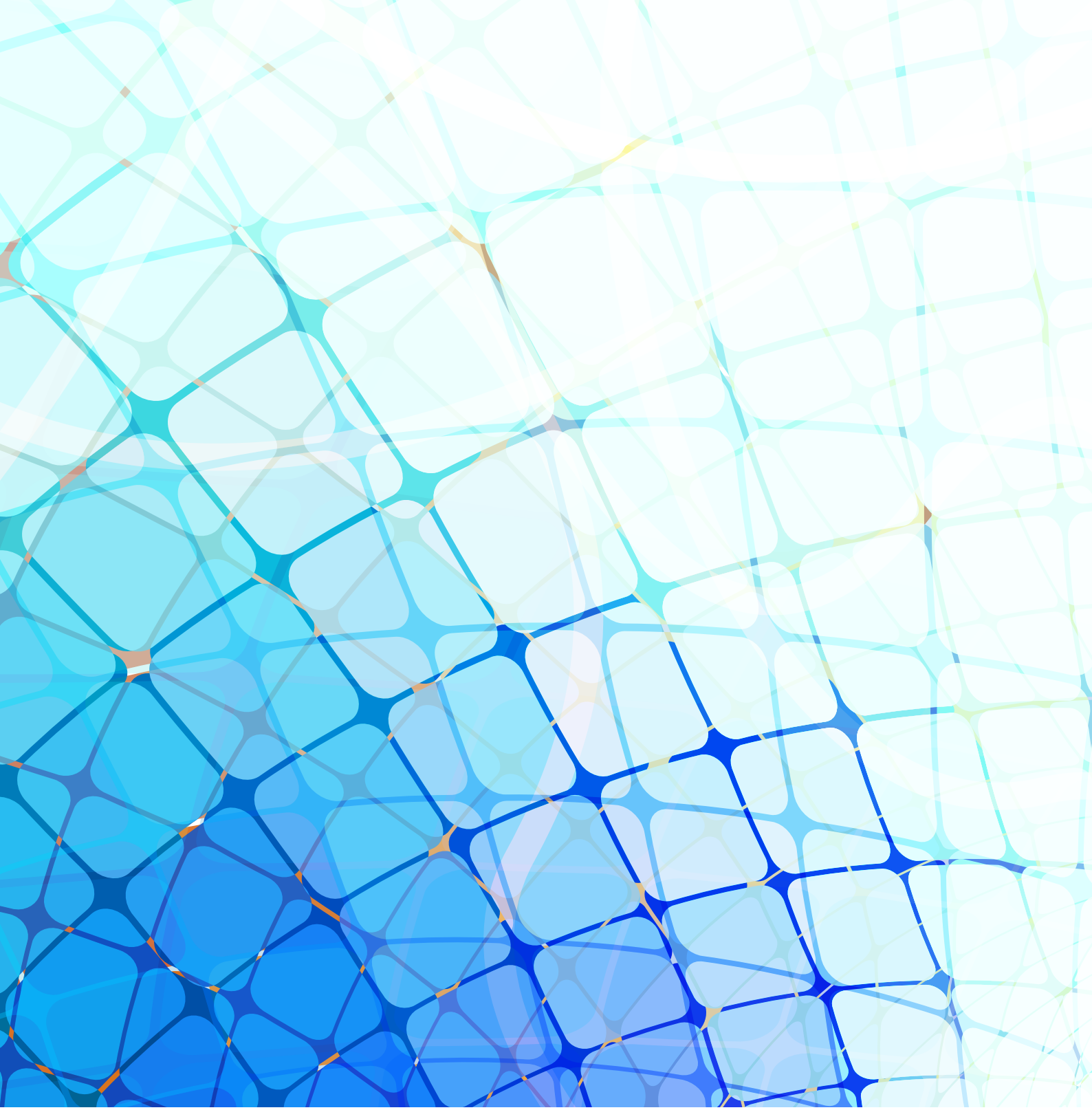

Understanding patents, competition & standardization in an interconnected world

Understanding patents, competition and standardization in an interconnected world

Telecommunication Standardization Bureau

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The opinions expressed in this publication are those of the principal authors and do not necessarily represent the views of the ITU. Nothing in this publication is to be considered as an authoritative interpretation of the ITU-T/ITU-R/ISO/IEC Common Patent Policy and related Guidelines as this publication is only intended for educational and informational purposes.

Foreword

The intention of this publication is to provide government officials, private-sector executives and industry analysts of all disciplines with an overview of the current state of play in the interrelationship of intellectual property and standardization in the information and communication technology (ICT) sphere. It provides a high-level introduction to standardization and intellectual property systems and the various means with which ICT standards bodies manage their intersection. Building on these fundamental concepts, the publication explores recent years' uptick in litigation involving standard-essential patents to provide readers with the basis necessary to engage with ITU's ongoing evaluation of possible reform to the ITU-T/ITU-R/ISO/IEC Patent Policy and related Guidelines.

Intellectual property rights (IPR) and technical standards are essential ingredients in driving market growth, mutually beneficial trade and economic development. And while the two systems seem at cross-purposes – intellectual property consolidating innovation's financial returns in the hands of inventors; standards publishing specifications designed for global adoption – both play complementary roles in providing a basis for iterative innovation and technological advance.

The ICT industry relies on intellectual property and standardization to an extent rivalled by few other industry sectors. The history of communications is one characterized by inventive step after inventive step, leading players in the ICT sector to amass an unparalleled volume of intellectual property. Technical standardization establishes engineering norms for technical systems and is crucial in capturing and further stimulating innovation, providing the lifeblood to ICT networks in need of common protocols or 'languages' to enable compatibility and interoperability.

Technical standards seek to reflect the state of the art and may include patented technologies by virtue of their drawing on the best available technologies to formulate specifications that ensure ground-breaking innovations can be shared across the world.

Managing the incorporation of patented technology in ICT standards demands a precise balance of the interests of IPR holders and standards implementers. IPR holders need an assurance of reasonable compensation for the adoption of their IPR-protected innovations to motivate their contribution of such innovations to standards development processes. Potential standards implementers similarly require the security of a reasonable IPR licensing fee to motivate their conformance with standards.

ITU's Telecommunication Standardization Sector (ITU-T) has garnered many years of experience with the complexities of patents' inclusion in standards through its longstanding commitment to the consensus-driven development of 'open standards'. In 2007, based on best practices determined by ITU-T Study Groups, a common ITU-T/ITU-R/ISO/IEC Patent Policy and related Guidelines were established as a unified governing framework for the three international standards bodies' approach to 'standard-essential patents' (SEPs).

Malcolm Johnson
Director of the ITU Telecommunication Standardization Bureau

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Introduction

Standards have existed for thousands of years. Standards for the measurement of time, distance and weight were among the first types of standards created, but as humankind has advanced, so has standardization.

In the last century, ITU standards enabled international direct dialling of telephones and the sending of faxes. In today's high-tech world, standards have increased dramatically in prevalence and complexity, as well as in their importance to government, industry and consumers. Standards today underpin interconnection, interoperability and the exchange of data such as images and video; they are critical to the functionality of computers, tablets, phones and other ubiquitous information and communication technologies (ICTs).

The early years of the World Wide Web saw the proliferation of a variety of largely proprietary video and interactive formats, but today nearly all devices using the Web rely on standards such as HTML 5 and Rec. ITU-T H.264. International standardization has ensured that modern mobile phones, tablets and other devices are able to create and view interactive Web content using telephone and data networks almost anywhere in the world.

For many years, people were more than satisfied with being able to pick up a telephone and have an operator connect them to their friends and family across town. Innovation led to operators' later ability to connect callers over greater distances, often across regional and national borders. Subsequent innovations – in the form of standardized numbering plans and advancements in switching and other technologies – eliminated the need for most operators, enabling telephone operating companies to empower callers to connect themselves. These innovations were driven by both consumers and telephone operating companies, the former seeking greater privacy and convenience, the latter aiming to reduce their costs and improve performance.

This is a common pattern. The advent of ground-breaking innovation or technological advance is, over time, followed by standardization that improves related technologies' interoperability and functionality, freeing creative technologists and implementers to dream of better, faster, more convenient ways to fulfil the needs served by earlier innovation.

As the world becomes more connected, it is becoming even more important to bring innovators together to develop standards that reflect innovation and spur successive steps forward. Standards bodies such as ITU are a primary means of enabling the collaboration and cooperation that leads to the establishment of international standards. Standards bodies adhere to rules and procedures that promote openness and transparency, thereby providing an environment where innovators from competing companies can come together to develop and agree on technical standards in the public interest. Negotiations and decisions on the technical characteristics of a soon-to-be standardized technology are resolved during the development of the requisite standards, early in the technology's lifecycle, seeking to minimize the possibility that producers and consumers will invest in technologies later made obsolete by the emergence of a superior solution.

Competitors' collaboration and cooperation in the development of standards create efficiencies enjoyed by all market players. Internationally agreed standards lower the costs to start a company or develop a product. They enable new firms to enter a market, increasing competition and incentivizing competitors to innovate both in differentiating their products and streamlining their production methods. Interoperability improves as greater numbers of standards-based products enter the market,

which in turn encourages the adoption of standards by other market players. This continuous process in markets for standards-based products results in lower costs to producers and lower prices to consumers. Through iterative refinement, future innovations accommodate prior technologies and, in parallel, the new standards developed in line with such advances will often accommodate prior standards to ensure the backward compatibility of standards-based products. As technology marches on, the need for interoperability continues unabated.

There are many considerations relevant to the choice of the specific technologies to be included in a standard. It is important to remember that standardization is not always about adopting the 'best' innovation. Standardization brings together diverse, competing interests to develop and agree on standards with the potential to benefit all market players. Participants in a standard's development might favour different technologies and the standard agreed to provide the long-term foundation of a market will often be a compromise of technologies rather than one in isolation.

This cycle – *innovate, standardize, innovate, standardize, innovate, standardize* – is continuous.

Almost all the governments of the world recognize the need to protect creativity and invention through intellectual property protection regimes. Whether patents, trademarks or copyright, IPR acknowledge and reward innovation while encouraging the advancement of the useful arts for all of society.

Intellectual property, like innovation, plays a key role in standardization. IPR regimes protect inventors' exclusive rights to practise their inventions for a limited period of time. However, seemingly in opposition to IPR regimes, the goal of standardization is to encourage widespread practise of inventions codified by standards. Standards bodies address this tension through their IPR or patent policies. The patent policies of ITU and most other standards bodies allow the inclusion of patented technology in standards only if patent holders disclose the presence of patented technology in a draft standard and make commitments to licensing the relevant IPR to standards implementers on Reasonable and Non-discriminatory (RAND) terms. In exchange for RAND commitments, such patent holders enjoy, among other things, RAND royalty streams from standards implementers as well as potential time-to-market advantages born of their advance knowledge of the best-practice implementation of their standardized inventions.

The broad, non-discriminatory licensing of standard-essential patents (SEPs) is a means to spread the benefits of inventions as quickly and widely as possible. As more standards implementers practise the patented technology, these implementers discover new sources of improvement and develop additional inventions. Standards implementers adopting patented technology as part of their conformance to standards can improve standard-essential inventions to the extent that they become the origin of inventions essential to successive standards, themselves possibly becoming the recipients of new RAND licensing revenue streams.

In some standards, the presence of a large number of SEPs will favour the formation of a 'patent pool'. These patent pools aggregate a standard's SEPs with a view to enabling faster, simpler SEP licensing arrangements, often on preferable monetary terms.

This cycle – *innovate, patent, standardize, license, innovate* – makes it clear that a synergy exists among standards, innovation, and intellectual property. This cycle is not immune to abuse. Opportunities

remain for some to upset the cycle in favour of their own interests; however, when properly managed, this cycle of technological progress benefits us all.

– Innovators benefit from the opportunity to license their SEPs to standards implementers and receive RAND compensation in return. Alternatively, they may see value in having their SEPs included in standards in terms of their related product strategy (including time-to-market and other possible advantages).
– Standards implementers benefit from the ability to enter a market using the SEP-protected technology, as well as the subsequent ability to use that technology as a basis for further or complementary innovation.
– Consumers benefit from greater choice, more affordable products, and the higher quality incentivized by strong market competition. IPR regimes work to protect the incentive to innovate. Markets rely on standards to maintain interoperability as innovation progresses the state of the art, and standards also provide a common basis for the iterative innovation that extends the knowledge frontier.

Carefully developed patent policies, alongside well-crafted and enforced competition law, can help balance the sometimes divergent interests of innovators, patent holders, standards implementers, proprietary technology add-on developers, and consumers.

Part I – Standards and standards development

Introduction and objectives of Part I

Social interaction relies on common respect for basic sets of norms, concepts or meanings – in other words, standards.

Standards vary widely, having been established to serve a wide range of purposes, and they are at play in almost every product we consume and every process that readies products for consumption.

'Technical standards' are those that establish norms and requirements for technical systems, specifying standard engineering criteria, methodologies or processes. The functionality of systems incorporating communicating parts is especially dependent on conformance with common standards, and here we often speak of 'compatibility standards' or 'interoperability standards'.

In our increasingly digital society, technical standards targeting compatibility and interoperability are growing in importance, justifiably attracting the attention of policy-makers in their task of creating regulatory conditions able to stimulate socio-economic development. Traditionally most prevalent in the fields of information and communication technology (ICT) and consumer electronics, technical standards are finding new relevance in supporting the roll-out of ICT-enabled services in areas such as healthcare, transportation and energy.

Technical standards today fall into different categories, depending on the 'entities' responsible for their development, their mandatory or voluntary nature, and the degree of 'openness' regarding participation in a standards-development process and the ability to access and implement resulting standards.

The ICT standardization landscape is a complex one, characterized by numerous standards and standards-setting entities, some very focused and others very broad in scope. Standards are developed by single companies or groups of companies, formal standards-developing organizations (SDOs), and forums and consortia (quasi-formal SDOs).

Advantages of technical standards include their ability to encourage competition and innovation, facilitate interoperability, improve cost efficiency and promote national development. Potential disadvantages or 'side-effects' of technical standardization stem from the risk that power is transferred to standardization participants, that standards are used to protect markets and obstruct market access, and that successful standards lead to a loss of variety or a reluctance to adopt new or improved standards.

Upon completion of Part I, the reader should have a good understanding of:

- The purpose and impact of standardization in the ICT industry and global economy;
- The general taxonomy of standards and standards-setting entities;
- The general principles governing standardization processes; and
- The possible advantages and disadvantages of technical standardization.

1. A brief history of standardization

Standards in their many forms play a fundamental role in connecting members of society with reliable modes of communication, codes of practice and trusted frameworks for cooperation. Introducing common interpretations on reciprocal sides of a communication or transaction, standards are integral to mutually beneficial trade and resource-efficient international commerce.

Social interaction relies on common respect for basic sets of norms, concepts or meanings – intuitive examples being language, weights and measures. Different communities, rich in different skills and means of production, will find mutual benefit in trade and the larger marketplace it creates; but this can only be achieved with a common language as a basis of communication or through smaller communities' learning the languages of their most important trading partners. A common system of weights and measures is equally important, enabling trade by establishing an agreed method of calculating volumes and corresponding values.

The roots of standardization lie in Egypt, China and Mesopotamia. Ancient Egypt, for instance, is said to have applied an early form of standard weights and measures in uniformly shaped cylindrical stones and it likely also had standards for building activities, including the construction of pyramids.[1] Work across the world to develop a calendar is one of best-known and earliest examples of science-based standardization.[2] The 15th century republic of Venice was not only the cradle of the modern patent system, but also a pioneer in technical standardization, where standards played an important role in producing interchangeable elements of warships.

The time of the French Revolution is considered the origin of conference-based standardization as we know it today, pioneering large-scale setting of standards and norms in the interests of a larger, more competitive common market.[3]

Standards enlarged the marketplace by unleashing trade, innovation and development on a scale that was impossible in a feudal system in which transporting goods across different regions was made inefficient by the variety of tariffs and taxes levied by landowners. Standardization is thus widely credited as an integral component of the West's modernization and industrialization over the 18th and 19th centuries. Especially intriguing was the development of the metre, which replaced not only a wide variety of different measures of length but also many standards that combined length, quality and other dimensions.[4]

While many of the above standards were developed or commissioned by governments or regulators, as from the late 18th century industry became more invested in standardization and took a leading role.

The steam engine fuelled rapid industrialization by enabling the mass movement of goods and people that ushered in unprecedented levels of urbanization and trade. This symbol of the Industrial Revolution also supplied an early example of technical standardization, insofar as the impact of this innovation

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1 Hesser, W. (ed.) (2012) *Standardisation in Companies and Markets*, 3rd edition, Hamburg: Pro Norm.

2 Richards, E.G. (1999) *Mapping Time: The Calendar and its History*, Oxford: Oxford University Press, [Online], Available: ftp://antares.as.itb.ac.id/pub/ebooks/astronomy/ebooksclub.org__Mapping_Time___The_Calendar.pdf

3 Wenzlhuemer, R. (2010) *The History of Standardisation in Europe*, [Online], Available: http://ieg-ego.eu/en/threads/transnational-movements-and-organisations/internationalism/roland-wenzlhuemer-the-history-of-standardisation-in-europe

4 Alder, K. (2002) *The Measure of All Things*: *The Seven-Year Odyssey and Hidden Error That Transformed the World.* New York: Free Press.

hinged on the widespread adoption of a standardized railway gauge, quickly discovered to be essential in allowing trains to travel seamlessly between various railway networks.

Midway through the 19th century, standardization became a key element of industrial production in the United States (US), a famous example being provided by Eli Whitney's manufacture of arms for the military, whereby standardized gun parts were made interchangeable and so separated the production of guns from that of bullets. Also midway through the 19th century, the adoption of the electric telegraph gave rise to the world's first international technical standard and, as a result of the International Telegraph Convention of 1865, the first truly intergovernmental organization in the form of the International Telegraph Union, the predecessor to today's International Telecommunication Union (ITU).

2. The types of standards and their increasing importance

How many interoperability standards in a laptop?

A recent empirical study identified 251 technical interoperability standards in a modern laptop computer, and estimated that the total number of standards relevant to such a device is much higher.

Biddle, B., White, A., & Woods, S., How Many Standards in a Laptop? (And Other Empirical Questions). Proceedings of the 2010 ITU-T Kaleidoscope Academic Conference, Pune, India, 13-15 December 2010

A standard can be defined as a document which provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose.[5] Today, standards are at play in almost every product we consume and every process that readies products for consumption. Standards are applied to increase the efficiency of individual processes and to introduce common systems across divisions of individual companies. They establish commonalities across companies in an industry, industries in a country and countries in a region, and across regions in today's global economy.

Despite fulfilling the above definition, standards vary widely, having been established to serve a wide range of purposes. While many taxonomies of standards are used, the following overview summarizes some of the most important types of standards:

– *Vocabulary standards* cover glossaries and definitions of terms, and these standards provide uniformity and cohesion in the interpretation of terms used in various other standards. Among many other areas, vocabulary standards are important in health and medical information to prevent misunderstandings and mismatched interpretations among medical practitioners.[6]

– *Measurement standards*, as their name suggests, address definitions of measure. With the exception of a few seemingly fundamental physical constants, units of measurement are essentially arbitrary; in other words, people make them up and then agree to use them. This category includes basic standards, which detail seven basic units of the International System of Units: length as metre (m), mass as kilogram (kg), time as second (s), electric current as ampere (A), temperature as Kelvin (K), substance as mole (mol) and luminous intensity as candela (cd).

[5] International Organization for Standardization (ISO), *What is a standard?*, [Online], Available: http://www.iso.org/iso/home/standards.htm

[6] See, for example, the International Non-proprietary Names (INN) Programme maintained by the World Health Organisation (WHO), whereby WHO collaborates closely with INN experts and national nomenclature committees to select a single name of worldwide acceptability for each active substance that is to be marketed as a pharmaceutical. For more information, see http://www.who.int/medicines/services/inn/en/

- *Safety standards* are standards designed to ensure the safety of products, activities or processes. They may be voluntary or mandatory and are normally established by an advisory or regulatory body.
- *Management standards* cover a diverse range of standards and techniques including inventory management, production management, banking transaction documentation, information technology, logistics, quality management systems and environmental management systems.
- *Product standards* are the most common type of standard. They contain specifications that cover the requirements for a material or product, providing comprehensive guidance for producing, processing, selling, purchasing and using the product. Product standards may include requirements for dimensions, performance, packaging, labelling, methods of sampling and test methods.
- *Technical standards* generally refer to the establishment of norms and requirements for technical systems, specifying standard engineering criteria, methodologies or processes. The functionality of systems incorporating communicating parts is especially dependent on conformance with common standards. Here, we often speak of 'compatibility standards', also known as 'interoperability standards'. These standards specify how technologies such as a mobile phone and a mobile network, or a compact disc and a compact disc player, interact with one another and work together successfully. Compatibility and interoperability standards are most common in the ICT and consumer electronics sectors, but their importance to other industry sectors is growing rapidly.

The value of standards is well understood, both from an economic and a policy perspective. More than ever before, with European integration a case in point, standards are being recognized as crucial to expanding common markets and sustaining socio-economic development. This is reflected in the attention that policy-makers are devoting to technical standardization. The European Union has emphasized standards and interoperability as 'Pillar II' of the *Digital Agenda for Europe*,[7] and the US has included standardization as a key component of its *Strategy for American Innovation: Securing Our Economic Growth and Prosperity*.[8] Other countries are attributing similar weight to standardization; this is especially true of China, a country of increasing prominence in the standardization world.[9]

There are several reasons behind policy-makers' growing focus on standardization.

