalty-free standard have incentives to search for any third-party patents in order to avoid the situation described. However, given the extremely large number of patents in existence, this task can never be exhaustive, and SSOs strongly depend on the duty of disclosure of their members. Importantly, even members to an SSO often only have a duty to perform a 'good faith' or 'reasonable' patent search in recognition of the heavy burden involved.
838. Priscilla Caplan, 'Patents and Open Standards' (2003) 14(4) Information Standards Quarterly 1, 2-3.
839. See Wikipedia, 'JPEG' <http://en.wikipedia.org/wiki/JPEG#Patent_issues> accessed 14 October 2016.
840. Contreras, 'A Tale of Two Layers' 865: ("In many respects, the differences in standardization practices between the Network world and the Internet arise from differences in the historical development of these two fields.")
841. A considerable number of companies such as Apple Inc, Panasonic, Sony, Hitachi all held essential patents to the H.264 codec standard for video compression. See Indiworks, 'H.264 List of Shame: All the Patent Holders' <http://indiworks.wordpress.com/2010/05/18/h-264-list-of-shame-all-the-patent-holders/> accessed 14 October 2016.
842. See Ewing and Feldman, 'The Giants Among Us' 1 ("The patent world is quietly undergoing a change of seismic proportions. In a few short years, a handful of entities have amassed vast treasuries of patents on an unprecedented scale…[T]he most massive of these has accumulated 30,000-60,000 patents worldwide, which would make it the 5th largest patent portfolio of any domestic US company and the 15th largest of any company in the world."); see also

as well as a general increase in patenting worldwide.[843] These factors suggest that the risk is growing.[844]The example of Google's WebM RF standard mentioned in Section III(D) is a case in point. Shortly after announcing its intention to release a new RF video codec that would be compatible with HTML5, the licensing administrator of traditionally royalty-bearing standards, MPEG-LA, responded to the threat of WebM by stating that the proposed standard infringed a number of patents in its pool.[845] Additionally, MPEG-LA launched a call for VP8-essential patents and attempted to form a patent pool around the codec to draw in royalties. As a result, support for Google's WebM swiftly disintegrated and active supporters (such as Mozilla FireFox) started implementing the H.264 codec into HTML 5.[846]

This example is just one of a growing trend of 'outsider' assertion of patents against SSO-developed standards. A recent empirical study[847] by Contreras et al, suggests that 'the assertion of SEPs by 'outsiders' constitutes a material segment of all SEP assertions'.

V. DEALING WITH THE CHALLENGE OF THIRD PARTY IP COMPANIES

Given that RF interoperability standards have a higher risk of exposure to third party IP litigation than FRAND standards, governments, implementers, and users must adopt a strategy to deal with this risk in order to maintain the openness of interoperability standards.

A. Defensive Patenting

One option would be to follow the lead of the open source community and adopt a strategy of 'defensive patenting'. In order to protect the openness of the Linux kernel, an IP company called the *Open Invention Network*[848] has a practice of acquiring patents relevant to the kernel and arranging royalty-free cross-licenses with third-party patent holders in order to guarantee

Simcoe, 'Open standards and Intellectual Property Rights',162-163.

843. Dietmar Harhoff et al., 'The Strategic Use of Patents and Its Implications for Enterprise and Competition Policies (European Commission Report 8 July 2007), 4: ("[a] surge in patent applications, "a patenting explosion", has been observed at the European Patent Office (E.P.O.) as well as at the patent office for the United States of America (U.S.P.T.O) and other patent offices world wide").

844. Although the risk is growing, competition authorities on both sides of the Atlantic are starting to pivot towards a tougher approach to such strategic use of patents, see Mair, 'Taking Technological Infrastructure Seriously'; Petrovcic, 'Patent Hold-Up'.

845. See this news article summarising the dispute and its resolution http://www.theregister.co.uk/2013/03/08/google_mpegla_webm_patent_license/> last accessed 29 April 2017

846. Eventually the US DOJ opened investigations into MPEG LA for anticompetitive practices, and the parties settled. See Carl Mair, 'Is the Future Open for Web Video?

847. Jorge L. Contreras 'When A Stranger Calls: Standards Outsiders and Unencumbered Patents' Journal of Competition Law & Economics, 1–33, 28

848. See OpenInventionNetwork, <http://www.openinventionnetwork.com/> accessed 14 October 2016.

mutual patent non-assertion. The company plays a crucial role in maintaining the continued openness of the Linux operating system by a combination of the carrot of a royalty-free license to essential Linux patents and the stick of patent litigation by outsiders.

If RF interoperability standards are to be defended in the same way as the Linux kernel, it would require SSO participants as well as downstream implementers and users to develop a culture of cooperation around IP management and filing patents similar to the open source community. This is perhaps not inconceivable given the potential for open source software companies to enter the market under a royalty-free licensing policy, and which may well have incentives as well as experience of dealing with such risks. However, as in the case of NAC's already discussed, pure IP companies and in particular, patent trolls, often have little to lose by the threat of a counter-suit. For this reason, defensive patenting would only be partially effective as a solution to maintaining the openness of interoperability standards.