In our increasingly digital world, the global economy is becoming more dependent on technical standards to enable interoperability and compatibility.[10] Today, it is hard to imagine how telecommunication services would function without the standards that underlie mobile terminals' interaction with telecommunication networks, or how a TV or video-streaming service would operate without the television receiver implementing the same standard as the broadcaster or creator of the audiovisual material. Consumer electronics are equally dependent on standards, with an example in MP3 audio coding.

Computers also rely on a wide range of standards to perform the functions expected of them. And while not all standards employed in computers, or in game consoles for that matter, are 'open standards',

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7 European Commission (EC) *Pillar II of the Digital Agenda for Europe*, [Online], Available: http://ec.europa.eu/digital-agenda/en/our-goals/pillar-ii-interoperability-standards

8 Executive Office of the President (2012) *Memorandum for the heads of executive departments and agencies*, Issued 17 January 2012, [Online], Available: http://www.whitehouse.gov/sites/default/files/omb/memoranda/2012/m-12-08.pdf

9 Breznitz, D. and Murphree, M. (2011) 'Standardized Confusion? The Political Logic of China's Technology Standards Policy', *Social Science Research Network (SSRN)*, [Online], Available: http://ssrn.com/abstract=1767082

10 See, for example, *ISO Studies on benefits of standards*, [Online], Available: http://www.iso.org/iso/home/standards/benefitsofstandards/benefits_repository.htm?type=EBS-MS; United Nations Industrial Development Organization (UNIDO) (2006) 'Role of Standards: A guide for small and medium-sized enterprises', Working Paper, [Online], Available: http://www.unido.org/fileadmin/media/documents/pdf/tcb_role_standards.pdf

these standards are nonetheless crucial in ensuring that these products can operate successfully and interact with their environment.

A second reason for policy-makers' increased interest in standardization is that standards are fast becoming essential to industry sectors outside the domains of ICT and consumer electronics. New demand for compatibility and interoperability standards is being driven by innovations of key value in responding to fundamental socio-economic challenges, such as smart grid, e-health, intelligent transport systems (ITS), mobile money and smart metering technologies for water, gas and electricity management.

Nearly every industry sector introducing 'smart' systems is expected to rely heavily on compatibility standards.[11] The use of ICTs as 'enabling technologies' will demand ICT standards that are either purpose-built or adapted to the requirements of markets not traditionally involved in the ICT standardization process.

One example is the European eCall road safety programme, where each new car will be capable of initiating an automatic call for emergency services in the event of an accident. This programme relies on existing telecommunication standards, augmented to serve this new application.[12]

Some smart systems will call for new compatibility standards developed to fit the purposes of new fields not yet part of existing technology areas. Standardization to drive the growth of e-health systems is one illustration of this type of targeted standards development.

Regardless of the nature of standards to serve these new applications – applications of great importance to our future as a society – standardization will be pivotal in realizing their potential, and political attention to standardization is set to grow further in response.

Many standards — many standards-setting entities

Modern communications services, and associated devices and equipment, seldom rely on one single standard to satisfy end users' needs. They often depend on dozens if not hundreds of different standards, some of which address very specific technical aspects while others specify broader solutions or systems. These standards often originate from a wide array of standards-setting entities.

Take for example your smartphone. ITU's standardization arm (ITU-T) develops the 'codecs' that provide voice and video, also enabling mobile backhaul with optical transport standards. ITU's radiocommunication arm (ITU-R) manages the radio-frequency spectrum in which it operates. The Third Generation Partnership Project (3GPP) develops standards for the radiocommunications between smartphone and network. The Institute of Electrical and Electronics Engineers (IEEE) develops 'Wi-Fi' standards.* The Internet Engineering Task Force (IETF) maintains the Internet Protocol suite (TCP/IP) and Hypertext Transfer Protocol (HTTP). The World Wide Web Consortium (W3C) is responsible for Hypertext Markup Language (HTML) and Extensible Markup Language (XML), and this is just a sample of the many standards bodies and standards involved.

* Formally, this is called the IEEE 802.11 series of standards. The popular 'Wi-Fi' term was introduced by the Wi-Fi Alliance, an organization that performs interoperability certification and related standardization activities.

[11] Gungor, V.C., Sahin, D., Koçak, T., Ergüt, S., Buccella, C. Cecati, C. and Hancke, G.P. (2011) 'Smart Grid Communication Technologies and Standards', *IEEE Transactions on Industrial Informatics*, vol. 7, no. 4, November, pp. 529-539.

[12] EC eCall: *Time saved = lives saved*, [Online], Available: http://ec.europa.eu/digital-agenda/ecall-time-saved-lives-saved

3. Standards development and standards-setting entities

3.1 General overview

There are three broad categories of standards-setting entities: single companies, formal SDOs and forums or consortia. The type of entity responsible for a standard usually has implications for the status of that standard, particularly regarding its degree of 'openness' (see section 3.5). Table 3-1 provides a general overview of the different types of standards-setting entities and the nature of their standards.

Table 3-1 – Different standards-setting entities and their resulting standards

Standards-setting entity	Produces	Examples
Single companies	'Proprietary specifications'.	Standards that evolve from a specific company or vendor.
Formal standards-developing organizations (SDOs)	'Open standards'[13] (which can become 'de jure standards' if their implementation is mandated by law).	ITU, ISO, IEC, ETSI, various national standards bodies, etc.
Forums and consortia (quasi-formal SDOs)	Typically, open standards, but may produce closed standards, depending on the organization in question.	IETF, Broadband Forum, W3C, Bluetooth consortium, OASIS, etc.

3.2 Standards developed by single companies

Standards developed by a single company are also known as 'proprietary specifications'. The firm retains full control over the specifications and their future evolution, typically not allowing others to participate, or setting the rules by which others can participate but keeping the final say. Such specifications, to their developers, have the benefit that they can be developed, published and taken to market faster than their conference-based counterparts (which allow input from many competing interests), and they may be optimized to serve the specific interests of the firm developing them. If a proprietary specification comes into widespread use (assuming the owner has allowed this to happen by granting licences to intellectual property), it can translate into a strong source of revenue or provide other benefits. It is important to note that these 'proprietary specifications' are not the same as collaboratively-developed standards, and the owner of any related patents is not subject to the specific licensing constraints (such as 'RAND', which will be discussed later).

Since standardization is essentially a voluntary activity, any company (or group of companies)[14] can develop its own specification or standard.

When these publicly available specifications or standards become very successful in terms of market acceptance (or adoption), they may be referred to as 'de facto standards'. Growth in popularity as a measure of determining whether a technique or technology has become a de facto standard is a

[13] The term 'open standard' is further discussed in section 3.5

[14] If a group of companies develops a standard, it can also be considered a forum or consortium, as further discussed in section 4.1.3.

significant element of informal standardization, as opposed to more formal standardization processes whereby standards are *approved* or *declared* by designated entities.

The company that developed a specification will decide whether it wants to promote and facilitate others' adopting it or, alternatively, 'keep the standard to itself'. A company will choose the first scenario if it believes it stands to benefit from sharing the specification with others, because it wants to create a wider, more attractive market and platform for all companies, itself included, or because it wants to encourage the development of complementary devices, software, service or content.

A well-known example is the Video Home Standard (VHS) developed by the Japanese company, JVC. JVC was convinced that it would benefit from actively promoting its standard, not only among competing manufacturers of video deck players, but also among tape manufacturers and movie makers able to provide the VHS platform with valuable content.

A company will choose to keep a specification to itself for many reasons, including if it believes it is well positioned to serve the full market. Manufacturers of computer printers (laser printers, inkjet printers, etc.) serve as an example. While they might try to discourage others from adopting their specifications by not making the specifications available to the public, they can only legally prevent others from doing so if they own the necessary intellectual property rights on their standards and decide not to license those rights to others.

Additional examples of proprietary specifications:

– Hewlett-Packard's Printer Command Language (PCL) is a page description language originally developed in 1984 for early inkjet printers, which later came into widespread use in thermal, matrix and laser printers.
– IBM's Video Graphics Array (VGA), introduced in 1987, was an IBM-developed graphical standard that the majority of IBM *Personal Computer* clone manufacturers conformed to, making it the common denominator that almost all post-1990 PC graphics hardware can be expected to implement. Even today it is close to indispensable in connecting a laptop computer to a projector.

If proprietary specifications become very widespread, it is not unusual for the original developer to offer the specifications to a formal SDO, particularly in cases where specifications lend themselves to international standardization[15]. If approved by an SDO, the specifications gain the status of a formal standard and the SDO in question becomes responsible for the maintenance and further development of the standard (as appropriate) – a model which provides specifications with a good platform for greater dissemination and adoption. However, the company will in this case not retain its full and exclusive control over the standard.

Examples of proprietary specifications later formalized by SDOs:

– Portable Document Format (PDF), developed by Adobe Systems, is a file format used to represent documents in a manner independent of application software, hardware and operating systems. Adobe made the PDF specification available free of charge in 1993 but it remained a proprietary format until 2008 when it was formalized as an international standard by the International Organization for Standardization (ISO) as ISO 32000-1. By submitting PDF to ISO, Adobe made the standard more attractive to governments, among others, which were seeking a universal open document format for communications and archival purposes. In parallel, Adobe published a public patent licence to

[15] It should be noted that companies also routinely offer industry specifications to consortia.

ISO 32000-1, thereby granting royalty-free rights to all Adobe-owned patents necessary to make, use, sell and distribute PDF-compliant implementations.

– Synchronous Optical Networking (SONET) has been the dominant transport protocol within telecommunication networks for the past 20 years. It can be thought of as a set of generic transport containers to carry voice or data messages. These transport containers enable the delivery of a variety of protocols, including traditional telephony, asynchronous transfer mode (ATM), Ethernet and TCP/IP. The protocol was originally defined by Telcordia Technologies and later formalized by ITU under the name Synchronous Digital Hierarchy (SDH), as Recommendations ITU-T G.707, ITU-T G.783, ITU-T G.784 and ITU-T G.803.

3.3 Standards developed by formal standards-developing organizations (SDOs)

Underlining the importance of an open, accessible standards-setting system, many national authorities have established and/or formally recognized certain national or international standards bodies. Such organizations are generally known as formal SDOs.[16] National SDOs are usually membership-driven bodies that bring together standardization experts – often from competing companies and from governments, academia and civil society – to develop standards in response to priorities determined by public- or private-sector members. Some regional or global SDOs permit direct participation from private-sector entities by granting them membership, while others facilitate indirect private-sector participation via national SDOs (usually "the national body most representative of standardization in its country").[17] In the latter case, SDOs delegate to National Committees the role of representing the interests of all national stakeholders, including entities in the private sector.

SDOs establish rules governing rights to participate in the standards-development process, consensus-based procedures for decision-making, the open availability of standards' specifications,[18] and often also policies on patents' interaction with standards. Standards are finalized through an approval process conducted by the membership, the secretariat or a combination of the two, most often through a consensus-based approach.

Important international SDOs are the International Organization for Standardization (ISO), which covers almost all technical areas; the International Electrotechnical Commission (IEC), which focuses on electrical, electronic and related technologies;[19] and the International Telecommunication Union (ITU), which focuses on ICT.

ITU, ISO and IEC collaborate under the banner of the World Standards Cooperation (WSC) to ensure the efficient coordination of their international standardization

Fostering development through international standards

"International standards bodies such as ISO, IEC and ITU provide cohesion to a myriad of national and regional standards, thereby harmonizing global best practices, eliminating technical barriers to trade and fostering shared socio-economic advance."

Message by Klaus Wucherer (President of IEC), Terry Hill (President of ISO) and Hamadoun I. Touré (Secretary-General of ITU), on the occasion of World Standards Day 2013, India, 13-15 December 2010

[16] Some literature instead uses the term standards-setting organization (SSO); but in the context of this publication, we will consider both terms interchangeable.

[17] ISO (2013) *ISO Membership Manual*, pp. 8, [Online], Available: http://www.iso.org/iso/iso_membership_manual_2013.pdf

[18] Here, 'open' does not necessarily mean 'free'. Many national standards organizations have a funding model based on selling their standards.

[19] ISO and IEC collaborate in ISO/IEC JTC1 (Joint Technical Committee 1), which focuses on ICT standardization.

work. ITU also works to harmonize national and regional standards, and here the Global Standards Collaboration (GSC) is the mechanism giving direction to the global coordination of standards development by assembling key international, regional and national standards bodies in the telecom and radiocommunication fields.[20]

As a result of direct recognition by the European Commission, Europe hosts three important regional SDOs: the European Committee for Standardization (CEN), the European Committee for Electrotechnical Standardization (CENELEC)[21] and the European Telecommunications Standards Institute (ETSI). Similar regional standards bodies are found elsewhere in the world, two examples being the Pacific Area Standards Congress (PASC) and the African Regional Organization for Standardization (ARSO).

At the national level, most countries possess a government-recognized SDO. The largest such bodies include the British Standards Institution (BSI), the *Deutsches Institut für Normung* (DIN) and the *Association Française de Normalisation* (AFNOR). The American National Standards Institute (ANSI) is another very important SDO. ANSI differs significantly from BSI, DIN and AFNOR in that it does not itself develop standards, instead overseeing the development of US voluntary consensus standards by standards bodies that it accredits. Meeting the necessary conditions, a standard developed by an accredited organization will be recognized as an "American National Standard". ANSI thereby coordinates US-based standards-development activities and represents the country's standards-related interests in certain regional or international standardization entities.

3.4 Standards developed by forums and consortia or quasi-formal SDOs

Forums, consortia and other informal industry associations (considered similar for the purposes of this publication) are especially prevalent in the ICT industry. They are often established in the belief that informal cooperation among a smaller group of like-minded organizations can more quickly achieve an outcome satisfying all participants. Among other functions they carry out in the service of members' common interests, sector-specific industry associations respond to demands from member companies to develop technical standards. As such, these organizations lie somewhere between single companies that develop standards and formal SDOs. Some organizations are established specifically to develop a single standard, while others are designed to have a long lifespan or serve a wider technology area.

There are a large number of active standardization consortia across the world, some national or regional in scope, some global. The well-known live inventory of standards-setting entities maintained by Andrew Updegrove[22] currently includes over 800 organizations developing, promoting or supporting ICT standards, of which the lion's share can be characterized as consortia. CEN also publishes such a list, albeit not as comprehensive as Updegrove's.[23]

Consortia differ in their degree of exclusivity. Some are open to everyone interested in participating in the standards-development process, satisfying many, if not all, of the 'open standards' criteria

[20] GSC participants include ITU-T, ITU-R, the Alliance for Telecommunications Industry Solutions (ATIS), US; the Association of Radio Industries and Businesses (ARIB), Japan; the China Communications Standards Association (CCSA); the European Telecommunications Standards Institute (ETSI); the ICT Standards Advisory Council of Canada (ISACC); the Telecommunications Industry Association (TIA), US; the Telecommunications Technology Association (TTA), Korea; and the Telecommunications Technology Committee (TTC), Japan.

[21] CEN and Cenelec are the European counterparts of ISO and IEC, respectively.

[22] Updegrove, A., *Standard Setting Organizations and Standards List*, [Online], Available: http://www.consortiuminfo.org/links/

[23] European Committee for Standardization (CEN) *ICT Standards Consortia*, [Online], Available: http://www.cen.eu/cen/Sectors/Sectors/ISSS/Consortia/Pages/default.aspx

mentioned in section 3.5 below. An example is the Organization for the Advancement of Structured Information Standards (OASIS). Other types of consortia are more exclusive, restricting participation or access to standards to invitees only, holding closed meetings or only accepting members who meet certain criteria.

There are some very large, successful standards bodies that fall into the 'consortium' category. These bodies are similar to formal SDOs in most respects other than not being formally recognized by national authorities, and could hence be termed 'quasi-formal SDOs'. These organizations include the Internet Engineering Task Force (IETF), responsible for the Internet Protocol suite (TCP/IP), and the World Wide Web Consortium (W3C), the source of the standards underlying the Web.

Examples of standards created by consortia include:

– The Universal Serial Bus (USB) is a standard hardware interface for attaching peripheral devices to a computer, which was developed by a consortium of companies (including Intel, Compaq, Digital, IBM, Microsoft, NEC and Nortel) to enhance physical hardware compatibility by establishing a specific connector and pin definition. Although USB is an industry-developed specification rather than a formal standard, USB-enabled hosts and devices today number in the billions.
– The DVD standard for the digital optical storage of movies, multimedia content or other data on a 12cm disc is standardized by a membership-driven industry association known as the DVD Forum.

As with proprietary specifications, it is not unusual for consortia to have their standards adopted by formal SDOs.

– The Compact Disc (CD) standard, originally developed by a Philips-Sony consortium and first published in 1980, was formalized as an IEC International Standard in 1987 with various amendments made in 1996.
– Originally developed by Ericsson, Bluetooth technology was further developed by a consortium, the Bluetooth Special Interest Group, and subsequently standardized by IEEE.[24]
– The widely implemented Common Alerting Protocol (CAP 1.1) is a simple but general format for exchanging all-hazard emergency alerts and public warnings, disseminated simultaneously over all kinds of networks. It was originally developed by the Organization for the Advancement of Structured Information Standards (OASIS), and later standardized by ITU as Recommendation ITU-T X.1303.

3.5 Core principles governing formal standardization processes

The various formal national, regional and international SDOs apply standards-development principles which differ in certain dimensions but which all broadly conform to the following well-established best practices in standards development: consensus, transparency, balance, due process and openness.

These concepts are briefly outlined below:

– *Consensus*: An inclusive standards-development process where all views are taken into account and the final composition of standards is agreed by all relevant stakeholders. Consensus is not unanimity, but rather the absence of sustained opposition to substantive issues.[25]

[24] The IEEE 802.15.1 'Bluetooth' standard is no longer maintained, however.

[25] ISO/IEC, for example approach the notion of consensus as that of a "*General Agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments",* noting at the same time that "*Consensus need not imply unanimity"*. ISO/IEC Guide 2:2004, Standardization and related activities – General vocabulary (2004)

– *Transparency*: Making information available as to the proposal, development and approval of a technical standard, in the interests of enabling informed, equitable participation by all stakeholders.
– *Balance*: Stakeholders' interests should be allowed equal weight in the standards-development process, and a standards body's participation and funding mechanism should take into account the need to ensure that no specific interest dominates the process.
– *Due process*: Mechanisms that afford all materially affected entities the ability to, on an equal footing, express a position and its basis, have that position considered and appeal an outcome adversely affecting that position. Due process ensures an equitable standards-development process.
– *Openness:* The standards-development process should be open to participation by all materially affected interests. The exact definition of an 'open standard' is the subject of widespread debate,[26] with definitions revolving around the relative 'openness' of the standards-development process, the resulting standards and the ownership of the rights attached to the technologies or techniques contained within a standard.[27] The word 'open' has also been applied to software, in the context of free or open-source software, but this concept is rather different and should not be confused with that of an open standard. Closed standards, in contrast, are standards that do not satisfy one or more of the abovementioned criteria. Examples of closed standards are typically proprietary specifications for which the owner does not grant licences, or standards which are created in a setting accessible by invitation only.

Transparency and openness

"Standards should be set and adopted in an open and transparent manner at all times. This prevents established players from manipulating the process to keep innovative companies and their technologies on the side-lines. A process that arbitrarily keeps some parties outside may unfairly benefit those that are on the inside. This is especially important in those industries where standards are urgently needed – such as for digital and Internet services."

Joaquín Almunia, Vice President of the European Commission responsible for Competition Policy, speaking at the International Bar Association Antitrust Conference in Madrid, 15 June 2012, European Commission - SPEECH/12/453.2010

The World Trade Organization's Committee on Technical Barriers to Trade subscribes to these principles, in addition recommending the following four principles to clarify and strengthen the concept of international standards development:[28]

– *Impartiality*: All countries should be afforded equal opportunity to influence or participate in the international standards-development process, ensuring that standards do not favour any particular companies, markets or regions.
– *Effectiveness and relevance*: An effective international standards process is one that responds to relevant demands for technical standards driven by technological advance as well as regulatory and market needs.

[26] Andersen, P. (2008) *Evaluation of Ten Standard Setting Organizations with Regard to Open Standards*, Copenhagen: IDC; Krechmer, K. (1998) 'The Principles of Open Standards', *Standards Engineering*, Vol. 50, no. 6, November/December, pp. 1-6.

[27] In ITU, 'open standards' are defined as standards made available to the general public and are developed (or approved) and maintained via a collaborative, consensus-driven and transparent process, from which materially affected and interested parties are not excluded. 'Open standards' facilitate interoperability and data exchange among different products or services and are intended for widespread adoption. See also Resolution GSC-12/05 of the 12th Global Standards Collaboration meeting (Kobe, 2007), Available: http://www.itu.int/dms_pub/itu-t/oth/21/01/T21010000040011MSWE.doc

[28] World Trade Organization (WTO) Committee on Technical Barriers to Trade (2002) *Decision of the committee on principles for the development of international standards, guides and recommendations with relation to articles 2, 5 and annex 3 of the agreement*, G/TBT/1/Rev.8, 23 May, Section IX, [Online], Available: http://ita.doc.gov/td/standards/pdf%20files/WTO%20GTBT1Rev8.pdf

– *Coherence*: Cooperation and coordination among international SDOs is essential to avoid the development of conflicting international standards caused by duplications or overlaps of standardization work.
– *Development dimension*: International standards should reflect the needs of all the world's regions and measures should be taken to encourage developing countries' participation in the international standards-development process.

The implementation of standards is, in principle, voluntary. This is true even for standards developed by formal SDOs. Although these organizations are formally recognized by national or regional authorities, the implementation of their standards is, for the most part, voluntary.[29]

De jure standards are the exception to the general rule of voluntary implementation. Such a standard's implementation is mandated by law, by virtue of the standard being created as part of new legislation or legislation referring to an existing standard (usually developed by a formal SDO). De jure standards can aim to limit standards battles or 'platform wars', attempting to impose certainty by fiat. However, this imposition may come at a cost if a standard is mandated too early, based on incomplete information, crowding out the opportunity for the emergence of a superior standard. If too slow to evolve, de jure standards can hamper innovation, potentially also raising barriers to competition and trade in cases where the adoption of a standard works to grant market dominance to a small group of companies.

Table 3-2 – Examples of international SDOs and consortia and their standards of relevance to ICTs

Standards body	Type	Technology focus	Notable standards
International Organization for Standardization (ISO)	Formal SDO	All technological areas, including but not limited to ICT	ISO 9660 (CD File System); ISO 5800 (photographic film speed); ISO/IEC 11172, 13818 and 14496 MPEG suite; ISO 3166 Country codes; ISO 9000 Quality management; ISO 14000 Environmental management
International Electrotechnical Commission (IEC)	Formal SDO	Electrical, electronic and related technologies[a]	ISO/IEC 11172, 13818 and 14496 MPEG suite IEC 62196 for plugs and charging modes for electric vehicles

[29] Authorities sometimes ask or commission an SDO to develop a specific standard, which is then called a 'mandated standard'. For instance, the European Commission regularly mandates ETSI or another recognized body to develop a specific standard, which is then approved as a European Standard (EN). Notwithstanding the word 'mandated', the resulting standard is *not* mandatory in terms of implementation. It can be true, however, that implementing a EN standard does have some advantages. This is part of the so-called European New Approach. A discussion of this policy is beyond the scope of this publication, but the interested reader is referred to Farr, S. (1996) *Harmonisation of technical standards in the EC (Second edition)*, Chichester: John Wiley & Sons.

Standards body	Type	Technology focus	Notable standards
International Telecommunication Union (ITU)	Formal SDO	Telecommunications[b]	ITU-T E.164 Numbering Plan; xDSL standards for Internet access over copper; Passive optical networks (PONs) for fibre-to-the-home (FTTH) Internet; Synchronous Digital Hierarchy (SDH); Optical Transport Network (OTN); Fax machines (ITU-T T.30 and ITU-T T.4); Video codecs (ITU-T H.264 AVC and ITU-T H.265 HEVC, developed with ISO/IEC MPEG)
European Telecommunications Standards Institute (ETSI)	Formal SDO	Telecommunications[c]	Various mobile standards including 2G GSM, 3G UMTS/W-CDMA, 4G LTE;[d] Cordless telephony: DECT; Safety communications: TETRA; Car safety: eCall
Institute of Electrical and Electronics Engineers (IEEE)	Formal SDO	Wide range of electro-technical areas[e]	IEEE 802.3 Ethernet; IEEE 802.11 Wireless Networking ('Wi-Fi'); IEEE 1394 'Firewire'; IEEE 802.15.1 'Bluetooth';[f] IEEE 802.16 'WiMax' wireless networking; IEEE 802.15.4 'ZigBee' standard for low-distance, low-power communications
Internet Engineering Task Force (IETF)	Consortium (quasi-formal SDO)	Internet protocols	Internet Protocol suite (TCP/IP); Hypertext transfer protocol (HTTP)
World Wide Web Consortium (W3C)	Consortium (quasi-formal SDO)	Web-related standards[h]	Hypertext Markup Language (HTML); Extensible Markup Language (XML)
Organization for the Advancement of Structured Information Standards (OASIS)	Consortium (quasi-formal SDO)	Standards for e-business and Web services	Common Alerting Protocol (CAP); Content Management Interoperability Services (CMIS); Electronic Business using XML (ebXML); Key Management Interoperability Protocol (KMIP); OpenDocument[i]

[a] This includes areas such as world plugs, smart grid, functional safety, electromagnetic compatibility, renewable energies and colour management.

[b] ITU Radiocommunication Sector (ITU-R): Spectrum management; Radiowave propagation; Satellite services; Terrestrial services; Broadcasting services; Science services. ITU Telecommunication Standardization Sector (ITU-T): Operational aspects of service provision and telecommunication management; Electromagnetic effects, environment and climate change; Broadband cable and TV; Signalling requirements, protocols and test specifications; Performance, QoS and QoE; Future networks including cloud computing, mobile and NGN; Multimedia coding, systems and applications; Security, and technical languages and description techniques.

[c] including standards for fixed and wireless communications, content delivery, transportation, interoperability and public safety and security.

[d] The 3G W-CDMA and the 4G LTE standards are developed in collaboration with other regional standards organizations in the context of the Third Generation Partnership Project (3GPP).

[e] including fixed and wireless Local Area Networks, aerospace electronics, antennas and propagation, batteries, computer technology, consumer electronics, electromagnetic compatibility, green and clean technology, healthcare IT, industry applications, instrumentation and measurement, nanotechnology, national electrical safety code, nuclear power, power and energy, power electronics, smart grid, software and systems engineering, and transportation.

[f] Ratified by IEEE but developed by the Bluetooth Special Interest Group (SIG).

[g] including routing, infrastructure, operations and management, and real-time applications and infrastructure.

[h] Web design and applications; Web architecture; Semantic web; XML technology; Web of services; Web of devices; Browsers and authoring tools.

[i] also formalized as an ISO/IEC International Standard.

4. The advantages and disadvantages of technical standards

4.1 General overview

Standards serve the public interest in a variety of ways, and several scholars have worked on quantifying the economic impact of standards,[30] a task made very challenging by the multifaceted nature of standards' effects on production, trade and technological progress. It is also important to realize that standards can have undesirable 'side effects'.

Table 4-1 provides a brief overview of standards' possible advantages and disadvantages. Whether they occur, and to what degree, is often dependent on the exact context in which a standard is developed.

Table 4-1 – Overview of possible advantages and disadvantages of standards

Possible advantages of standards	Possible disadvantages of standards
Encourage innovation and competition • More suppliers; lower risk for one-supplier dominated markets • More competition later in product lifecycle • Lower prices • Increased network value for users; greater offer and lower prices of complementary goods • Lower switching costs • Less risk of 'tying' • Easier evaluation of offerings • Easier communication between actors Facilitate interoperability • Easier combination of products or services • Reduces risk of choosing a future loser • Easier interchangeability of products or services • Facilitates certification Increase cost efficiency • R&D resources are combined • Less duplicity Promote national development • Facilitates market liberalization • Opens access to international markets	Transfer power to participants in the standardization process • Less diversity between technical approaches, particularly early in product lifecycle • Biased to large vendors • Biased to large purchasers • Higher costs associated with gateways Protect markets by obstructing their access Hamper competition through a reluctance to adopt new or improved standards • Limiting performance or functionality Loss of variety • Fewer products optimized for niche user groups, users with disabilities, etc.

[30] See, for example, Blind, K. (2004) *The Economics of Standards; Theory, Evidence, Policy*, Cheltenham: Edward Elgar Publishing.

4.2 Potential advantages of standards

Encourage innovation and competition

Markets look to standards as building blocks of a competitive business environment. Capturing innovation and proven best practices, standards grant companies access to greater numbers of buyers, sellers and partners, thereby expanding the scope of opportunities enjoyed by all of a market's constituents.

Standards can work to ensure that buyers (consumers or intermediate buyers) enjoy a higher degree of competition, benefiting from lower prices and greater choice of sellers, products and services. Markets underpinned by standards can be less prone to sellers tying products or services together in such a way as to make the purchase of one product conditional upon that of another. Again advantageous from a consumer's perspective, standards can make it easier to switch suppliers, reducing the risks of getting 'locked-in' to any one particular solution; and as products conforming to standards will have common sets of features, standardization can aid in the comparison of suppliers' offerings.

Standards can reduce technical barriers to trade and increase competition by laying out the fundamental norms to which a product or service must conform if it is to function (and compete) effectively within a larger, global product ecosystem. A product accredited as conforming to an international standard is marked with a trusted symbol of quality, safety or compatibility, and thus – without expert knowledge of the company having developed a product or service – a buyer can make an informed purchasing decision based on what they know of the standard.

Facilitate interoperability

The imperative of technical standardization is extremely evident in the market for ICT, an international ecosystem demanding widespread adherence to the common standards that act as defining elements in the global communications infrastructure.

Standards are critical to the interoperability of ICTs and, whether we exchange voice, video or data messages, standards enable global communications by ensuring that countries' ICT networks and devices are 'speaking the same language'.

International ICT standards can help avoid costly market battles over preferred technologies, limiting market players' ability to establish 'walled gardens' of proprietary solutions that lock-in customers by virtue of their not interoperating with solutions provided by other players. Standardization can also reduce the risks that consumers will select a future 'loser' and subsequently be faced with discontinued products or a lack of complementary products (content, software, etc.).

Increase cost efficiency

Standardized parts and processes were instrumental in the rise of cost-efficient mass production, enabled by the interchangeability of parts and a greater division of labour and specialization of skills. Here, standards introduced efficiencies that played a central role in lowering unit costs of production through economies of scale, and they are today indispensable in the day-to-day operations of modern economies.

Industrialization and modernization greatly magnified economies' complexity and – were it not for standards establishing benchmarks of technological progress and enabling the widespread adoption of best practices – duplication of research and development (R&D) efforts would have seen constant 'reinvention of the wheel' and far more stunted technological innovation and economic growth. In other words, standards are critical to technology transfer in that they can help ensure that technological breakthroughs achieved in one country can be replicated elsewhere in the world.

Promote national development

Standards also can be an essential aid to developing countries in building their infrastructure and encouraging economic development. To market players in emerging economies, international standards can offer an avenue through which to access new markets.

In building a road or railway network, international standards specify the techniques and materials able to ensure safety and quality. In stimulating domestic economic activity, market players are enriched by access to greater numbers of buyers and sellers if their products conform to internationally recognized standards. And in the world of communications technology, conformance with international standards signifies entry into an international product ecosystem composed of a multitude of other products designed with compatibility in mind.

However, inequality in national standards capabilities continues to contribute to the persistence of the digital divide between developed and developing countries, as well as to disparities in opportunities for economic development and technological innovation.

Countries with relatively well-developed standardization capacities stand to gain the most from standards' ability to promote trade and technology transfer. A country with expert knowledge of standards and how to implement them will produce goods and services that can be exchanged with other countries, based on common recognition of international standards. The same logic applies to technology transfer. Standards lay out detailed plans for cutting-edge innovations or best practices, but knowledge of these standards and the ability to implement them as intended are preconditions for standards-enabled technology transfer.

ITU's 'bridging the standardization gap' programme

ITU has a longstanding commitment to improving opportunities for developing countries to develop and implement ICT standards, and is seeking to identify remaining standardization disparities and recommend actionable measures that can help to overcome them. To this end, ITU's Telecommunication Standardization Sector (ITU-T) has embarked on an ambitious effort to bridge the standardization gap between developing and developed countries.

The overarching goal of ITU-T's 'Bridging the Standardization Gap' (BSG) programme is to facilitate increased participation of developing countries in international standardization, to ensure that developing countries experience the economic benefits of associated technological development and to reflect the requirements and interests of developing countries in the standards-development process.

The 'standardization gap' is defined as disparities in the ability of developing countries, relative to developed ones, to access, implement, contribute to and influence international ICT standards, specifically standards developed by ITU (called 'Recommendations'). One of the main weaknesses identified by ITU studies assessing the standardization capabilities of developing countries was that participation by developing countries in international ICT standardization is hampered by a lack of understanding of the importance of ICT standards, which results in inadequate funding at the national level for standardization work and the coordination of a country's participation in international standards forums.

Two ITU reports are available on BSG: Measuring and reducing the standards gap[31] and ICT standardization capabilities of developing countries.[32]

ITU also developed guidelines[33] for developing countries to establish 'national standardization secretariats' in the interests of enhancing their contribution to international standardization activities.

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31 ITU-T Research Project: Measuring and Reducing the Standards Gap (2009), [Online], Available: https://www.itu.int/dms_pub/itu-t/oth/32/02/T32020000010001PDFE.pdf

32 ICT Standardization Capabilities of Developing Countries (2012), [Online], Available: http://www.itu.int/dms_pub/itu-t/oth/0B/1F/T0B1F0000013301PDFE.pdf

33 Guidelines on the Establishment of a National Standardization Secretariat for ITU-T (2014), [Online], Available: http://www.itu.int/en/ITU-T/gap/Documents/NSSGuidelines.pdf

4.3 Potential disadvantages of standards

Transfer of power to standardization participants

Allowing a group of companies to develop and agree on a standard (often a select group of companies, not reflecting every current and future implementer of the standard) carries the risk that the resulting standard will be advantageous to some, and less so to others. This can adversely affect the wellbeing of consumers as well as other producers by limiting product choice and diminishing rival companies' ability to compete. Similarly, the decision-making procedures of a standards-development process may be biased towards the interests of large producers or, sometimes, large buyers (e.g. government departments as buyers, or large telecommunication network operators).

Companies banding together to develop a standard effectively agree to implementing a common solution. In some cases, this can decrease competitive pressure to the extent that it diminishes the diversity of technical approaches available in favour of the agreed standard. In contrast, where standards are absent, companies may compete much more aggressively to win consumers over to their own platform.

Finally, participants in the standardization process willing to contribute their technology to a standards-setting effort are generally doing so on the basis of it being advantageous to their business model. It is certainly the case that a contributor may seek endorsement of their solution via international standardization with a view to their technology finding greater deployment and thus competitive advantage. Consider a company that has already made large investments in the deployment of a particular technology, for example, an interface for third-party products. Such a company would have a strong incentive to campaign for this interface's selection as an international standard – which raises the risk that companies participating in a standard's development will influence the process in a way that favours narrow commercial interests over those of the broader market. Further, certain companies whose business model includes the active monetization of their standard-essential patents also will have an interest in the standard's outcome.

Market protection and obstruction of market access

When countries set standards unilaterally, they can be used as a form of protectionism. Recognizing this potential for trade disputes, GATT member countries adopted the Technical Barriers to Trade (TBT) agreement in an effort to limit such uses of standards. According to the TBT agreement, governments cannot arbitrarily choose a standard: the choice of a standard must be supported by 'sound science' that confirms its ability to achieve a legitimate objective. The adoption of international standards largely avoids this problem, and the TBT agreement thus encourages countries to adopt international standards wherever appropriate. ISO, IEC and ITU, among others, facilitate international cooperation in standardization.

A market requiring that foreign companies comply with domestic standards can raise costs and deter market entry, a well-known example being the fragmented implementation of TV standards that slowed the growth of a global TV market. The US and Japan supported NTSC; SECAM was adopted in France, Greece, Eastern Europe and Russia; and PAL was used by the rest of the world.

Reluctance to adopt new or improved standards

In certain cases, the costs associated with migrating to a new standard may create a degree of inertia in its adoption, especially where the older standard has been widely implemented. This seems to be the case with the next-generation suite of IP standards, IPv6, where adoption has been slow despite

broad agreement that IPv6 take-up is necessary given the diminishing number of IPv4 addresses and that the new IP suite is technically superior to its predecessor. This is partly attributable to the fact that there is no clear benefit to being an early adopter, in that you can only use the new protocol once the people you communicate with have also upgraded. However, most commentators have steered clear of recommending government intervention, believing that IPv6 will steadily become more widely adopted. Governments, as major ICT users, are instead expected to play a strong role in leading implementations.

Loss of variety

The availability of widely deployed, successful standards may also result in a loss of variety, and here non-standards-based products are needed to serve a larger diversity of niche user groups. A standard will necessarily be built around the market's largest common denominator, and specific user groups may not find the feature set they are looking for – be it greater performance and versatility, or lower-cost products with more basic functionality.

Part II – General concepts of patent law and competition law

Introduction and objectives of Part II

Patent law, competition law and standardization systems are designed to support and incentivize innovation and technological progress.

The patent system rewards creativity, and patents can be used as a measure of the rate of innovation or knowledge accumulation. Inventions that meet the requirements of patentability are granted a temporary monopoly by giving innovators the right to exclude others from adopting and profiting from their inventions. In parallel, the publication of patents and patent applications are marks of the creation and further dissemination of new knowledge.[34] The patent system of today faces major challenges rooted in the proliferation of patents and its effects on backlog and uncertainty, the quality of patent searches and examinations, and certain strategic behaviour by patent owners.

Competition law discourages collusive or monopolistic market behaviour that adversely affects competition and innovation. Competition law encourages innovation by prohibiting market behaviour ('conduct') that restricts access to a market or otherwise negatively affects domestic or international trade. Competition law is built on three pillars: (1) prohibiting agreements, collaborations or practices between market players which may restrict free trading or competition between businesses; (2) prohibiting abusive conduct by a dominant market player; and (3) monitoring market concentration and mergers.

Standardization seeks to scale-up the benefits of an innovation, bringing experts together to codify best practices in the interests of encouraging widespread adoption. Standardization is a form of collaboration among competing market players, with potentially anti-competitive effects; however, competition authorities and courts agree that standardization provides significant benefits to competition and consumers by enacting economies of scale, interoperability and compatibility, greater choice and more affordable products. Given the risks attached to the collaboration of ordinarily competing interests, certain conduct is prohibited in a standards-setting context, such as discussions on product prices and pricing strategies, or allocations of business-sector or geographic market shares.

Upon completion of Part II, the reader should have a good understanding of:

- Patents and the requirements of patentability;
- The organization of the global patent system, and the challenges it is facing;
- The general rules and mechanisms in competition law; and
- How competition law is applied to standards-development processes and the inclusion of patents in standards.

[34] See, for example, Romer, P.M. (1986) 'Increasing Returns and Long-Run Growth', *Journal of Political Economy*, vol. 94, no. 5, October, pp. 1002-1037, Chicago, IL: The University of Chicago Press, [Online], Available: http://www.jstor.org/stable/1833190

5. General concepts of patent law

5.1 Objectives and scope of patent law

Generally speaking, the patent system is designed to encourage technological innovation by rewarding intellectual creativity. It is society's formal mechanism that provides creators of technical inventions with the possibility of receiving just reward for their time, money and expertise invested in achieving an advance deserving of a patent.

The patent system is based on the premise that innovators are more likely to invent, and disclose their knowledge to the public, if supported by a system that assures an innovator the right to exclude others from exploiting the invention for a limited period of time. Patents thus secure their owners the right to exclude others from making, using, selling or importing an invention, typically for a period of 20 years. Society at large benefits from the granting of patents through the publication and dissemination of the specifics of a patented invention.

The patent system is a social contract or *quid pro quo* between the applicant and society at large. To incentivize research that yields breakthroughs of great value to society in the long run, patents award innovators exclusive rights to profit from the commoditization of an invention in the short run.[35]

An invention must meet certain requirements in order to obtain a patent. For example, it must be new (novel), involve an inventive step (non-obvious), and be capable of industrial application. In general, an invention is considered new if it does not form part of the 'state of the art', a term describing in most countries everything known or used by the public, in any way, anywhere in the world, before the date of filing a patent-application. An invention is considered to involve an inventive step if it is not obvious to a skilled person (usually in that particular technical field) with knowledge of the state of the art. The evaluation of whether an invention is new and not obvious occurs by comparing the invention with other inventions already known at the time (e.g. as set out in other patent applications or in technical publications, or by looking at products already on sale). These inventions are referred to as "prior art".

Many countries have adopted specific exclusions to patentability, prohibiting the award of patents for advances such as discoveries of substances, plants or animals already existing in nature, or developments and proofs of scientific or mathematical theories. However, with rare exceptions, all forms of innovation are eligible to be patented, if they are found to meet the requirements of patentability.

A patent can serve very different purposes, depending on its holder's objectives. Patents can be used to preserve patent holders' market dominance by preventing competitors from adopting patented inventions. Conversely, patents can also be licensed to third parties to encourage the adoption of

[35] While not every invention (or patent) is necessarily the result of costly research, inventions are more often than not the results of systematic investment in R&D. It is not surprising, then, that studies systematically find a positive link between patent activities and performance of companies and countries. See, for example – Organisation for Economic Co-operation and Development (OECD) (2009) *Patent Statistics Manual,* [Online], Available: http://browse.oecdbookshop.org/oecd/pdfs/free/9209021e.pdf – which mentions various studies that find an increased correlation between patents and companies' R&D performance ratings.

inventions, or used to facilitate access to third-party patents through mechanisms such as cross-licensing arrangements. In addition, large patent portfolios are often used for defensive purposes, protecting owners from potential patent-infringement lawsuits stemming from their use of competitors' intellectual property.

5.2 Four challenges of the patent system affecting the standardization ecosystem

Criticism of the patent system's shortcomings has grown, calls for reform have arisen[36] and increased attention is being paid to the patent system's potentially negative side-effects on technological progress and socio-economic welfare.[37]

Proliferation of patents and the effects on backlog and uncertainty

Modern national patent offices were established between the late 18th and 19th centuries. The number of patent applications received and patents granted by such offices has fluctuated over time but, for the most part, the growth rates of patent grants remained relatively stable until the 1980s, a decade in which growth rates began to dwarf those observed in the past.