B. Competition Law Remedies

Compared to the United States, the EU has taken a stronger stance[849] on using competition law to control the abuse of IP in the context of technological standards.[850] In the EU 'patent ambush' case of *Rambus*[851], the EU Commission imposed certain 'commitments'[852] designed to neutralise the deceptive conduct of the company, including granting 'royalty holidays' to licensees of the essential patents, as well as royalty caps on several others.[853]

In the earlier EU case of *Microsoft* the Court of First Instance (now the 'General Court') arguably applied the so-called 'essential facilities doctrine' to grant a compulsory license to certain 'interoperability information' under FRAND terms to competitors in a derivative market to which that information was essential to compete, in relation to the *de facto* technological standard of the Windows operating system.[854] Likewise, the 2014 case of *Huawei*[855] concerning cooperatively-set standards over mobile data communications led the European Courts to apply Art 102 TFEU and an effective compulsory licensing rule in relation to a willing licensee of SEPs.[856]

849. Not only a matter of will, however, but also a matter of law, since the US antitrust legal regime framework is less amenable to take on such cases. Petrovcic, 'Patent Hold-Up'.
850. See discussion in chapters 1 and 2 of this thesis.
851. See Commission, Press Release IP/09/1897.
852. Under Article 9 of Regulation 1/2003.
853. *Rambus*, para 49.
854. See the discussion of this case in chapter 2 of this thesis and also generally Case T-201/04 *Re Microsoft* .
855. See *Huawei v ZTE.* (see discussion generally in chapter 1 of this thesis)
856. See discussion in chapter 1 and Mair, 'Taking Technological Infrastructure Seriously'.

The European Courts' proactive stance on maintaining the openness of technological standards might seem to be encouraging for the situation of third party IP enforcement over an RF interoperability standard which we envisage. However, certain technical legal barriers make reliance on competition law for a remedy highly uncertain in practice.

First, unlike in the case of *Huawei,* an 'outsider' pure IP company would not have given any licensing commitment (RF, FRAND or otherwise), meaning that much of the analysis in this case would not apply.[857] Given this, the licensee would need to rely on an action under the essential facilities doctrine, as discussed in chapter 2. In order for this argument to go through, the pure IP company would need to have refused to license the IP. In the circumstances we envisage, it is much more likely a third party IP company would attempt some sort of 'patent holdup' against standard implementers: so the problem would be one of 'excessive pricing' rather than one of refusal to supply. Second, even if, as in *Microsoft*, the third party IP company is compelled to license its IP under the essential facilities doctrine, such a license would most likely be on mandatory FRAND terms, and would not be royalty-free. . In the case of *Rambus*, where certain 'royalty holidays' were granted, this was on facts where the company concerned deliberately misled the SSO by not disclosing its essential patent applications over the standard. In the situation we envisage, the third party company would never have participated in the SSO so could not be accused of deception nor misconduct of any kind. Furthermore, Art 31(h) of the *TRIPS Agreement* would likely prevent a competition authority from granting compulsory licensing without providing the patentee with 'adequate remuneration'.[858] This would rule out the possibility of compulsory licensing on royalty-free terms.

Given the above, once a royalty-free interoperability standard is successfully challenged by a third party as infringing its patent, EU competition law is unlikely to offer a remedy to reinstate its royalty-free status. The most it could do would be to grant a compulsory license on FRAND terms, as was the case in *Microsoft.* And as in *Microsoft,* this remedy offers little in the way of respite for open source software suppliers utilising the GPL-family of licenses, who would remain unable to implement the standard. [859]

857. Both *Huawei* and the English Court in *Unwired* (discussed in chapter 1) required an ex ante licensing commitment as a central part of the analysis.

858. Of course, it is still unclear to what extent *TRIPS* needs to be applied by the EU courts. In *Microsoft* for instance, the General Court stated that Community law prevails over international norms, but went on to argue that its judgment was nevertheless consistent with Article 31(k) of *TRIPS* – a provision that allows competition concerns to trump IP rights in some cases. In any case, the fact that the Court chose to make the IP licensed on FRAND rather than royalty-free terms is perhaps indicative of the kind of licensing terms to be expected in future cases involving anti-competitive behaviour absent misconduct. For further discussion of the relation between *TRIPS* and EU competition law , see Sujitha Subramanian, 'EU Obligation to the TRIPS Agreement: EU *Microsoft* Decision' (2010) 21(4) Eur J Intl L 997.