Figure 5-1 offers an illustration of the rising number of patent applications received and patents granted by the US Patent and Trademark Office (USPTO). A range of possible explanations for these exponential growth rates have been put forward, attributing them to the growth of international trade, globalization of production chains, greater international collaboration in R&D, and the ever-increasing speed of technological innovation in developed and developing countries alike.[38]

Others, however, emphasize that institutional changes and developments in jurisprudence – which have improved the position of patent owners in terms of the likelihood of their winning patent-infringement lawsuits – are important reasons for this intensification of claims to intellectual property.[39]

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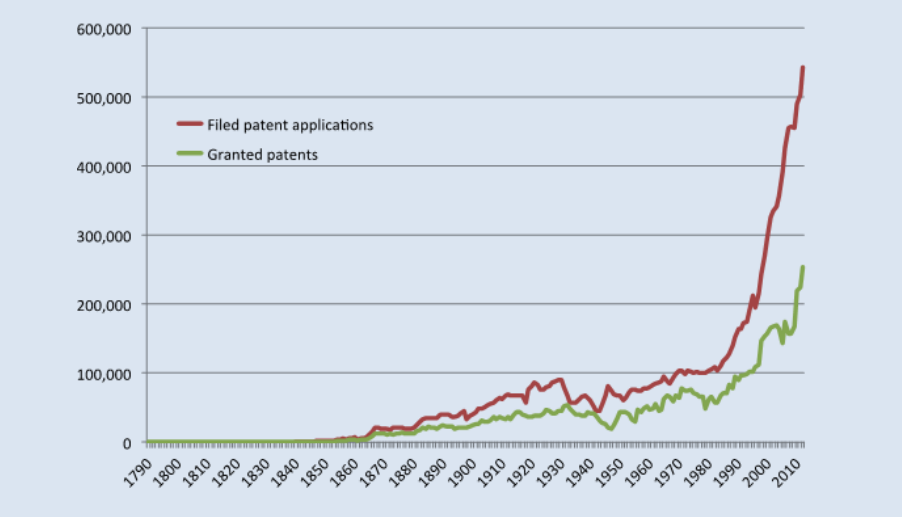
[36] European Patent Organisation (EPO) (2007) *Scenarios for the future: How might IP regimes evolve by 2025? What global legitimacy might such regimes have?*, [Online], Available: http://www.epo.org/news-issues/issues/scenarios/download.html; U.S. Federal Trade Commission (FTC) (2011) *The Evolving IP Marketplace: Aligning Patent Notice And Remedies With Competition*, [Online], Available: http://www.ftc.gov/os/2011/03/110307patentreport.pdf

[37] Examples of well-known critiques include Jaffe, A. B. and Lerner, J. (2006) *Innovation and Its Discontents: How Our Broken Patent System is Endangering Innovation and Progress, and What to Do About It*, Princeton, NJ: Princeton University Press; Bessen, J. and Meurer, M. J. (2008) *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk*, Princeton, NJ: Princeton University Press; and, Boldrin, M. and Levine, D.K. (2008) *Against Intellectual Monopoly*, Cambridge: Cambridge University Press.

[38] World Intellectual Property Organization (WIPO) *World Intellectual Property Indicators 2012*, [Online], Available: http://www.wipo.int/ipstats/en/wipi/index.html

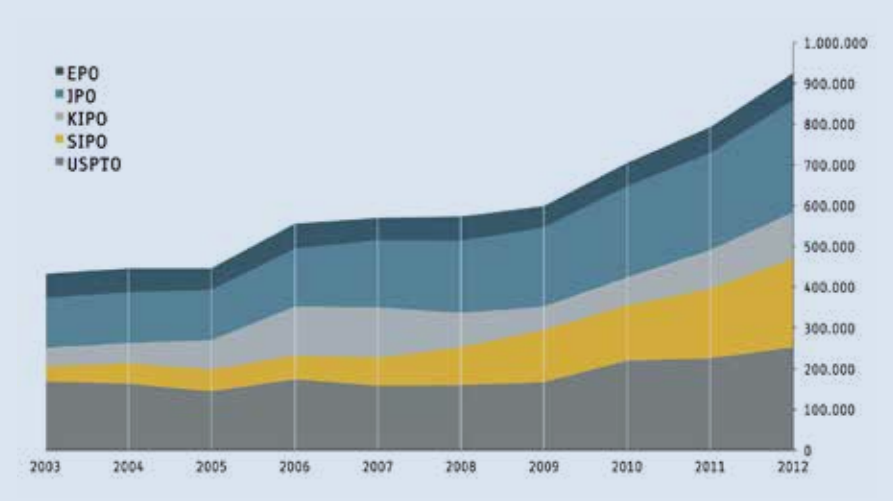
[39] See, for example, Jaffe and Lerner (2006), *op cit*.

Figure 5-1 – Number of patent applications received and patents granted by the US Patent and Trademark Office, 1790-2010 [40]



Unprecedented growth rates began to take hold in the 1980s and have been sustained into the new millennium. As shown in Figure 5-2, from 2003 to 2012 the total number of patents granted by the world's five largest patent offices almost doubled, rising from 500 000 to 924 000.

Figure 5-2 – Annual number of patents granted by the world's five largest patent offices [41]



[40] United States Patent and Trademark Office (USPTO), *U.S. Patent Activity Calendar Years 1790 to the Present: Table of Annual U.S. Patent Activity Since 1790*, [Online], Available: http://www.uspto.gov/web/offices/ac/ido/oeip/taf/h_counts.htm

[41] fivelPoffices (2013) *2012 key IP5 statistical data*, [Online], Available: http://www.fiveipoffices.org/stats/keydata.pdf

This growth of patent applications has added to the workload of patent offices, creating backlogs of unprocessed applications which often span years.[42] These backlogs create uncertainty, acting to the detriment of patent applicants as well as potential competitors unsure as to whether or not they have the 'freedom to operate' in the field in question. The longer the patent search and examination process, the longer the pendency of patent applications, thus affecting the amount of time organizations might have to delay important business decisions.

The sheer scale of the number of patents and patent applications worldwide has introduced considerable challenges in the identification of patent infringements,[43] and concerns have been expressed that large numbers of patents in a market might create 'patent thickets' that create barriers to market entry or the commercialization of new products.

Quality of patent searches and examinations

The proliferation of patent applications has led to concerns around the quality of patents granted. A high-quality patent-search and examination process is essential to ensure that exclusive rights to profit from an innovation are only granted for genuine inventions, *i.e.* inventions that are new and contain an inventive step.[44]

As an example, only half of the patent applications filed with the European Patent Office (EPO) are granted, with the other half either refused or withdrawn during the examination process. Of the patents granted, approximately half have their scope reduced by EPO.

High-quality patent searches and examinations act to reduce patent thickets at source, maximize the transparency of the patent system and reduce the number of patents that will later be subject to invalidation. Decreasing the pendency of patent applications is also critical in providing indications as to the likelihood of an innovation being awarded a patent, especially to inform the strategic decisions of market players active in high-tech industries characterized by shortening product lifecycles.

Access to the appropriate 'prior art' in any particular field, described by both patent-related and non-patent-related literature, is an essential part of ensuring high-quality patent grants. Determining the most relevant prior art with which to compare an application for a new patent – in the examination of a patent's credentials in terms of novelty and inventive step – poses another significant challenge to the patent system in that the quantity of relevant prior art continues to increase exponentially.

Patent thickets

The proliferation of patent applications and corresponding approval procedures has stimulated enormous growth in the number of patents granted, and this is especially true for the ICT sector. Carl Shapiro, a leading US academic, wrote in 2001, *'... thoughtful observers are increasingly expressing concerns that our patent (and copyright) system is in fact creating a patent thicket, a dense web of*

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42 By November 2013, the USPTO had an average backlog of over two-and-a-half years, according to USPTO *Data Visualisation Center Patents Dashboard*, [Online], Available: http://www.uspto.gov/dashboards/patents/ main.dashxm. The USPTO is definitely not the only national patent office with a long backlog of applications. In addition, the actual backlog per technology area tends to vary considerably; in some areas it might be twice as long as the average.

43 See Bessen and Meurer (2008), *op cit.*

44 As mentioned above, other requirements must also be met in order to obtain a patent.

overlapping intellectual property rights that a company must hack its way through in order to actually commercialize new technology'.[45]

Patent thickets emerge as a consequence of the fact that advances in technology are often founded on numerous prior innovations deemed patentable by patent offices' application of the standards of obviousness. For every patent application received, a patent office must determine whether or not the patent application describes an improvement over the prevailing state of the art significant enough to merit the protection afforded by a patent. The lower the burden of proof in relation to improvements over the state of the art, the greater the number of patents granted resulting in increases in the density of patent thickets. However, refusing patent protection to novel inventions may discourage innovation by denying inventors the benefits of exclusivity that patents confer. Patent thickets are especially prevalent in 'complex' industries in which cumulative innovation processes typically result in products covered by numerous patents.

Non-practising entities and patent trolls

The term 'non-practising entity' (NPE) refers to any organization that holds a patent but does not practise it in any of its own products or services. The term therefore describes a wide range of patent owners, including research universities and public research laboratories. Many of these organizations are highly inventive. In addition, many private firms conduct advanced research but do not develop products or services, instead relying on revenue generated by granting others licences to patents resulting from their research. Here, the patent system allows for the creation of 'markets for technology', and this contribution of public and private research organizations to technological advance is very welcome in that their specialization may lead to higher levels of innovation.

However, when used in the context of policy discussions, the term NPE sometimes refers to organizations that have less noble objectives, to the extent that they are often termed 'patent trolls' (or 'patent assertion entities'). Some patent trolls exercise patents that they have earned, but it is more common that they simply acquire patents on the patent market. The primary business model of such an organization consists of threatening to enforce their patent rights against alleged infringers, in an attempt to extort licensing fees.

Patent trolls take advantage of the prohibitively high costs incurred by defendants in patent-infringement lawsuits, as well as the business risks associated with having to modify a product or withdraw from a market as a result of a successful patent-infringement lawsuit. In fact, legal procedures against alleged patent infringers are often instituted only after products have been brought to market, forcing companies found guilty of patent infringement to face the extensive switching costs mandated by court decisions that deny them the right to use the patented technology. Companies targeted in this manner might decide to settle out of court and pay licensing fees, even if the asserted patent is of a low-enough quality to risk being declared invalid in court.

President obama on patent trolls

"The folks that you're talking about are a classic example; they don't actually produce anything themselves. They're just trying to essentially leverage and hijack somebody else's idea and see if they can extort some money out of them."

US President, Barack Obama, 2013 [46]

[45] Shapiro, C. (2001) 'Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting', in Jaffe, A., Lerner, J. and Stern, S. (eds.), *Innovation Policy and the Economy Vol. 1*, National Bureau of Economic Research (NBER), [Online], Available: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=273550

5.3 Other forms of intellectual property rights relevant to standardization

Patents are the most relevant form of intellectual property right (IPR) in the standardization context, but other issues arise from the inclusion of copyrighted software or trademarks in standards.

Characteristics of copyright

Copyright is a bundle of rights designed to protect literary and artistic works. The aim of copyright is to promote creativity in diverse areas such as science, culture and the arts by offering rewards to creators of original works. The balance between fostering creativity and enabling access to works is achieved through several mechanisms, including limiting the period of time of economic rights and implementing limitations and exceptions provisions.

Although international instruments aim to harmonize and establish a global minimum standard of copyright protection, copyright remains territorial in nature, with countries each establishing their own copyright systems and associated limitations and exceptions applying to various types of works for which copyright can be granted.

Works eligible for copyright protection are all, as a rule, original intellectual creations. National copyright laws contain non-exhaustive, illustrative enumerations of these types of works, and such lists often include books, films, computer software, photographs and musical works. A work must be an original creation in order to obtain copyright protection, which will protect the form of expression, but not the ideas used as a basis for that work.

There are two aspects to copyright, namely economic rights and moral rights. Economic rights protect the financial interests of an original work's creator, whereas moral rights aim to protect the intellectual and non-financial interests of a work's creator, for example, by offering a legally enforceable guarantee that a work will not be misrepresented by others as their own.

The most widely recognized economic right under copyright is the exclusive right of reproduction, which allows the copyright owner to prevent others from making and benefiting from copies of an original work without permission.

Characteristics of trademarks

A trademark is a sign capable of distinguishing the goods or services of one enterprise from those of another. The main function of a trademark is to enable consumers to identify products (whether goods or services) as attributable to a particular company, thereby distinguishing a company's products from identical or similar products offered by competitors.

Trademarks also provide incentive for companies to invest in maintaining or improving the quality of their products, in an effort to ensure that their trademarks continue to symbolize high quality. Trademark registration, under relevant trademark law, gives companies the exclusive right to prevent others from marketing identical or similar products under the same name or a mark so similar to the protected trademark that it confuses consumers. Trademark protection is usually achieved through trademark registration, although in some countries it can also be obtained through use.

[46] Sternberg, A. (2013) Obama acknowledges patent troll problem (w/transcript), Project DisCo (Disruptive Competition), [Online], Available: http://www.project-disco.org/intellectual-property/021413-obama-acknowledges-patent-troll-problem-w-transcript/ [14 February 2013]

6. General concepts of competition law

6.1 Objectives and scope of competition law

Competition law, also referred to as 'antitrust' or 'anti-monopoly' law, is a form of market regulation that aims to create a competitive business environment through the prohibition of conduct that restricts access to a market or otherwise negatively affects domestic or international trade.

The primary objective of competition law is to protect consumers by promoting and maintaining a market environment where businesses can compete on a level playing field. Increased competition among suppliers gives customers greater choice, which, in turn, prompts suppliers to innovate and enhance their productivity and efficiency in order to offer better products or services at competitive prices.

Competition as a means to promote innovation

"Competition is also essential to promote innovation. Firms facing competitive rivals innovate more than monopolies (although after such competition a firm may of course end up with a monopoly through a patent). Competitive mechanisms can even help deliver on other strategic objectives, like environmental or health benefits. It all depends on good design. If companies are rewarded for producing the things we value, competition between them gives them the incentive to do so still better. Equally, if markets reward bad behaviour, then companies will behave badly."

Angel Gurría, OECD Secretary-General, 27-9-2013 [47]

Competition legislation provides a legal framework that limits market players' ability to benefit themselves at the expense of the efficiencies gained in free trade. Business naturally acts in self-interest, and the difficult task of distinguishing anti-competitive behaviour from competitive behaviour requires a legal regime, often including expert law enforcement agencies or regulators that monitor market participants and enforce competition laws against suspected violators. Increasingly, competition laws empower private citizens who believe that they have been injured by violations of competition laws to seek judicial redress.

Signs of competition regulation can be traced as far back as the Roman Empire and the Middle Ages, but competition rules as we know them today were first enacted in Canada and the US[48] at the end of the 19th century when state authorities outlawed market behaviour in which large companies cooperated with rivals (forming 'cartels') to fix outputs, prices or market shares.

The adoption of competition laws has increased over the past three decades. Today, most nations have both competition laws and national competition regulators. Competition law varies across jurisdictions, both in terms of the law's substance and of the procedures involved in its administration. Some government systems provide for multiple levels of enforcement, at the national level as well as the sub-national level, for example in states or provinces. In Europe, the European Union forms a supra-national level of enforcement.

47 Remarks by Angel Gurría, OECD Secretary-General, at *The Future Ain't What it Used to Be - 20 Years of Competition Law and the Challenges Ahead*, Reykjavík, Iceland, 17 September 2013, [Online], Available: http://www.oecd.org/competition/20-years-of-competition-law-and-the-challenges-ahead.htm

48 This so-called 'Sherman Antitrust Act', adopted in 1890, was the first U.S. federal statute to limit cartels and monopolies and still forms the legal basis for a significant portion of US competition enforcement at a federal level. Although its reference to 'trusts' seems somewhat anachronistic today, it should be kept in mind that at the time of its adoption 'trusts' were a very popular way for the industrialists of that era to maintain a monopoly or to create cartels.

In some countries, a violation of competition legislation amounts to a criminal offence. In addition to government enforcement, usually performed through dedicated competition regulators or authorities, some countries permit their competition laws to be enforced through lawsuits initiated by private parties. For example, in a situation where a group of competitors colludes to create artificially high prices, a customer might sue to recover the amount overcharged during the period over which the pricing agreement was in force. Despite trends towards private enforcement of competition laws, countries allowing it remain in the minority.

International or intergovernmental organizations – such as the United Nations Conference on Trade and Development (UNCTAD) and the Organisation for Economic Co-operation and Development (OECD) – have published recommendations outlining sets of principles that developing countries can apply as tools to build competitive markets,[49] also encouraging collaboration among countries in the field of competition law to promote the convergence of different regulatory systems. National competition regulators around the world have formed an informal collaborative network to coordinate their enforcement of competition laws.[50] Organizations such as WTO continue to examine the interaction between competition laws and international trade.[51]

Competition law and its associated monitoring and enforcement activities serve three main purposes: 1) prohibiting agreements, collaborations or practices between market players which may restrict free trading or competition between businesses; 2) prohibiting abusive conduct by a dominant market player; and 3) monitoring market concentration and mergers.

Prohibiting agreements, collaborations or practices between market players which may restrict free trading or competition between businesses

Competitive markets afford all players fair opportunity to pursue increases in market share, incentivizing innovation and keeping prices competitive. Agreements, arrangements or practices between competitors which substitute the risk of competition with the comfort of cooperation[52] are considered potentially harmful to competition and efficient economic activity.

Agreements encompass formal contracts or arrangements between market participants, as well as concerted practices or other informal 'gentlemen's agreements'. In certain scenarios, competitors' sharing sensitive commercial information can amount to anti-competitive behaviour. Other examples of agreements able to restrict or distort competition include collaboration aimed at price-fixing, or limiting or controlling production outputs or technical development to the benefit of a select group of businesses. These agreements could be horizontal, agreed between competitors, or vertical, agreed between companies at different levels of the value chain.

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49 United Nations Conference on Trade and Development (UNCTAD) (2000) *The United Nations Set of Principles and Rules on Competition*, [Online], Available: http://r0.unctad.org/en/subsites/cpolicy/docs/cpset/rbpc10rev20en.pdf; and OECD *Competition*, [Online], Available: http://www.oecd.org/competition/

50 International Competition Network: http://www.internationalcompetitionnetwork.org/

51 World Trade Organization (WTO) *Interaction between Trade and Competition Policy*, [Online], Available: http://www.wto.org/english/tratop_e/comp_e/comp_e.htm

52 European Court Justice (Fifth Chamber) (31 March 1993) *A. Ahlström Osakeyhtiö and others v Commission of the European Communities*, Joined cases C-89/85, C-104/85, C-114/85, C-116/85, C-117/85 and C-125/85 to C-129/85, *European Court reports (1993)*, pp. I-01307, para.63, [Online], Available: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:61985J0089%2801%29:EN:HTML .

Prohibiting abusive conduct by a dominant market player

Anti-competitive conduct by a company with significant market share or market power, and thus increased influence over market direction, could have far-reaching consequences for competition. A dominant market player leveraging its market position to retain dominance can pose a threat to competition and consumer welfare.

Examples of such anti-competitive practices include: excessive pricing, overcharging customers by exploiting the absence of alternative products; predatory pricing, selling below cost in order to drive competitors out of a market[53]; product tying, making the sale of one product a condition for the sale of another; and boycotting, refusing competitors access to facilities essential to business in a particular market.

It is not dominance or monopoly that competition law prohibits, but rather the abuse of that dominance by engaging in certain anti-competitive practices. Opportunity to gain greater market share and revenue is a key incentive to innovation, and competition law seeks to ensure that market share is gained or preserved through legitimate business practices.

Monitoring market concentration and mergers

Merger control laws and regulations aim to prevent any anti-competitive consequences arising from concentrations in the market, caused for instance by company mergers and acquisitions that confer collective market dominance on the companies involved. The basic premise behind these regulations is that market pluralism allows for competition between companies, and hence greater choice and more affordable products on offer to consumers. Market concentration, in contrast, has the potential to allow a monopoly or oligopoly of a small group of companies to abuse their dominant market positions to harm competition, reduce choice or increase prices, among a range of other effects to the detriment of consumers. Horizontal or vertical in relation to the value chain, mergers include competitors uniting in common purpose or buyers and suppliers conjoining their business operations to gain efficiency. Competition law often requires that significant, large-scale mergers – in terms of participants' market shares, the geographical area affected, or the nature of the participants' business – be accompanied by a notification to and clearance by one or more competition regulators. The 'clearance' for a merger granted by a regulator is often subject to certain 'commitments' or 'remedies' that the merging entities are required to undertake. These can include both 'structural remedies', such as requirements to divest part of a company formed through a merger or acquisition, and 'behavioural remedies', such as those that aim to ensure that certain fundamental facilities remain open to dominant companies' competitors.

[53] While excessive pricing is a concern when potential competition (like market entry by other firms) is unlikely, predatory pricing is more of a concern when potential competition is likely.

Google's acquisition of Motorola Mobility

An example of an intercontinental merger is Google's acquisition of Motorola Mobility. In 2011, a couple of months after Motorola Mobility's spin-off into an independent entity (focusing on the manufacture of mobile phones and tablets), Google announced that it would acquire the company, subject to regulators' approval. The proposed acquisition warranted analysis under merger control legislation, taking into account the size of the two companies and their positions in the markets concerned.

The analysis looked at whether Google would have the ability and incentive to prevent Motorola's competitors from using the Android platform, as well as the value of Motorola's considerable patent portfolio (which includes numerous patents that are essential to ICT standards) and the potential effect on competition should Google assert Motorola IP assets aggressively.

The proposed merger was cleared by regulators as Android helps Google to profit from its other services and it was therefore considered unlikely that Google would restrict the platform solely to Motorola devices. The threat of restriction of competition through abusive assertion of Motorola's patents was considered limited, given that Google also assured regulators that it would honour Motorola's prior commitments to license any standard-essential patents (SEPs) on reasonable and non-discriminatory (RAND) terms.

6.2 Competition law in a standards-setting context

Standards are developed by formal or quasi-formal bodies such as SDOs, forums and consortia. The memberships of these bodies comprise market participants that work together to develop and reach agreement on technical standards. In theory, this could be seen as an agreement, collaboration or practice between competitors that distorts competition - a form of collusion that competition law aims to prevent.

Competition authorities and courts have a different view, repeating in a large number of cases that standardization provides significant stimulus to innovation, substantial efficiency gains and benefits to consumers, by underpinning the interoperability and compatibility of different manufacturers' products, reducing transaction costs and encouraging the achievement of economies of scale.

Agreements among market participants that lead to the creation of new standards, though not exempt from scrutiny within the bounds of competition law, do not normally raise any concerns in relation to anti-competitive behaviour.

Despite the many acknowledged benefits of standardization, standards might in some circumstances, depending on their scope and the intentions of participants in standards development, '*[give] rise to restrictive effects on competition by potentially restricting price competition and limiting or controlling production, markets, innovation or technical development*'.[54]

[54] EC (2011) *Communication from the Commission - Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements*, para. 264, [Online], Available: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52011XC0114(04):EN:NOT

Competitors gathered in a standardization expert group could share confidential information regarding IPR licensing practices, product prices or levels of planned production outputs. Divulging or exchanging business-sensitive information within standards-setting activities could potentially constitute collusion with respect to product prices or other concerted business practices prohibited by competition law (such as the coordination of planned production outputs, or allocating market shares in a way that intentionally limits competition). This conduct would clearly exceed the intended scope of a standards-development process, which is confined to developing and agreeing technical specifications.

With the exception of cases in which participants abuse the standardization process in such a way as to affect competition adversely, competition regulators note that the pro-competitive effects of standardization generally outweigh potential limitations to product diversity emerging as a result of standardization, regardless of whether or not participants enjoy significant collective market share. In the European Union, for example, the European Commission asserts that standardization effects working to restrict competition are very unlikely to occur in the absence of market power (that is, where there is effective competition among a number of voluntary standards of related subject matter). Even in situations where an agreed standard comes to dominate a market as a result of its widespread adoption, such an agreement would not raise concerns around threats to competition if the following non-exhaustive benchmarks are met:[55]

- Participation in the standards-development process is unrestricted, with all interested competitors being allowed to participate in the process that leads to the agreement of standards
- The procedure to agree or approve standards is transparent and, if possible, selected according to objective criteria
- Standardization agreements do not create any obligation to comply with a standard and all participants and implementers remain free to develop and/or use alternative standards
- The standard remains accessible to every implementer on royalty-free or otherwise reasonable and non-discriminatory (RAND) terms. This is usually stipulated by an SDO's 'IPR or patent policy', which will require that patent owners wishing to have their patents included in a standard make irrevocable commitments, prior to the agreement or approval of a standard, that they will grant third parties licences to the patents in question on RAND terms.

Competition regulators support standardization in line with observations that standards are commonly developed and agreed within standards bodies that adhere to procedures meeting the aforementioned criteria. In fact, today's standardization ecosystem relies largely on 'open standards', the requirements of which mirror the suggestions of regulators as to the standardization environment that creates pro-competitive effects.

[55] *ibid,* paras. 280-286. The Commission notes that even the non-fulfilment of any or all of these conditions will not lead to a presumption of restriction on competition, but it will necessitate a case-by-case analysis of whether such a restriction is indeed caused by the agreement (para.279).

Antitrust guidelines in formal SDOs

To prevent their members from violating competition law, many SDOs and consortia have published guidelines or handbooks that inform their participants of the behaviour allowed or not allowed in their standards-setting activities. The ETSI Guidelines for Antitrust Compliance, for instance, include the following text: [56]

'Discussions, communications or any other exchange of information in all ETSI meetings, on the edge of all ETSI meetings (e.g.: informal discussions, social gatherings, corridor talks etc.) as well as during any activity in ETSI should not have as their subject matter the following topics, discussion of which (among other things) is prohibited by competition law:

- *pricing strategies or product pricing,*
- *terms and conditions of sale including discounts and allowances, credit terms, etc.*
- *production levels or capacity,*
- *limitation of technical development or investment,*
- *allocation of sales territories, markets or customers,*
- *market shares,*
- *submitted bids or intentions to bid,*
- *preventing anybody from gaining access to any market or customer for goods and services,*
- *refusals to deal or do business with competitors, vendors or suppliers and*
- *ongoing litigation or threatened litigation.*

Even the appearance of any discussion, communication or exchange of information that appears to be leading to restraints on competition of any kind should be carefully avoided.'

7. Interplay between patent law and competition law

7.1 General treatment of patents under competition law

At first glance, it might appear that patent law and competition law are at cross-purposes. Intellectual property laws protect the exclusive rights of an innovator to the benefits stemming from an invention. Patent law can thus pose legal barriers to third parties' use of protected inventions and, in this sense, intellectual property rights can serve to restrict free-market competition.

However, the two bodies of law are not as mutually opposed as they might first appear. The exclusive rights held by the owner of a valid patent do not necessarily confer on the patent holder a strong market position, and, in practice, there is often strong competition among market players responsible for numerous patented innovations and the products that embody them. Intellectual property law and competition law thus share the aim of creating a regulatory environment that promotes innovation and economic development, rewarding innovators and protecting market competition.

[56] European Telecommunications Standards Institute (ETSI) (2011) *ETSI Guidelines for Antitrust Compliance, Version adopted by Board* #81, 27 January, [Online], Available: http://www.etsi.org/images/files/IPR/etsi%20guidelines%20for%20antitrust%20compliance.pdf

The economic relationship between competition, patents and innovation is complex, but economic theory suggests that the effects of competition on patent applications is dependent on the strength of competition in a market. The proposition is that strong competition creates more incentive for competitors to innovate and seek protection for the product of that innovation through patent filings. There are many more factors at play in this relationship, but competition having the effect of stimulating innovation and patent filings seems to hold true for the ICT industry. Patents awarded in relation to ICTs – such as networking technologies, information processes, telecommunications, semiconductors and computer systems – have accounted for nearly 40 per cent of all US patents granted over the past decade.[57]

The relationship between ipr and competition policy

"In our view, antitrust law and policy should be careful not to constrain the legitimate exercise of intellectual property rights. We need to ensure that the application of antitrust laws does not illegitimately stifle innovation and creation by condemning pro-competitive activities that would maximize incentives for investments or efficiency-maximizing business arrangements."

Makan Delrahim, Deputy Assistant Attorney General, Antitrust Division, US Department of Justice

The interplay between competition law and intellectual property rights is beyond the scope of this publication, but a few underlying principles should be kept in mind:

As a general rule, the exercise of intellectual property owners' rights to exclude others from using their patented innovations should not raise concerns under competition law. Regulators and courts have often confirmed, for example, that the enforcement of intellectual property rights does not, as such, constitute an abuse of a dominant market position.[58] Competition law, in parallel, generally avoids stipulations that compel owners of valid patents and copyrights to license them to competitors where they have previously refused to do so.

With respect to the contractual terms of licensing agreements, the views of regulators share a common denominator in the understanding that most IPR licensing agreements are pro-competitive and enhance economic development.[59] Competition regulators in major jurisdictions have issued guidelines in which they describe the details of their policies as regards IPR licensing agreements between competitors.[60]

Abuse of the IPR system can constitute behaviour prohibited by competition law in the context of efforts to leverage the power of valid intellectual property rights to maintain or extend a dominant market position. Competition law thus often provides that, if intellectual property rights confer on their owners market dominance, this dominance should not be abused by forcing licensees to purchase

[57] U.S. National Science Board (2012) 'Chapter 6: Industry, Technology, and the Global Marketplace', *Science and Engineering Indicators 2012*, [Online], Available: http://www.nsf.gov/statistics/seind12/c6/c6s4.htm

[58] The U.S. Supreme Court in *Trinko* noted, for example, that "[t]o safeguard the incentive to innovate, the possession of monopoly power will not be found unlawful unless it is accompanied by an element of anticompetitive conduct," *Verizon Communications Inc. v. Law Offices of Curtis V. Trinko*, LLP 540 US 398 (2004) 305 F.3d 89

[59] For example, the U.S. Department of Justice (DoJ) and Federal Trade Commission (FTC) guidelines note that "*intellectual property licensing allows firms to combine complementary factors of production and is generally procompetitive*." U.S. DOJ and FTC (1995) *Antitrust Guidelines for the Licensing of Intellectual Property*, [Online], Available: http://www.justice.gov/atr/public/guidelines/0558.htm;

[60] For example, the U.S. DOJ and FTC (1995) *Antitrust Guidelines for the Licensing of Intellectual Property*, *op. cit.*; the Japan Fair Trade Commission (2007) *Guidelines for the Use of Intellectual Property under the Anti-Monopoly Act*, [Online], Available: http://www.jftc.go.jp/en/legislation_gls/imonopoly_guidelines.files/070928_IP_Guideline.pdf; *Commission Regulation (EU) No 316/2014 of 21 March 2014 on the application of Article 101(3) of the Treaty on the Functioning of the European Union to categories of technology transfer agreements* [Online], Available: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.093.01.0017.01.ENG; EC (2014) *Guidelines on the application of Article 101 of the Treaty on the Functioning of the European Union to technology transfer agreements* [Online], Available: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C:2014:089:FULL&from=EN

or license additional non-protected products, services or technologies as a condition of licensing the market-dominant intellectual property. This could be the case in situations described as 'tying', i.e. making the purchase of a product or service a mandatory addition to the purchase of another product or service. In exceptional circumstances, a refusal to license IPR indispensable to others' participation in a market could constitute an abuse of a dominant position. A potential remedy in this scenario would be a court decision that mandates the licensing of such IPR on terms consistent with the requirements of competition law. This could arise if a refusal to license IPR prevents market entry by new products or services for which there is consumer demand, and such practices could also be viewed as attempts by IPR holders to limit production and output, in itself a severe violation of competition law. However, before such behaviour can be considered anti-competitive it must meet a number of specific conditions elaborated in case law.[61]

7.2 Anti-competitive conduct involving standard-essential patents

Standard-essential patents (SEPs) are patents that must be licensed in order to implement a given technical standard. Unlike non-SEPs, by definition it is not possible to work around a SEP and still implement the standard. As noted by competition authorities, owning a SEP may confer market power.[62]

SEPs are very relevant to ICT standardization in that many standards are based on technologies protected by a wide range of patents. As SEPs are indispensable to the implementation of standards, a third party wishing to develop standards-compliant products would have to negotiate licences to any SEPs present. This requirement is a potential obstacle to deployment of a standard, given the inherent monopoly rights conferred by patent law on owners of SEPs (granting them the ability to exclude third parties from using the patented technologies, which would prevent their competitors from implementing standards).

Widespread deployment of standards depends on the existence of mechanisms that offer all industry participants, whether standards developers or implementers, an assurance that the patent-protected technologies incorporated in a standard will be made available to all interested parties, and that SEP owners cannot obtain an unfair competitive advantage as a result of having their patents included in a standard. It has thus become an established practice for standards bodies to require that, when contributing patented technologies to a standard's development, patent owners commit to licensing their SEPs to standards implementers on royalty-free or reasonable and non-discriminatory licensing terms (so called 'RAND' terms).[63] In this sense, RAND commitments incentivize the inclusion of sophisticated patented technology in standards, while also working to ensure that standards remain open to all industry participants, regardless of whether or not they are members of the corresponding standards bodies.

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61 These circumstances were further elaborated by the European Court of Justice in the *Magill* (Joined cases C-241/91 P and C-242/91P, ECR [1995] I-0743]) and *IMS* (C-418/01, *IMS Health* [2004] ECR I-5039) and *Microsoft* (T-167/08) cases, and include the following: (i) the refusal to license must relate to a product or service indispensable to the exercise of a particular activity on a neighbouring market; (ii) the refusal to license must be of such a kind as to exclude any effective competition on that neighbouring market; (iii) the refusal to license must prevent the appearance of a new product for which there is potential consumer demand; and, (iv) the refusal to license must not be objectively justified.

62 While merely having a patent does not necessarily confer market power, the European Commission's Directorate-General for Competition has held that "[i]t suffices to stress that market power can be conferred by a single SEP" when the standard constitutes a barrier to entry. See EC (2012) *Case No. COMP/M.6381 Google/Motorola Mobility, Regulation (EC) No. 139/2004 Merger Procedure,* [Online], Available: http://ec.europa.eu/competition/mergers/cases/decisions/m6381_20120213_20310_2277480_EN.pdf .

63 The RAND commitment is further discussed in Part III.

In light of the importance of RAND commitments as safeguards to the implementation of a standard, it follows that any acts or omissions by SEP owners that disregard such commitments could possibly bear anti-competitive consequences.

More specifically, threats to competition might arise as a result of attempts by SEP owners to circumvent RAND commitments in order to serve their strategic interests. Such strategies could entail participants in the standards-development process deliberately failing to disclose their SEPs during a standard's development phase, or manipulating the process by "secretly" filing patent applications for innovations covered by a nascent standard. These are sometimes referred to as 'patent ambush' strategies, and generally considered anti-competitive. If a standard incorporating hidden patents is adopted, SEP owners having avoided RAND commitments could use non-declared SEPs to extract excessive royalties from implementers (over and above those provided for by RAND), or even to prevent certain third parties from implementing the standard. Practices of this kind undermine the openness and accessibility of standards and distort competition by creating significant barriers to market entry.

To disclose or not to disclose?

In 1996, the US Federal Trade Commission filed an administrative complaint against Dell Computer Corporation, alleging that it had unlawfully restricted competition by failing to disclose patents essential to the VESA Local Bus standard (a computer bus carries information between the computer's central processing unit and the computer's components and peripheral devices).

VESA (the SDO) had approved the standard, a Dell representative participating in the standard's development having assured the SDO that, to the best of their knowledge, the standard did not cover any patents owned by Dell. Once the standard was approved and widely implemented in the market, Dell announced that it owned an SEP on the standard (granted in 1991) and sought to enforce it aggressively.

The FTC noted that the specific SDO had adopted 'affirmative disclosure requirements' and that these requirements had not been met by Dell's representative whose failure to disclose allegedly was 'not inadvertent'. It also noted that the SDO would have implemented a 'different, non-proprietary design, had it been informed of the patent conflict'. The parties reached a settlement (Consent Decree), whereby Dell was prevented from enforcing its patents against any third party wishing to implement the specific standard.

Part III – The interplay between patents and standards

Introduction and objectives of Part III

The intersection of patent law, competition law and the standardization ecosystem results in the collision of arguably very different concepts:

- Standards are developed through the collaboration of technical experts, often representing competing commercial interests, to address marketplace needs such as interoperability or data exchange.
- Patent law grants innovators sole rights to benefit from their inventions for a limited period of time, seeking to preserve incentive for companies to invest in the research and development (R&D) that results in innovation by providing an assurance that such investment will yield fair return.
- Competition law is designed to protect marketplace competition and is thus closely related to patents and standards in that both instruments affect competition in a variety of ways.

Standards are viewed by many as "quasi-public" goods, and, in the ICT context, standards are often not implementable without access to proprietary technology protected by patents. Targeting a balance between the interests of IPR holders and standards implementers, most standards bodies have established IPR or patent policies that provide a framework for the inclusion of IPR-protected technology in standards, often mandated by standards' encompassing the best available technologies.

While there is broad agreement on the need for clear frameworks to govern the inclusion of patents in standards, in order to balance the needs of IPR holders and standards implementers, there are many different views as to how this balance should be achieved. Recent years have witnessed noticeable growth in tensions and conflicts surrounding the incorporation of patented technology in standards. The global ICT industry has played host to an upsurge of standards-related patent litigation, particularly among parties active in the mobile and tablet markets.

These so-called 'patent wars' have seen certain ICT industry players allege, among other things, that holders of SEPs subject to RAND licensing commitments are seeking licensing terms beyond those provided for by RAND-based IPR policies, pressuring standards implementers into accepting those terms by leveraging injunctive relief (banning imports, sales and/or distribution of standards-compliant products).

Standards' incorporation of patented technology raises several other challenges, such as those related to non-discriminatory access to SEPs, royalty stacking, or the effects of transfers of patents on their associated licensing commitments.

Upon completion of Part III, the reader should have a good understanding of:

- What exactly a standard-essential patent is;
- How RAND-based IPR policies aim to create and protect a fair balance between stakeholders' varied interests; and
- The nature of conflict between stakeholders, both from the perspectives of patent owners and standards implementers.

8. The challenging relationship between patents and standards

The complex relationship between patents and standards is the subject of heated debate worldwide.

Although the patent and standardization systems both aim to support and incentivize innovation and technological progress, the intersection of these two mechanisms may give rise to various tensions and conflicts. The standardization system is based on the assumption of commonalities, creating an even playing field for competition by granting stakeholders equal access to innovative solutions. Conversely, the patent system is based on the award of temporary monopolies borne of IPR holders' ability to exclude others from implementing protected technologies. The contrasting principles of the inclusivity of standards and exclusivity of IPR do not meet without complexity.

Standardization processes open to participation by all interested parties – such as those of formal SDOs, quasi-formal SDOs and many forums and consortia – usually involve the cooperation of numerous ICT market players, often with very different commercial interests and business models. Open standardization processes intend to ensure that resulting standards reflect the needs of different standards implementers, also creating an environment where a standard's development can benefit from the multifaceted expertise, knowledge and insight gained by assembling stakeholders that represent a broad cross-section of the ICT industry.

In a typical standardization process, it is the participants that drive a standard's development by proposing the inclusion of what they deem to be the most appropriate methodologies, technologies or technical solutions. The development of such methodologies, technologies or technical solutions is often a complex, costly endeavour demanding investments in R&D that can span several years. Yet, for a variety of reasons, many companies volunteer their patented innovations for inclusion in standards. Standards can incorporate literally thousands of patents, and the associated difficulties have been compounded by the fact that the development of standards sometimes anticipates the progression of technology rather than following it.

A standard-essential patent (SEP) is one that is indispensable to the implementation of a standard. A patent is considered standard-essential if the text of a standard is drafted in such a way that it becomes impossible to implement the specifications of the standard without using the technology protected by the patent. While there may be (and usually are) many patent-protected innovations able to add value to standards-based products, these are not necessarily essential as per the above definition. For instance, patented technology related to an integrated phone antenna might add to the functionality of a standardized antenna, but such patents will not be considered standard-essential if the specifications of the relevant standard do not require the use of this technology.

Most standards bodies have developed IPR policies that allow for companies' patent-protected innovations to be reflected in standards, provided that such intellectual property is made available to all standards implementers under royalty-free or reasonable and non-discriminatory (RAND) terms and conditions.

While the inclusion of patented technology in standards might have been an incidental matter in the past, it is very common today.[64] One explanation for this is that the inclusion of patented technology adds to standards' ability to improve ICT performance, cost-effectiveness, connectivity or interoperability. Another is that patents have come to cover a larger portion of our society's overall knowledge base. A further, complementary explanation for the increase in SEPs is that they serve the strategic interests

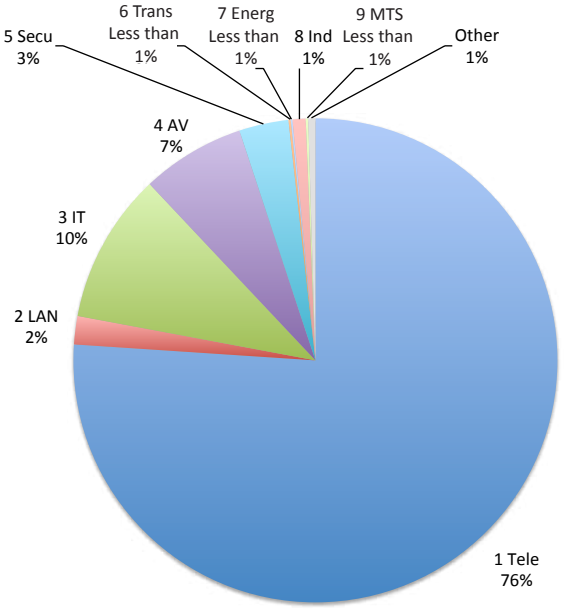
[64] The recently compiled Open Essential IPR Disclosure Database (OEIDD) of SEPs in thirteen large standards-setting entities shows that there have already been over 45,000 patents disclosed as potentially essential.

of market players, which see considerable benefit to having their patented technologies selected as part of a standard.

Companies owning SEPs benefit from new revenue-generating opportunities in that every implementer of a standard is *by definition* infringing the associated SEPs unless they acquire licences to these SEPs from their owners. SEP owners possess strong bargaining positions in cross-licensing deals that grant them access to other patents. Companies also benefit from contributing patented technology to a standard because the widespread adoption of that standard might signify a change in market direction that suits a SEP owner's strengths and expertise or existing products, platforms and clients, thereby giving them a competitive advantage by virtue of their having less need than their competitors to remodel their product offerings.

It should be noted that the distribution of SEPs is skewed in several ways. In terms of technology areas, the lion's share of SEPs are found in the field of telecommunications.

Figure 8-1 – Disclosed SEPs by technology class[65]



	Technology area legend:
1 Tele	Telecommunications via public networks
2 LAN	LAN/PAN/BAN networks, wired and wireless
3 IT	Information technology and Internet
4 AV	Audio/video systems, coding and compression, broadcasting, home systems, home entertainment
5 Secu	Security, identification, cryptography, biometrics
6 Trans	Transport, logistics, aerospace, intelligent transport systems (excl. areas in the above categories)
7 Energ	Energy generation and distribution and storage, fuel cells, power electronics
8 Ind	Industrial equipment, manufacturing, production
9 MTS	Measurement, testing, safety standards, language standards
Other	[A wide variety of topics that do not fit into the above categories]

[65] Calculations on the basis of the OEIDD database. See also Bekkers, R., Catalini, C., Martinelli, A., & Simcoe, T. (2012). Intellectual Property Disclosure in Standards Development. NBER conference on Standards, Patents & Innovation, Tucson (AZ), January 20 and 21, 2012. Available: http://users.nber.org/~confer/2012/IPKE/Bekkers.pdf

The distribution of SEPs is also skewed in relation to standards, with only a small minority of standards mandating the implementation of patented solutions. Looking only at the standards that incorporate patents, just a handful of them include volumes of SEPs that far outweigh the average (see Table 8-1), with a small set of around two dozen standards each covering over a hundred SEPs. These patent-heavy standards include those for telecommunications (e.g. 3GPP's GSM, W-CDMA and LTE), wireless LAN (e.g. IEEE's 802.11 'Wi-Fi' and 802.16 'WiMax' series), and audio and video codecs (e.g. ITU-T H.222/H.262 'MPEG-2' and ITU-T H.264 'AVC'/'MPEG-4').