859. Krzysztof Siewicz, *Towards an Improved Regulatory Framework of Free Software* (EM Meijers Instituut, 2009).

C. Patent System Remedies

In terms of remedies supplied by the patent system itself, the choices are considerably narrower. If we assume that the third party IP company's patents over the royalty-free interoperability standard were not achieved by deception as in the case of *Rambus* or by misusing the patent system as in *Astrazeneca*[860], then very few options are available outside of outright patent invalidation.[861] Patent invalidation, however, would depend on the particular circumstances of each specific case.[862]

Nevertheless, as in the case of the JPEG standard, patent invalidation in the context of software-related patents is a promising choice of action. This is because the current European practice[863] of granting software-related patents is deficient in many important respects, such as prior-art searches which only involve patent databases and occasionally non-patent literature.[864] The cursory nature of these prior-art searches means that a great deal of software-related patents are probably granted which are technically invalid[865], including perhaps those which may be relevant to interoperability standards. The UK Intellectual Property Office's 6-month trial of a Peer-2-Patent programme (which ended in 2011)- and where patent validity examinations were outsourced to interested external experts, such as open source software programmers[866]- is just one policy which is being investigated to try to improve the quality of software-related patents, and which could help in the long-run to protect the openness of royalty-free interoperability standards.

Indeed, perhaps only real policy changes such as this will really have any effect on the risk exposure of royalty-free interoperability standards to third party IP infringement suits. This is because the risks of third party IP infringement which we envisage here are a result of

860. Judgement of the General Court Case T-321/05 Aztrazeneca.
861. The possibility of other remedies (as opposed to antitrust remedies), based on the equitable doctrine of patent misuse –such as the above cases represent- would not be a good course of action in the EU in any case. Firstly, EU patent laws are still jurisdiction-specific, meaning that pan-European remedies would not be available. Secondly, the doctrine is still under-developed for use in standards-related cases, particularly in the EU. For an assessment of the arguments for its use in such cases in the US context, see Daryl Lim, 'Misconduct in Standard-Setting: The Case For Patent Misuse' (2011) 51(4) IDEA: J L & Tech 557.
862. Mark A Lemley and Carl Shapiro, 'Probabilistic Patents' (2005) 19(2) J Econ Perspectives 75.
863. See generally Andreas Grosche 'Software Patents – Boon or Bane for Europe?' Int J Law Info Tech (2006) 14 (3).
864. See IPKAT Blog June 13, summarizing a presentation by Nigel Hanley from the UK IPO about software patents prior art searches, available at 'P2P: The Aftermath' (*The IPKat,* 13 June 2011) <http://ipkitten.blogspot.com/2011/06/p2p-aftermath.html> accessed 14 October 2016. ("Nigel Hanley from the UK IPO introduced the subject with an admission that the United Kingdom's Intellectual Property Office (IPO) primarily search patent databases and only search some of the available non-patent literature. They do some Internet searching but not much. P2P is about accessing that part of the prior art inaccessible to examiners.")
865. Not just in the EU system, however. The 2014 US Supreme Court case of *Alice Corp. v. CLS Bank International*, 573 U.S. __, (2014) No 13-298 arguably raised the bar for software patentability in the US, meaning that possibly dozens if not hundreds of currently in-force US software patents may now be deemed invalid. See Dan L Burk, 'The Inventive Concept in Alice Corp. v. CLS Bank Int'l' (2014) 45 Intl Rev IP & Comp L 865.
866. Ibid.

SSO participants and technical committee's collective inability to locate relevant third-party patents during patent searches; and this, in turn, was due to the search burden created by excess patent proliferation. If the search burden is reduced due to the systematic invalidation of unmeritorious software-related patents by crowdsourcing prior-art searches, then the patent system itself as well as royalty-free interoperability standards will be generally more robust.

VI. CONCLUSION

This chapter has applied pressure to the notion that RF interoperability standards are less innovative than standards adopted under a FRAND licensing policy. Companies do have incentives to contribute proprietary technology to RF standards. These incentives relate to the potential of network effects to increase the penetration of their end-products incorporating the technology which can then be indirectly monetised by selling more products. However these incentives do not apply to pure IP companies and some large vertically-integrated companies, which an RF IPR policy may well discourage from participating in standardisation. Since these companies are excluded from RF standard-setting, they could pose a threat to the integrity and openness of royalty-free interoperability standards in practice. This threat could be in the form of asserting patent claims against implementers of the RF standards or by creating standard fragmentation. While defensive patenting in the tradition of the open source community might offer a partial remedy to this problem, it would require a more cooperative effort between all stake-holders who have an interest in keeping RF interoperability standards royalty-free. Competition law remedies would be difficult to rely on since although they may be able to exert some price control on licensing fees and prevent outright refusals to license, they would be unable to maintain a standard's royalty-free status in the face of a valid patent, even if abused. To this end, patent invalidation remains the only sure solution against a third party claiming that an RF interoperability standard infringes its patent.

In the long-run, the openness of interoperability standards and technological infrastructure in general may only be maintained with improvements to the patent system itself and some cap on software-related patent proliferation. Possibilities of crowd-sourcing 'state of the art' information such as Peer-2-Patent initiatives might well be an answer to this problem on the policy level. In any case, if indeed royalty-free interoperability standards are what governments, users, and the open source software community want, they will have to be prepared to fight for them, as neither the competition law remedies covered in chapters 1-2 would be expansive enough to deal with the interests at stake in guaranteeing the continued openness of RF interoperability standards.