Table 8-1 – The 24 standards that have 100 or more patent statements[66]

Standard	Description	Total disclosure statements (both specific patent statements and blanket declarations)*
ETSI grouping 3G	Standard for 3G mobile telecommunications, a.k.a. UMTS, W-CDMA and 3GPP [67]	16007
ETSI grouping 2G	Standard for 2G mobile telecommunications, a.k.a. GSM and DCS-1800 [68]	7458
ETSI project LTE	Standard for 4G mobile telecommunications	3876
ITU-T H.264 & ISO/IEC JTC1 14496	Standard for video compression, aka MPEG-4 Part 10, Advanced Video Coding. Developed as collaboration between ISO/IEC JTC1 and ITU. Used in many devices including Blu-ray players, game consoles, computer software, etc.	1682
ISO/IEC JTC1 18000	Standard for RFID technologies	1107
IEEE 802.11	Standard for wireless Local Area Networks, popularly known as 'Wi-Fi'	449
ITU-T H.222 & ITU-T H.626 & JTC1 ISO/IEC 13818 and	Standard for video compression, aka MPEG-2. Parts 1 and 2 of MPEG-2 were developed in collaboration with ITU-T. Used in many devices including DVD players, computer software, etc.	381
IEEE 802.16	Standard for wireless Metropolitan Area Networks., popularly known as 'WiMax'	335
ETSI grouping DVB	Standard for digital television broadcast [69]	270
ITU-T G.992	Standard for ADSL, for delivering internet services to residential homes via telephone cables	229

66 Calculations on the basis of the OEIDD database. See also footnote 64.

67 This group includes the following ETSI projects: 3GPP, 3GPP / AMR-WB, 3GPP / AMR-WBYes, 3GPP / EMS, 3GPP Release 7, 3GPP Release 99, HSPAYes, HSUPA, UMTS, UMTS / CDMA, UMTS FDD, UMTS Release 4, UMTS Release 5, UMTS Release 6, UMTS Release 7, UMTS Release 8, UMTS Release 9, UMTS Release 99, WCDMA, SAE.

68 This group includes the following ETSI projects: DCS 1800, GPRS, GSM, GSM / AMR-NB, GSM / TDMA, GSM Release 6, GSM Release 7, GSM Release 98, GSM Release 99, GERAN, GERAN Release 6, GERAN Release 7, GERAN Release 8, GERAN Release 98, GERAN Release 99.

69 This group includes the following ETSI projects: DVB, DVB-C2, DVB-H, DVB-S2, DVB-SH, DVB-T2.

Standard	Description	Total disclosure statements (both specific patent statements and blanket declarations)*
ITU-R M.1225	Not a product standard in itself, but guidelines for the various 3G mobile technologies were going to be evaluated by ITU (the so-called process for IMT-2000)	204
ISO 25239	Standard for friction stir welding, a technique that is applied in shipbuilding, aerospace, automotive and railway sectors, among others	191
ETSI group BRAN HIPERLAN/2 HIPERMAN	ETSI activities for Broadband Radio Access Networks (BRAN), including HiperLan/2, HiperAccess, HiperMan	169
ISO/IEC JTC1 15938	Standard for multimedia content description, also known as MPEG-7	167
IEEE 802.3	Wired LAN standard known as Ethernet	149
ETSI project TETRA	Standard for professional mobile radio applications for policy, ambulance and fire brigade applications, as well as commercial use	144
ITU-T G.729	Voice compression technology used in Voice over Internet Protocol (VoIP) application, among others	132
TIA 136	Second generation (2G) mobile telecommunication standard developed in the US, known as D-AMPS. Now considered end-of-life and replaced by GSM or 3G technologies	124
ITU-T G.993	Standard for VDSL, for delivering internet services to residential homes via telephone cables. Faster than ADSL	117
OMA WAP	Wireless Application Protocol (WAP), for interactive data services on mobile phones. Now considered end-of-life	117
ITU-T M.1457	Again not a product standard in itself, but detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2000 (IMT-2000)	113
ISO/IEC JTC1 14888	Techniques for digital signatures	111
IEEE 802.1	Standard for architecture, interworking, overall network management and several other general elements of LAN and MAN networks	105
ISO/IEC JTC1 11172	MPEG-1 is a standard for compression of video and audio. Used for digital radio and video CD, but best known for the MP3 audio format it introduced (which is officially called MPEG-1 Part 3)[70]	100

* Please note that blanket declarations are allowed in some of these bodies.

[70] Later, an audio layer was introduced in MPEG-2 that provides backward compatibility with MPEG-1 Part 3. As such, the common term 'MP3' typically refers to both MPEG-1 Part 3 (Audio Layer III) and MPEG-2 Part 3 (Audio Layer III).

9. The role of SDOs and their IPR policies

9.1 General overview

In the light of the need to balance the competing interests of SEP holders and standards implementers, and aiming to develop standards that reflect the best available technical solutions, SDOs have established rules (usually referred to as IPR policies or patent policies) governing the inclusion of patents in standards.

These IPR policies generally require that patent holders disclose their SEPs during a standard's development and that they make commitments to licensing such SEPs to all standards implementers under reasonable and non-discriminatory conditions.

Commitment-based IPR policies, detailed in section 9.2 below, have become the most widely adopted approach to dealing with the challenges associated with the interplay of patents and standards, thereby providing the central mechanism through which ICT standardization balances the interests of various stakeholders.[71]

The quest for balance

"A well-balanced IPR policy is likely to attract all types of stakeholders to the standardization process. However, if the IPR policy overly favours patent holders, then the standard may not meet users' needs, and not be readily implementable. Similarly, if the IPR policy overly favours users, then patent holders may decide not to contribute their technology to the standardization process"

Malcolm Johnson, Director of ITU's Telecommunication Standardization Bureau

The task of balancing the interests of various stakeholders is made more challenging by the cross-cutting nature of ICT standardization, which increasingly needs to take the requirements of other industry sectors and consumer interests into account. Maintaining a healthy standardization ecosystem, in which standards continue to benefit the greater part of the global population, relies to a large extent on SDOs' ability to strike a balance between the interests of SEP owners and standards implementers.

SDOs thus pay close attention to the use and abuse of standards, SEPs and RAND commitments, since they have a clear interest in preserving the purpose, integrity and effectiveness of the standardization ecosystem. The establishment of a reliable IPR policy, with robust review mechanisms and safeguards that limit abuse of the system, should be a key priority for any standards body.

The idea that the implementation of standards could require the use of patented technology was formally elaborated as early as 1932, when a committee of the American National Standards Institute (ANSI) made the recommendation: '*That as a general proposition patented design or methods not be incorporated in standards. However, each case should be considered on its own merits and if a patentee be willing to grant such rights as will avoid monopolistic tendencies, favorable consideration to the inclusion of such patented designs or methods in a standard might be given*'.[72] The recommendation was adopted unanimously, marking what may have been the first instance of a standards body adopting a formal IPR policy.

[71] For instance, for both competition authorities and courts, any SEP licensing commitments made within SDOs usually play an important role in deciding related outcomes.

[72] ANSI Minutes of Meeting of Standards Council, Nov 30, 1932. Item 2564: Relation of Patented Designs or Methods to Standards.

However, it was not until the 1980s that the incorporation of patents in standards began to attract wider attention, and this intensified scrutiny may have been in part the result of several conflicts rooted in patents' inclusion in standards:

– In the early 1980s, IGR, an organization owned collectively by German TV manufacturers, was the holder of a patent essential to Germany's stereo television broadcast standard.[73] IGR granted patent licences to its members but refused to grant a similar licence to Finnish TV manufacturer Solera, thereby blocking Solera's entry into the German market for stereo televisions. The European Commission initiated legal proceedings against IGR, which shortly after agreed to grant Solera a licence under the same conditions as those allowed to its members.
– The early 1990s also saw the first deployment of the European GSM standard for mobile telecommunications. This standard would later become an unprecedented European technology success, with billions of users worldwide. As a result of growing tension between US firm Motorola and a number of European companies, Motorola refused to license its standard-essential GSM patents to many implementers, selecting only a few large firms with which it agreed cross-licensing deals. Although not uncommon for standards bodies at the time, the GSM standards-development process had yet to adopt effective IPR policies and this is now considered one of the main reasons for the lacklustre competition in GSM terminals and infrastructure observed over GSM standards' first decade on the market.[74]

The need for IPR policies has become clearly apparent over the past three decades, and today almost all established standards bodies have put in place reasonably sophisticated IPR policies. Emphasis on the importance of such policies has in no way diminished, and many have been amended and updated in recent years.[75]

As mentioned above, the aim of IPR policies is to ensure that all known owners of SEPs commit to making such patents available to potential standards implementers, on either: 1) reasonable and non-discriminatory (RAND) licensing terms,[76] which do allow for royalty-bearing licences; or 2) royalty-free (RF) terms, sometimes referred to as 'RAND-RF' or 'RAND-zero', which emphasize that, apart from no royalties, the owner will not stipulate any other conditions incompatible with RAND (such as restrictions as to the field of use, etc.).

A less common third approach is one in which the standards body calls for 'non-assert' commitments (which may include specific terms and conditions), whereby SEP holders will not assert their patents against any implementer using their technology in the context of a standard.

Table 9-1 shows the licensing commitments called for by the IPR policies of twelve standards bodies.

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73 EC (1982) *XIth Report on Competition Policy*, Brussels: EC, 63-64.

74 For a detailed analysis, see Bekkers, R. (2001) *Mobile Telecommunications Standards: GSM, UMTS, TETRA, and ERMES*, Norwood, MA: Artech House; and Bekkers, R., Duysters, G. and Verspagen, B. (2002) 'Intellectual Property Rights, Strategic Technology Agreements and Market Structure: The Case of GSM', *Research Policy*, Vol. 31, no. 7, pp. 1141-1161.

75 See also Section 15.5 in Note 9.

76 The RAND abbreviation is used predominantly in the U.S., while the term FRAND is used more commonly in Europe. This seems to be a matter of convention, though, and does not seem to reflect any difference in meaning or intent. See Contreras, J.L. (2011) *An Empirical Study of the Effects of Ex Ante Licensing Disclosure Policies on the Development of Voluntary Technical Standards*, Gaithersburg, MD: U.S. Department of Commerce, National Institute of Standards and Technology, NIST Standards Service Group.

Table 9-1 – Licensing or non-assertion modes explicitly specified by the policy[77]

	ITU/ ISO/IEC	IEEE	ETSI	ANSI	IETF	OASIS	VITA	W3C	HDMI Forum	NFC Forum
F/RAND (may be royalty-bearing)	Yes	Yes	Yes	Yes	(Yes) [a]	Yes	Yes			Yes
RF, F/RAND-RF, or F/RAND on other restricted terms as specified by the policy	Yes	Yes		Yes	Yes	Yes		Yes		Yes
Non-assertion		Yes			Yes	Yes	Yes		Yes	

a) Although royalty-bearing F/RAND is formally an option in the IETF IPR policy, it is uncommon for working groups of this body to agree on standards which include patented technology that is not available on RF terms.

9.2 Principal types of IPR policies

Standards bodies will adopt the IPR policy that best serves their objectives, and these objectives will in some cases be made explicit by the IPR policy in question. The choice of an IPR policy is often the result of consensus agreements reached among a standards body's members, and such choices will therefore be impacted by a body's established culture and specific technical context, as well as the composition of members with the right to vote or otherwise influence its decision-making processes.

Generally speaking, there are two principal types of IPR policy in terms of how such a policy attempts to ensure the availability of licences on reasonable and non-discriminatory conditions: participation-based IPR policies, and commitment-based IPR policies.

Participation-based IPR policies[78]

Participation-based IPR policies require that, as a condition of membership or participation, companies joining a standards body submit to licensing any eventual SEPs on specified terms or under a RAND or RF licensing commitment. In other words, members are 'automatically' committed to licensing their SEPs on RAND or RF terms, usually just for those standards being developed in a technical committee where the member is participating. To prevent such obligations being 'misused' by fellow members to gain access to the IPR 'diamonds' of other members, such policies sometimes include provisions that allow member companies to opt out of their SEP licensing commitments should they object to a standard covering technologies that they do not wish to share with others. Such opt-out provisions could specify, for instance, that SEP owners may notify the standards body of the non-availability of RAND or RAND-RF licences within 30 days of a draft standard being published (sometimes also requiring that the SEP owner then step back from the working group developing the standard in question). However, companies are not usually permitted to opt out if the SEP covers a technical

77 Based on Bekkers and Updegrove (2012), *op cit*.

78 Examples include W3C or OASIS

contribution that they themselves submitted to a standards body. Participation-based IPR policies may have disclosure rules, but often do not.

Participation-based IPR policies are more common in smaller, more informal standards bodies such as consortia that focus on relatively narrow technological areas in which members or participants are confident of their ability to honour such binding SEP licensing commitments.

Commitment-based IPR policies[79]

Commitment-based IPR policies are designed to identify patents essential to a draft standard, in most cases through a disclosure policy which defines disclosure obligations related to SEPs owned by participants. When a potential SEP is identified, the SEP owner is requested to submit a licensing commitment. Certain standards bodies are satisfied with RAND commitments, while others seek RF commitments. Providing for rare cases in which SEP owners refuse to make a licensing commitment, an IPR policy will often specify that parties involved in the development of a standard should seek alternative solutions not using the patented technology, or that work on the standard should be withdrawn entirely if alternative solutions are not feasible.

Commitment-based IPR policies are more common in larger standards bodies. Large bodies will often comprise tens of working groups, making it difficult for members or participants to follow all the standards being developed at any given time, which would discourage them from submitting to participation-based IPR policies that could result their being bound to SEP licensing obligations in a wide range of technology fields. That said, very often the commitment only applies to those standards emanating from specific technical committees where the member or participant has participated in the standardization process.

Both participation-based and commitment-based IPR policies share the same ultimate goal: to ensure that all known SEP owners commit to licensing their SEPs on reasonable and non-discriminatory terms. This is usually the limit of a standards body's involvement. Any negotiations are left to the parties and generally are to take place outside of the standard body. If the parties cannot come to an agreement, they may resort to a court to adjudicate their dispute. Standards bodies thus do not play a role in the enforcement of the RAND or RF licensing commitments made in relation to SEPs covered by their standards. Nor do they take a position as to whether declared SEPs are in fact essential, valid, and enforceable.

9.3 The basic building blocks of commitment-based IPR policies

Commitment-based IPR policies, dominant in large SDOs, comprise two main 'building blocks': disclosure rules, and seeking licensing commitments.

Disclosure rules

Disclosure rules specify the conditions under which members or participants are required to inform the standards body of the existence of patents they believe are essential to a standard, or that may become essential to a standard when its final text is approved.

[79] Examples include ITU, ISO/IEC and ETSI.

Disclosure is important for at least three different reasons:

- It can serve to 'trigger' requests to SEP holders that they make SEP licensing commitment.
- It ensures that an expert group drafting a standard can make informed decisions regarding the inclusion of patented technologies, judging each case on its own merits.
- It also yields information of relevance to prospective standards implementers in that SEP disclosures indicate which companies may have SEPs (as some SEP owners typically will seek RAND licenses and others will not, as they may generally use their SEPs for defensive purposes only). This information may be of value in assessing what would be a 'reasonable' SEP licensing fee to target in their negotiations with SEP owners.

Standards bodies' disclosure rules vary considerably, in line with different approaches to issues such as:

- The exact situations triggering disclosure obligations.

  Individuals participating in a standard's development are often required to disclose the existence of any SEPs of which they have knowledge, regardless of whether or not the owners of those SEPs are participating in a standard's development (i.e. members of a standards body not participating in the development of a particular standard are in principle not subject to disclosure obligations in relation to that standard). Given the difficulties associated with following all standards being developed in a large standards body, such bodies' IPR policies usually do not require participants in the specific technical committee to perform patent searches.
- Exactly what information needs to be provided in SEP disclosures.
- At which point in the standards development process these disclosures should be made.
- To whom the disclosed SEP information will be made available.

A detailed discussion of each of these points is beyond the scope of this publication. The interested reader is referred to a recent study on this topic carried out for the US National Academy of Sciences.[80]

Seeking licensing commitments

The procedure for seeking SEP licensing commitments is one in which known holders of potential SEPs are asked if they are willing to submit a public statement declaring that they will license their SEPs on RAND or RF terms. These statements are known as 'Licensing Statements', 'Undertakings', 'Letters of Assurance' or 'Declarations of Licensing Positions'. Requests for such commitments can be made to members of a standards body or participants in a standard's development process, as well as to third parties if they are believed to own potential SEPs.

These two building blocks – disclosure rules and the seeking of licensing commitments – are often combined into a single procedure using a predefined template or form that serves as both SEP disclosure statement and SEP licensing commitment. However, it should be noted that SEP disclosures and SEP licensing commitments remain conceptually distinct.

[80] National Research Council (2013), *Patent Challenges for Standard-Setting in the Global Economy: Lessons from Information and Communication Technology*. Washington, DC: The National Academies Press. Available: http://www.nap.edu/catalog.php?record_id=18510

10. The growing tension between patents and standards

Tensions relating to SEPs have become more apparent in recent years, as a result of several developments in the ICT field.

Companies' patent strategies have become more important parts of their business models, and the number of patent applications continues to soar worldwide.

Companies have also adopted more aggressive patent litigation strategies. The probability of a patent becoming the subject of a lawsuit within four years of its grant date almost tripled between 1986 and 1996.[81] With large commercial interests at stake, companies employ the weapons that are most effective in defending their market positions, and today these weapons are often patent portfolios.

A number of companies have also begun pioneering new business models not dependent on sales revenues, instead relying entirely on income gained by granting licences to their patents.[82] Such strategies conducted in bad faith, or representing op portunistic behaviour, could be branded 'patent trolling'. As discussed above, patent trolling entails a company enforcing its patents against one or more alleged infringers in an unduly aggressive manner, based on knowledge that the selected target is already locked-in to the patent-protected technology and would therefore prefer to settle the dispute out of court, paying the patent troll to avoid facing considerable litigation costs or the threat of having to withdraw their products from the market.[83]

Another business strategy becoming more noticeable is that of 'patent privateering', where, for instance, a company transfers its patents to a new firm tasked with aggressive litigation of competitors in relation to patent infringements. In such strategies, the new firm often remains under the control of the company having created it.[84]

Various developments specific to patents' inclusion in standards have also fuelled the intensification of SEP-related conflicts:

– Standards are becoming more relevant and successful.

  As shown in Part I, more and more products have come to rely on standards for their core functionality. Network-based technologies and platforms are making their way into almost every industry sector and aspect of social interaction, including healthcare, mobility and energy.

– SEPs have become extremely valuable business assets.

  SEPs bear substantial revenue-generating potential in that every implementer of a standard requires licences to its SEPs, and SEPs have thus come to represent powerful bargaining chips

81 Bessen, J. and Meurer, M. J. (2008) *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk*, Princeton, NJ: Princeton University Press.

82 It should be noted that the decision to adopt a licensing-based business model can also be pro-competitive in that it permits companies to focus on what they do best without the need to invest in the assets required to commercialize their creations in products.

83 See Reitzig, M., Henkel, J. and Heath, C. (2007) 'On sharks, trolls, and their patent prey - Unrealistic damage awards and firms' strategies of "being infringed"', *Research Policy*, Vol. 36, no. 1, pp. 134-154.

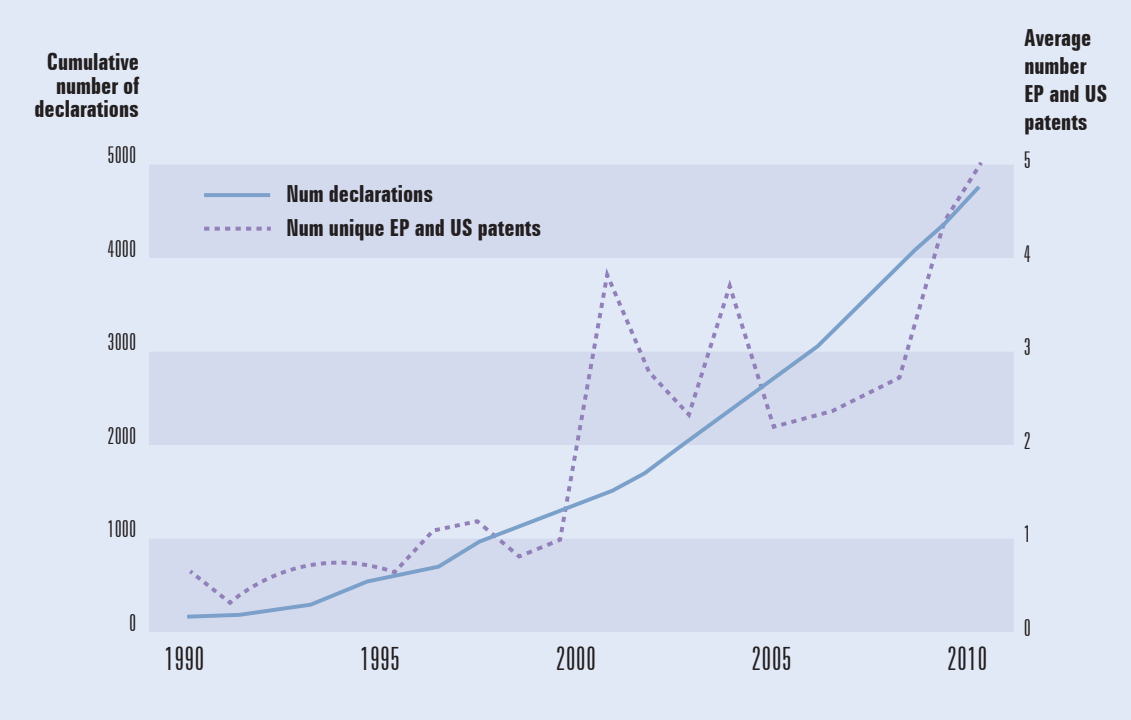
84 See Ewing, T. (2011) *Introducing the patent privateers*, Intellectual Asset Management magazine, January/February 2011.

when negotiating licences with other patent owners. However, in terms of SEP portfolios, the gap between the 'haves' and 'have-nots' is widening.

– The number of SEPs is increasing.

  The number of disclosed SEPs is, on average, doubling every five years (Figure 10-1). As discussed above, by 2012 companies had submitted over 45 000 SEP declarations. This figure could be a gross underestimation given that it also includes 'blanket declarations' in which the exact number of SEPs is not specified.

Figure 10-1 – Growth of SEP declarations over time[85]

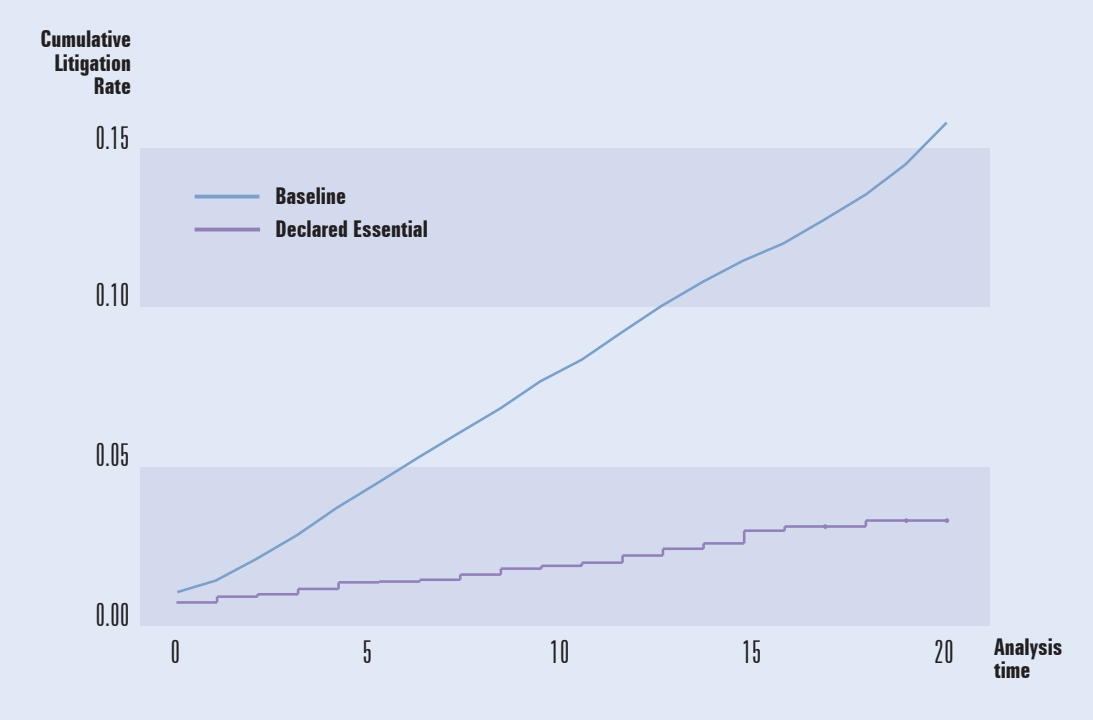


– SEP-related litigation has become more prevalent than that related to other patents.

  Litigation in relation to SEPs has become five times more common than that related to non-standard-essential patents (see Figure 10-2). This perhaps reflects the higher perceived value of these patents, or the fact that, by definition, every standards implementer infringes a standard's SEPs.

[85] In this graph, a declaration is defined as an event (at a specific date) that can either be a disclosure of one or more specific patents, or a 'blanket declaration'. Source: Bekkers, R., Catalini, C., Martinelli, A. and Simcoe, T. (2012) 'Intellectual Property Disclosure in Standards Development', *NBER Conference on Standards, Patents & Innovation*, Tucson, AZ, 20-21 January 2012, [Online], Available: http://users.nber.org/~confer/2012/IPKE/Bekkers.pdf.

Figure 10-2 – The probability of SEP-related litigation compared with that related to non-standard-essential patents ('baseline')[86]



– Impact on companies' IPR litigation strategies resulting from the dynamism of the ICT market.

  The mobile-telephony market serves as a good example. Nokia was once the uncrowned king of mobile phones, but lost market leadership in dramatic fashion when the market's focus evolved from 'feature phones' to smartphones. New market entrants, such as Samsung and Apple, achieved great success in a market already considered mature.

  Alcatel of France and Lucent Technologies of the US, two incumbent telecommunication giants, were hard hit by increasing global competition and thus merged to become Alcatel-Lucent.

  Canadian telco Nortel became insolvent, while former giant Motorola split itself up and sold its mobile-telephony business to Google.

  In less than a decade, Huawei of China escaped from relative obscurity to grow into the world's largest mobile infrastructure manufacturer, overtaking Ericsson in 2012.[87]

– Increasing prevalence of SEP ownership transfers:

  Given the value of SEPs to their owners, there is strong demand to buy such patents. There are also various reasons why companies may be willing to sell SEPs.

[86] Figure plots the 20-year cumulative litigation hazard, using the Nelson-Aalen cumulative hazard function. Source: Simcoe, T. (2012) 'Some Economics of Standard Essential Patents', *Keynote talk at the European Policy for Intellectual Property (EPIP) Conference*, Leuven, Belgium, 27 September 2012.

[87] 'Who's afraid of Huawei?', *The Economist*, 4 August 2012.

Companies that become insolvent will put their entire SEP portfolio up for sale, and companies enduring financial hardship might be willing to sell parts of their SEP portfolio. Given that companies' business models evolve to prioritize new business strategies, SEP sellers' losses in terms of the overall value of their SEP portfolios are often lower than the value of the SEPs sold to their new owners.

The box below provides a list of transactions likely to have involved transfers of SEP ownership. This list is based on deals reported in the press and should not be considered exhaustive. It is difficult to find complete, reliable information on such SEP transfers because, in most countries, patent holders are not required to report patent ownership changes. This difficulty is compounded by the fact that many standards bodies permit blanket SEP declarations, making it almost impossible to determine exactly which of the declared patents are essential (although typically blanket disclosures mean that more SEPs are included under the RAND licensing commitment).

Examples of recent transactions involving large patent portfolios

2011: Motorola sells its Motorola Mobility division to Google including a large patent portfolio valued at approx. USD 5.5 billion

2011: Nokia sells '2 000+ patents' to Mosaid

2011: Nortel Networks sells '6 000 patents and patent applications' to a consortium including Apple, EMC, Ericsson, Microsoft, Research In Motion and Sony, for a total of USD 4.5 billion

2012: Interdigital sells 1 700 patents specifically related to 3G, LTE and 802.11 technologies to Intel for USD 375 million

2012: Adaptix was sold to Acacia, along with its portfolio of what were believed to be LTE 'essential' patents

2012: Eastman Kodak sells its imaging patents portfolio to a consortium led by Intellectual Ventures and RPX Corp for USD 525 million

2012: IPWireless sells '500 patents including essential concepts in LTE, LTE-Advanced and 3G/4G technologies' to Intellectual Ventures and NVIDIA

2012: Nokia sells '450 patents including 300 SEPs' to Sisvel

2012: Nokia sells '500 patents' to Vringo

2013: Ericsson sells '2 185 US and international patents and patents pending' to Unwired Planet (formerly Openwave).

11. Specific concerns and issues with patents in standards

Few issues receive more attention in the ongoing debates concerning SDOs' IPR policies than the meaning of the RAND commitment. Identifying the appropriate royalty and licensing terms for RAND-declared SEPs, and understanding how the RAND commitment limits the relief available to the patentee for infringement of SEPs, are important aspects of the 'quest for balance' that IPR policies seek to strike between, on the one hand, the goals of fostering competition and widespread adoption of the standard and, on the other, the desire to reasonably reward innovation and technical contributions to standards development.

Because most SDOs' IPR policies do not explicitly define specific parameters or requirements for RAND licensing, debates regarding the meaning of the RAND commitment can arise in private licensing negotiations as well as in litigation between parties that cannot agree on RAND licensing terms for their SEPs. More recently, competition agencies in the US and EU have offered input, and SDO members have debated whether and how SDOs might revise existing IPR policies to clarify or codify RAND licensing principles. This section addresses six significant issues raised in these negotiations, litigations and policy debates, and summarizes the concerns and views that have been offered in relation to each.

Many of the positions identified in this section arise from concerns relating to patent 'hold-up', *i.e.* abuse by the patent holder of its position after a standard has been completed. In addressing these concerns, an SDO that has adopted RAND policies needs to be careful not to restrict a patent holder's ability to obtain, in good faith, reasonable compensation for use of its technology in the standard.

The patent hold-up concern arises because many practitioners of the standard (that is, potential licensees in SEP licensing negotiations) have invested substantial resources in developing and marketing products that comply with a given standard, to the point where it would not be economically feasible, and not good for promulgation of the standard, for that company to shift to non-compliant products or to withdraw from the market altogether. Because a SEP by definition cannot be worked around, it can obtain market power if there is a marketplace demand for products to conform to the standard in question. Once companies have made such investments, they can become 'locked into' a standard for all practical purposes, and can be vulnerable to efforts by a given SEP holder to extract exorbitant royalties far in excess of the value of the underlying patented technology. Thus, without some constraint on the SEP holder's ability to maximize royalties for SEP licensing, a locked-in manufacturer may become compelled to pay grossly excessive, non-RAND royalties rather than risk an injunction that would render it unable to market standard-compliant products, and then pass these extra costs onto consumers. In fact, many commentators argue that those hold-up situations raise competition law concerns and preventing hold-up is a primary purpose of the RAND commitment, and that the scope of the RAND commitment should be interpreted accordingly.[88]

On the other hand, many SEP holders have invested significantly in research and development for standardized technology, and the RAND commitment allows for 'reasonable' compensation for the SEP holder. Some SEP holders have raised concerns that policies limiting a SEP holder's rights when enforcing SEPs (such as limitations on the right to seek injunctions for infringement), or policies limiting

[88] Farrell, Joseph *et al.* (2007), 'Standard Setting, Patents, and Hold-up,' 74 Antitrust L. J. 603 (discussing SEP hold-up); *Broadcom v. Qualcomm*, 501 F.3d 297, 313-14 (3d Cir. 2007) ('When a patented technology is incorporated in a standard, adoption of the standard eliminates alternatives to the patented technology. Although a patent confers a lawful monopoly over the claimed invention its value is limited when alternative technologies exist. That value becomes significantly enhanced, however, after the patent is incorporated in a standard. Firms may become locked in to a standard requiring the use of a competitor's patented technology. The patent holder's IPRs, if unconstrained, may permit it to demand supracompetitive royalties. It is in such circumstances that measures such as FRAND commitments become important safeguards against monopoly power.') (internal citations omitted).

the royalties SEPs may earn, can incentivize potential licensees to become unreasonably aggressive in licensing negotiations and to 'hold out' for royalties lower than what the patent holder should be entitled to on a RAND basis. According to some, SDOs must be very careful to avoid diminishing an SEP holder's ability to obtain RAND compensation, and maintain reasonable incentives to innovate and participate in standardization. The positions summarized below often involve some variant of these basic themes.

11.1 The meaning of 'reasonable'

What considerations, principles and guideposts should be provided to assist in the resolution of disputes regarding 'reasonable' licensing terms?

The first prong of the RAND commitment requires an SEP holder to license SEPs on 'reasonable' terms and conditions. Many believe that the reasonableness prong of the RAND commitment implies several unique principles that should be considered in evaluating royalties for SEPs. It has been noted that while in some circumstances such principles might limit the compensation obtained by an SEP holder, the benefits of successful standardization – such as the widespread use of the standard and increased market for such standardized products – can ensure reasonable compensation for a SEP holder even though the per-product royalty may be relatively modest. Of course, views differ over the precise contours of the patent holder's obligation to license on 'reasonable' terms and conditions, or whether SDOs should provide further guidance on this issue.

Specifically, to assist patent holders and potential licensees, some commentators and standards participants have favoured the inclusion of additional guidance to companies (and potentially, to courts or arbitrators) so that they will be better able to negotiate mutually acceptable licensing terms. These commentators suggest the inclusion of various non-exclusive factors that should be considered in addressing reasonable licensing terms. Other commentators have claimed that no further clarification of 'reasonable' is necessary or desirable. These companies note that licensing terms should usually be left to the parties to determine, and that providing more specific guidance in an SDO policy could potentially risk involving the SDO in private business negotiations.

Three specific issues that have been subject to some debate are described below. Of course, these factors are not exclusive, and there may be others that could be considered.

Separating the value of the patented technology from the value of standardization itself

One of the most common arguments advanced regarding 'reasonable' compensation is that a RAND royalty should be carefully tied to the value contributed by the specific patented technology in comparison to other alternatives available to the SDO.[89] For example, under this approach, if the invention claimed in a particular SEP offers only minimal benefits over alternatives available to the SDO before standardization, the RAND royalty should be minimal and no greater than the incremental value offered by the standardized technology. Proponents of this principle argue that this royalty limitation allows RAND negotiations and adjudications to simulate the outcome of the royalty negotiation that would have taken place in a competitive environment (when the SDO and the potential licensee could

[89] For example, some SDO participants believe IPR policies should include language suggesting that the value of the patent should be assessed apart from any 'hold-up' or 'lock-in' effect associated with the patented technology being included in the standard (e.g. 'A patent holder is entitled to a reasonable royalty based on the value of its standard-essential patent(s) apart from any lock-in resulting from the patent(s) being included in the standard.').

still have chosen among other available alternatives). It is argued that this approach to RAND valuation can minimize the risk that SEP holders will obtain royalties based on the post-standardization 'hold-up' leverage created when companies are obliged to use the SEP technology to comply with the standard.[90] At a minimum, proponents of this view argue that 'reasonable' should be based on the intrinsic value of the patent itself apart from its inclusion in the standard. Any value that inures to the product because it implements the standard – the value of standardization – should be passed onto users and consumers.

Opponents of this principle, however, argue ignoring the value created by the standard as a whole would under-compensate patent holders thereby discouraging them from investing in research and development. For example, it is claimed that if a feature within a standard allows the implementer to earn significant additional profit from consumers, the inventor of that technology should receive its fair share of those profits even if there were several equally valuable options available to the SDO at the time of standardization.

Debate regarding this issue has been spirited, and different SDOs may elect to take different approaches.

Royalty stacking and aggregate reasonable royalties

Many technical standards, particularly in the ICT environment, include hundreds if not thousands of patented technologies. There is a school of thought that RAND royalties must be reasonable in the aggregate—that is, the sum of royalties collected for all SEPs covering a given standard should not be so high as to remove the incentives to make and sell products using the standard, or, where such costs are passed on to the customers, to undermine the desirability of and market for standardized end-products.[91] For example, if profit margins in a particular industry are 10 per cent, and the total royalty burden is 15 per cent, then manufacturers may face a Hobson's choice between selling products at a net loss or raising prices to the point where consumers will no longer purchase the standardized product.

Some argue, on the other hand, that unless and until the licensee shows that the aggregate royalty burden on a standard is actually affecting market adoption of the standard or distorting competition among manufacturers of standard-compliant products, the issue is only theoretical and should not act to reduce a royalty to which the SEP holder is otherwise entitled. It may be noted, for example, that many SEP holders do not seek royalties at all, and that the precise number of SEPs for many of the major standards is very difficult to ascertain.

Others, however, maintain that royalty stacking should always play a role in setting a RAND rate for a given SEP or subset of SEPs. These market participants argue that royalty stacking must be considered both retrospectively *and* prospectively because, unless each SEP royalty is calibrated in the light of

[90] See *Microsoft Corp. v. Motorola, Inc*., US District Court, WD Washington, Findings of Fact And Conclusions of Law, 25 April, 2013, §74 (United States District Court, Western District of Washington) ('[A] RAND commitment should be interpreted to limit a patent holder to a reasonable royalty on the economic value of its patented technology itself, apart from the value associated with incorporation of the patented technology into the standard.'); *Apple v. Motorola*, Opinion and Order, 22 June, 2012, p. 18) (United States District Court, Northern District of Illinois) ('The purpose of the FRAND requirements … is to confine the patentee's royalty demand to the value conferred by the patent itself as distinct from the additional value – the hold-up value – conferred by the patent's being designated as standard-essential.').

[91] Some have argued that problem of patent hold-up can be exacerbated where hundreds or thousands of patents may be essential to a single standard. See Brief of Amicus Curiae Federal Trade Commission Supporting Neither Party, *Apple Inc. v. Motorola, Inc.*, Fed. Cir. Nos. 2012-1548, -1549 (4 December, 2012), p. 13, Nos. 11-12; see also *Microsoft Corp. v. Motorola, Inc*., No. C10-1823, 2013 WL 2111217, *12, §72; id. *86, §539 ('The anti-stacking principle constrains RAND because parties in a RAND negotiation would determine a reasonable royalty by considering how much in total license fees the implementer can pay before implementation of the standard becomes cost-prohibitive.').

some reasonable overall SEP royalty cap, other SEP holders will demand royalties commensurate with the SEP royalties already set.[92] This phenomenon could result in one of two undesirable outcomes: an oppressively large royalty stack develops and hinders competition and use of the standard; or a royalty cap could be applied later and may deny future licensers a reasonable royalty, decreasing innovation incentives.[93]

Resolving these issues remains the subject of much debate in the courts, agencies and various SDOs.

Royalty base

Many believe that when assessing the reasonableness of a SEP royalty demand, or the reasonableness of the aggregate SEP royalty stack, negotiations should focus on the component that substantially incorporates the functionality covered by the patent. In some forums this has been referred to as the 'smallest saleable patent practising unit'.[94] The choice of royalty base can often be significant where, such as in the case of computers, the components that practise the standard can sell for a small fraction of the price of the downstream product.

Proponents of application of the smallest saleable patent practising unit rule to RAND royalties argue that using larger royalty bases enables SEP holders improperly to tax profits earned on non-infringing components within the larger device. Some patent owners, they argue, seek to recover hold-up royalties by disguising them as a small percentage of a high-priced 'end-user' device.[95]

Others strenuously oppose using the component as the relevant royalty base for a reasonable royalty assessment. They may argue, for example, that the technology within the component adds value to other components within the device (e.g. faster Internet access might be claimed to increase the value of gaming software). In certain cases, those resisting application of the smallest saleable patent practising unit rule argue that the price of the relevant component is commoditized and may not reflect the true value of the technology included. Accordingly, it is argued that the value of the accused technology is better reflected as part of the consumer price of the end-user device, regardless of whether the patent purports to have invented such other aspects of the device.

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92 See *Microsoft Corp. v. Motorola, Inc.*, 2013 WL 2111217, at §72 ('[A] proper methodology for determining a RAND royalty should address the risk of royalty stacking by considering the aggregate royalties that would apply if other SEP holders made royalty demands of the implementer.')

93 Accordingly, some SDO participants believe IPR policies should include language indicating that 'royalty stacking' should be considered – e.g. 'The value of the standard-essential patent shall be assessed in the light of whether the aggregate royalties that would apply if other owners of patents essential to the same standard demanded similar terms are consistent with the widespread adoption of the standard.'

94 See *LaserDynamics, Inc. v. Quanta Computer, Inc.,* 694 F.3d 51, 67 (Fed. Cir. 2012) ('Thus, it is generally required that royalties be based not on the entire product, but instead on the 'smallest salable patent-practicing unit'.'); US Federal Trade Commission, *The Evolving IP Marketplace* (March 2011), available at http://www.ftc.gov/news-events/events-calendar/2010/05/evolving-ip-marketplace, p. 212 ('The practical difficulty of identifying a royalty rate that accurately reflects the invention's contribution to a much larger, complex product often counsels toward choosing the smallest priceable component that incorporates the inventive feature.'); *Cornell Univ. v. Hewlett–Packard Co.*, 609 F.Supp.2d 279, 288 (N.D.N.Y. 2009) (reducing damages awarded where counsel improperly presented the jury with an inflated royalty revenue base of multi-component CPU bricks, servers, and workstations: 'The logical and readily available alternative was the smallest salable infringing unit with close relation to the claimed invention-namely the processor itself.').

95 Accordingly, some SDO participants believe IPR policies should include language indicating that royalties should be assessed based on the smallest saleable patent practising unit (e.g., 'The value of the standard-essential patent should be assessed with reference to the smallest saleable patent practising unit bearing the closest relationship to the portion of the invention claimed in the patent that is essential to the standard, but should be further apportioned when the smallest saleable patent practising unit contains functionality beyond that claimed in the patent.').

11.2 The meaning of 'non-discriminatory'

When, if ever, is it permissible to treat prospective licensees differently, such as by refusing to license some types of standard implementers?

The non-discriminatory prong of the RAND commitment prohibits 'discrimination', but the scope of such prohibition is another subject of debate. There are differing views, for example, about whether a SEP holder's obligation to license on 'non-discriminatory' terms permits the SEP holder to discriminate against certain classes of licensees, including by refusing to license certain types of companies altogether. In particular, some companies have taken the view that patent holders should have the ability to select the appropriate level of the supply chain at which to license their intellectual property, and to refuse licences to companies at other levels.

Under this view, for instance, a SEP holder might restrict SEP licences to 'end-user' product manufacturers only, and not license directly the suppliers of the standard-practising components that are incorporated into those products. Alternatively, the SEP holder might restrict SEP licences to component vendors only, and refuse to license end-user product manufacturers. Or – as some SEP holders have recently attempted – the SEP holder might even choose to license only *consumers* that utilize devices practising the standard.[96] Proponents of this view argue that such practices do not necessarily result in hold-up or unfairness. Rather, it is maintained that an SEP holder can provide 'access' to the standard via licences to one level of the supply chain so long as they do not seek to enjoin companies at other levels.

Many companies object to these types of selective licensing practices. First, they argue that companies supplying all levels within the supply chain have contributed to the technical and commercial development of the standard based on the expectation that they would be able to obtain RAND licensing. Selective licensing of the type described above may serve as a disincentive to contribute to and develop standardized technology. Secondly, opponents of this type of selective SEP licensing argue that allowing an SEP holder to target downstream levels of the supply chain – i.e. end-user products – and to avoid licensing component suppliers can be utilized to facilitate hold-up because SEP holders may attempt to tax revenues from the sale of an integrated device rather than the less-costly infringing component. For example, because end-user device manufacturers sell more expensive products, those end-user manufacturers may be more vulnerable to higher damages awards if royalties are adjudicated. Thirdly, it is stated that a company that practises a standard should not have to rely on its suppliers or customers to negotiate and license SEPs, as that could constrain the scope of the market for its goods (e.g. if an injunction is sought against the company's customer) or its certainty about ongoing supply (e.g. if an injunction is sought against the company's supplier). In this sense, a company that wants to pay a RAND rate for its own licence should be entitled to do so and thus acquire the certainty that it will be free to purchase needed supplies and to market its products to any customer without constraint. Fourthly, it is further argued that such licensing behaviour may also trigger reciprocity conditions, further diminishing the availability of licences to essential patents (*i.e.* if a particular company is denied a RAND licence, then it may have no obligation to offer RAND licences in return).

Once again, these issues remain the subject of much debate.

[96] Some SEP holders – mostly patent-assertion entities – have recently attempted this tactic, sending out thousands of licensing letters and filing dozens of separate lawsuits against small businesses seeking direct payment for their use of standardized consumer products.

11.3 Availability of injunctive relief for SEPs

When, if ever, is seeking or enforcing injunctions that would exclude products from the market for infringement of RAND-declared SEPs consistent with the SEP holder's RAND commitment?

National law provides generally applicable standards to determine when injunctive relief is an appropriate remedy for patent infringement. Yet even where injunctions may otherwise be available under national law, the availability of injunctive relief when enforcing RAND-declared SEPs has been contested in the courts, in governmental agencies and among standards participants.

There is a broad spectrum of views on this subject. Some companies believe that the RAND declaration is, fundamentally, an irrevocable commitment to license and therefore injunctions are never appropriate for RAND-declared SEPs. Others believe that injunctions should be generally disfavoured and permitted only when RAND royalties are proven to be unavailable—i.e. when the potential licensee refuses to negotiate and is outside the jurisdiction of the appropriate courts, or when the implementer is insolvent or otherwise refuses to pay a court-ordered RAND royalty. Still other parties believe that injunction threats are necessary to provide incentives for negotiations and agreement and to prevent misbehaviour and bad-faith delay by a potential licensee, and therefore that SEP injunctions should be available in many circumstances to facilitate and incentivize negotiations.

Once again, the injunction debate arises in large part due to the competing concerns of hold-up by abusive SEP owners, on the one hand, and protecting the legitimate ability of such SEP owners to obtain RAND compensation, on the other. Those that prefer to limit the use of SEP injunctions argue that injunction threats can be a form of anti-competitive hold-up because they force potential licensees into the untenable position of accepting exorbitant royalty demands (or other non-RAND terms) or risking having their products entirely excluded from the market. Given this dynamic, it is argued that even the threat of an injunction during royalty negotiations can allow SEP holders to obtain unreasonably high royalties. This can potentially affect the incentives to invest in making and selling the standardized products, or to have excessive costs (in terms of higher royalties) passed on to users and consumers.

Those that favour preserving an SEP holder's right to seek injunctive relief argue that it is a necessary tool in order to obtain RAND royalties in the first place. If the only remedy available to an SEP holder were a RAND royalty, they argue, potential licensees might not have sufficient incentive to agree on such a royalty in advance of trial. They maintain that implementers could refuse to negotiate in good faith and force SEP holders to litigate each patent claim in each relevant jurisdiction. In short, they contend that if SEP injunctions are unduly limited, SEP royalties might become unreasonably low.

Various alternative proposals have been offered to reach compromise concerning whether and when SEP injunctions could be appropriate. Some believe that so long as a party is willing to participate in a binding process to determine RAND compensation, injunctions (and claims seeking injunctions) should be off the table, as the mere threat of an injunction can potentially distort the parties' bargaining positions. Such proposals would prohibit a patent holder from seeking or enforcing an injunction against a licensee that is willing to participate in such a process. By agreeing to participate in such a process, it is said, the licensee may enter into a 'safe harbour' free from the threat or risk of injunctive relief.

There are different views about the proper scope of an adjudication process. Naturally, national laws regarding patents (including royalties and compensation) will differ. Some have pointed out that a licensee cannot be required to pay compensation for a patent that the licensee does not use (infringe), or that is invalid or unenforceable. Others have noted that such determinations can take a long time, and may be problematic in situations where the patent holder is asserting a large portfolio of patents that all allegedly read on the standard at issue. Balancing these concerns can be difficult, as standard

users may reasonably wish to retain their substantive right to challenge patents before being required to pay royalties (as they generally are entitled to do in connection with the assertion of any patents)[97] – yet bad-faith, serial litigation of dozens or hundreds of patents could substantially delay a patent holder's efforts to obtain RAND compensation. Identifying the proper adjudication process in any given circumstance may need to be left to the various national courts where the parties are unable to agree.

11.4 Transfer of ownership of SEPs

Should an SEP holder's RAND licensing commitment be binding on those that later acquire the SEPs, and how can SDOs best design their policies to ensure the RAND commitments bind successors-in-interest?

As discussed above, a RAND commitment may, at least in part, alleviate fears that patent hold-up will undermine the use and development of an industry standard. Participants in standards bodies may rely on RAND commitments when making decisions about what technologies to adopt as part of a technical standard. Similarly, market participants may rely on RAND commitments when deciding whether to commercialize standard-compliant products. Many standards participants have raised concerns that RAND obligations, and the investment that is made in reliance on those commitments, would be undermined if purchasers of RAND-committed patents are not obligated (by contract or otherwise) to abide by the commitments undertaken by the RAND declarant. Indeed, some patent-acquisition companies have taken the position that RAND is a contract to which they are not a party and, therefore, are not bound.

Strong consensus has developed in various SDOs, however, that patent obligations should 'run with the patent' when patent rights are assigned, and that RAND commitments should be construed as encumbrances that bind all successors-in-interest to the RAND declarant. However, SDO participants recognize that this interpretation may not apply in all jurisdictions. Accordingly, some SDOs include provisions requiring members to apprise assignees of RAND commitments and to include appropriate contractual requirements when transferring patents to ensure that, as to such transferred patent(s), the licensing declaration is binding on the transferee and that the transferee will similarly include appropriate provisions in the event of future transfers with the goal of binding all successors-in-interest.

11.5 Demands for reciprocity and/or cross-licensing with SEPs

What is the scope of 'reciprocity' conditions, and can a patent holder condition SEP licences on demands for cross-licences to non-SEPs or other patents outside of the standard?

Many SDO IPR policies allow patent holders to condition their RAND commitment on 'reciprocity', meaning that they are willing to license the covered SEPs on RAND terms so long as the licensee reciprocates. While most acknowledge that conditioning RAND commitments on some measure of reciprocity is permissible under IPR policies and competition law, parties may disagree on the appropriate scope of reciprocity demands.

[97] See *Vringo v. ZTE*, UK High Court of Justice (6/6/13) ('I reject the idea that the stance being taken by [the potential licensee] in this jurisdiction can fairly be said to mean that [the licensee] is not a willing licensee. [The licensee] has said it is willing to take a FRAND licence on any patent found valid and infringed. In my judgment, a defendant accused of patent infringement by a patentee who claims to have a standards essential patent is and must be entitled to say, 'I wish to know if this patent is valid or infringed or not before I take a licence.' Such a stance cannot fairly be described as unwillingness.')

In its narrowest form, reciprocity permits a RAND licence for SEPs to be conditioned on the licensee's agreement to cross-license SEPs covering the same standard(s) on RAND terms. Many find this type of reciprocity reasonable based on notions of fairness: someone that makes their IPR available for a RAND royalty ought to be able to practise that standard on RAND terms as well. Similarly, if a licensee insists on practising a standard paying only RAND royalties, they should allow competitors to play on a level playing field.

At the other extreme, many acknowledge that it can be improper to condition RAND royalties for SEPs on the licensee's willingness to cross-license non-SEPs (on RAND or any terms). A company's non-SEPs can protect differentiating features and technologies that they seek to practise exclusively during the term of the patent. While SEP holders ought to obtain a fair return on their investment, many believe that they ought not to be able to leverage the hold-up power of an SEP to force competitors to license differentiating technologies that would not otherwise be licensed. These sort of broad reciprocity demands have been criticized by some competition agencies.[98]

Where the line should be drawn between these two extremes is another area of intense debate among SDO participants. Some maintain that demanding cross-licensing of any patents other than SEPs for the same standard is an improper use of SEPs. Others maintain that reciprocity can extend to SEPs covering other standards promulgated by the same SDO or even other industry standards generally.

11.6 SEPs and patent-assertion entities

How might an SDO address 'patent troll' activities and the assertion of SEPs by entities that do not participate in the standardization process or marketplace for standardized goods?[99]

Recent years have seen a rise in 'patent-assertion entity' (PAE) claims targeting products practising technical standards. Standards-based assertions can be viewed as advantageous to the PAE because they may be able to use publicly available materials to identify the alleged infringement and to bring their allegations. (Conversely, non-standard claims may require reverse engineering efforts or other investigations that are viewed as costly.)

Such use of patent rights can potentially upset the balance in a standards community, as PAEs – because they do not make or sell products – can be immune from counter-assertions. This may encourage overly-aggressive behaviour and litigation tactics, particularly if injunctions are available that could exclude a standards-participant from the market.

As discussed above, standards bodies can use patent-transfer rules to limit the ability of PAEs to purchase essential patents without becoming bound to the SDO's licensing policy. Standards bodies can also develop rules and requirements regarding injunctions and 'reasonable' compensation to limit hold-up by PAEs. In addition, competition agencies and legislative bodies in some jurisdictions have expressed interest in addressing concerns relating to PAEs.

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[98] See, for example the European Commission's Decision regarding Google's acquisition of Motorola Mobility (Case No. COMP/M.6381): 'Another concern would be that the SEP holder may force a holder of non-SEPs to cross-license those non-SEPs to it in return for a license of the SEPs.' Of course, parties may always *voluntarily* agree to license or cross-license SEPs and non-SEPs together. Rather, the reciprocity concerns described here arise where an SEP holder *conditions* a licence to its SEPs on a cross-licence to the other company's non-SEPs.

[99] Once again, it should be noted that the decision to adopt a licensing-based business model can also be pro-competitive in that it permits companies to focus on what they do best without the need to invest in the assets required to commercialize they create in products

12. Overview of governments and courts' perspectives on SEPs

12.1 Governments' perspectives

The legality of seeking and enforcing injunctions against competitors on the basis of RAND-encumbered SEPs has begun to attract considerable attention, in particular in the US and Europe.[100]

For instance, in its recent decision on the Google/Motorola Mobility merger,[101] the European Commission expressed concern that injunctions could be used in an anti-competitive manner to exclude competing products from a market or to impose onerous licensing terms on potential licensees despite their willingness to acquire SEP licences on RAND terms. More recently, the EC's Directorate-General for Competition closed its formal investigation into the behaviour of certain companies active in the mobile industry suspected of SEP abuse.[102]

The potential abuse of RAND-encumbered SEPs has received similar attention in the US.

In July 2013, the US Federal Trade Commission (FTC) closed its investigation into the behaviour of Google's subsidiary Motorola only after Google agreed to a Consent Order that prohibits it from seeking injunctions against licensees willing to follow a RAND determination process.[103] The Google Consent Order also covers the seeking of exclusion orders from the US International Trade Commission (ITC), which has become a key forum in the US for disputes over the use of RAND-encumbered SEPs. The increasing number of requests being made to the ITC for exclusion orders has prompted the FTC,[104] the US Department of Justice (DoJ) and the US Patent and Trademark Office (USPTO)[105] to issue statements urging the ITC to take into account the potential impacts of its decisions on competition (particularly

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100 While the EU and the US have arguably been most active in this context, other States have also addressed some of the key areas of dispute.

101 Case COMP/M.6381 Google/Motorola Mobility of 13 February 2012, paragraph 107. See also paragraph 126 which mentions that "the seeking or enforcement of injunctions on the basis of SEPs is also not, of itself, anti-competitive. In particular, and depending on the circumstances, it may be legitimate for the holder of SEPs to seek an injunction against a potential licensee which is not willing to negotiate in good faith on FRAND terms"

102 In late 2012, the EC issued a Statement of Objections regarding Samsung's abuse of SEPs. In response, Samsung retreated in lawsuits it had instigated in Europe against standards implementers, conceding, among other things, its requests for preliminary injunctive relief. In May 2013, in a preliminary conclusion of its investigation of Google, the Commission found that the company had breached European competition law by seeking and enforcing an injunction against Apple. Both cases where closed in April 2014, with the EC clarifying how EU competition rules apply on enforcement of SEPs. More specifically, the two decisions affirm that recourse to injunctions is generally a legitimate remedy for patent infringements, but also clarify that the seeking of injunctions may be abusive when two conditions are met: first, a SEP holder has given a commitment to license on RAND terms in the context of standard development, and second, the potential licensee is willing to enter into a license on RAND terms. For more information, please see speech by Joaquin Almunia, *Introductory remarks on Motorola and Samsung decisions on standard essential patents*, Available: http://europa.eu/rapid/press-release_SPEECH-14-345_en.htm; EC Memo/14/322, *Antitrust decisions on standard essential patents (SEPs) - Motorola Mobility and Samsung Electronics - Frequently Asked Questions*, Available: http://europa.eu/rapid/press-release_MEMO-14-322_en.pdf; EC Press Release (IP/14/489), *Antitrust: Commission finds that Motorola Mobility infringed EU competition rules by misusing standard essential patents,* Available: http://europa.eu/rapid/press-release_IP-14-489_en.htm

103 Statement of the Department of Justice's Antitrust Division on its Decision to Close its Investigations of Google Inc.'s Acquisition of Motorola Mobility Holdings Inc. and the Acquisitions of Certain Patents by Apple Inc., Microsoft Corp. and Research in Motion Ltd of 13 February 2012. See also FTC's final Decision and Order of 22 July 2013 in *Motorola Mobility LLC and Google, Inc.*

104 FTC, Third Party Statement on Public Interest filed on 6 June 2012 in ITC investigation No 337-TA-752: '[…] *the threat of an exclusion order could allow a patentee to obtain unreasonable licensing terms despite its RAND commitment*'.

105 See DoJ and PTO, Joint Policy Statement on Remedies for Standards-Essential Patents Subject to Voluntary F/RAND Commitments of 8 January 2013: '[…] *an exclusion order based on a F/RAND-encumbered patent appears to be incompatible with the terms of a patent holder's existing F/RAND licensing commitment to a [SSO]*.'

in relation to the standards-setting process) and not to grant exclusion orders against licensees willing and able to acquire SEP licences on RAND terms.

12.2 Courts' perspectives

One of the cornerstones of the concept of RAND licensing commitments is that parties can take legal action if they believe that such commitments have been violated.

Opinion is divided on the implications of the considerable increase in the number of RAND-related court cases seen in the last few years. Some argue that this signals a problem with the system itself. Others argue that it demonstrates that the RAND system actually works, with parties able (and willing) to go to court when RAND commitments are violated.

In a standards context, courts' decisions affect not only the parties in conflict, but also the many other stakeholders that use such cases as a basis for their understanding of what is and what is not permitted, as well as where exactly the boundaries lie.

In April 2013, Judge Robart (US District Court) issued what is widely considered as the first judicial determination of a worldwide RAND portfolio rate in *Microsoft v Motorola*,[106] laying down economic guideposts for the determination of a reasonable rate.

National courts in Europe have been required to make similar rulings,[107] but as yet there has not been any ruling determining a RAND rate.

The question as to whether, and under what circumstances, a patent holder should be allowed to seek injunctive relief on the basis of a RAND-encumbered SEP has been answered differently by different courts.

In the US, certain district courts have held that SEP holders making RAND licensing commitments should generally not be entitled to injunctions, while others have concluded that a SEP holder does not breach its contracts simply by requesting an injunction and exclusionary order in its patent-infringement actions.

In Europe, national courts have applied a range of different legal tests in their grappling with the issue of injunctive relief in a RAND context. In some EU Member States, such as the Netherlands, France and UK, courts have generally held that granting an injunction may put a potential SEP licensee under considerable pressure in their negotiation of the terms and conditions of a RAND licence, compelling the licensee to agree to royalties exceeding a RAND level.[108]

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[106] *Microsoft Corp. v. Motorola*, Inc., No. 10-cv-1823 (W.D. Wash. April 25, 2013). Since that ruling, Judge Holderman of the District Court for the Northern District of Illinois has also made a RAND determination, in a case for WiFi SEPs, in which he slightly modified Judge Robart's approach to the specific situation of the case at hand; see *Re Innovatio IP Ventures, LLC Patent Litigation*, No. 11 C 9309 (N.D. Ill. October 3, 2013).

[107] See, for instance, in the UK, *Nokia v IPCom* and *IPCom v HTC* [2013] EWHC 1178 (Pat); or *Vringo v ZTE* [2013] EWHC 1591 (where Justice Birss refused to rule on a worldwide SEP portfolio licence as long as a potential licensee contests the validity/infringement of the patents in suit); and in Germany, *Motorola v Apple*, District Court of Mannheim, Case No. 7 O 241/12 (Germany-wide licence for all of Motorola's SEPs).

[108] *Samsung v. Apple*, District Court of The Hague, 14 March, 2012, Case No. 400367/HA ZA 11-2212.

In contrast, German courts have addressed this issue from a perspective generally more favourable to SEP holders.[109] Both the application of the 2009 'Orange Book' case-law by the country's lower courts and the characteristics of the German patent law system have made Germany the preferred jurisdiction for seeking SEP-based injunctions in Europe.

12.3 The promise of alternative dispute resolution

SEP-related disputes can be (and are) brought before national courts, but courts can be ill-equipped to consider the particulars of each dispute, given the complexity of the issues at hand and the consequent need for specialized expertise. Protracted legal battles can also entail very significant costs, posing barriers to litigation, especially for smaller players (which may also own SEPs). Moreover, differences in legal jurisdictions affect the outcomes of court cases in different countries, which can encourage a behaviour known as 'forum shopping' where the party initiating a court case (often the SEP owner) selects a venue favouring their point of view.

In light of these concerns, 'alternative dispute resolution' (ADR) – such as mediation and arbitration – has been highlighted as a promising means of resolving conflict in relation to SEPs.

ADR is a consensual procedure in which parties in conflict submit their dispute to one or more chosen mediators or arbiters. The procedure results in a binding and final decision based on the parties' respective rights and obligations, enforceable under the applicable ADR law. As a private alternative, ADR normally forecloses court options (in other words, parties cannot turn to court to appeal the arbiter's ruling).

ADR may offer the following advantages in disputes surrounding patent and standards in the ICT industry (depending on the design of the procedure):

Single procedure: ADR is able to use a single forum to settle disputes involving several jurisdictions, allowing the parties involved to avoid the great expense and complexity of multi-jurisdictional litigation, as well as the risk of inconsistent results.

Party autonomy: In contrast to litigation in court, the private nature of ADR allows parties greater control over the manner in which their dispute is resolved. The parties select the mediator or arbiter best suited to the task, a neutral party specialized in the subject matter of their dispute. The parties also choose the place and language of the proceedings and the applicable law.

[109] German Federal Supreme Court, judgment of 6 May 2009, Case No. KZR 39/06 - *Orange Book Standard*. According to this case-law, a company that is sued for patent infringement and against which injunctive relief is sought can invoke a competition law defence in those proceedings on the basis of the German civil law provisions on equity and good faith if the following conditions are fulfilled (i) the company seeking a licence must have made an offer to the patent holder; (ii) that offer must be unconditional; (iii) the patent holder may not reject that offer without infringing competition law; (iv) the company seeking a licence must adhere to its offer; and (v) where the company seeking the licence is already making use of the patents in question, it must behave as if the licensing agreement had been concluded and fulfil all the obligations resulting therefrom; in particular, it must pay the royalties to the patent holder or into an escrow account. See also *Philips v. SonyEricsson,* District Court of Mannheim, 27 May, 2011, Case No. 7 O 65/10); *Motorola v. Apple*, Court of Appeal in Karlsruhe, 27 February, 2012, Case No. 6 U 136/11); *IPCom v. Nokia*, District Court of Mannheim, 18 February, 2011, Case No. 7 O 100/10; *IPCom v. Nokia*, District Court of Düsseldorf, 24 April, 2012, Case No. 4b O 273/10; and *Motorola v. Microsoft*, District Court of Mannheim, 2 May, 2012, Case No. 2 O 240/11.

Expertise: The parties appoint arbiters, mediators or experts with specific proficiency in the relevant legal, technical or business area. This is particularly advantageous in IPR disputes rooted in the ICT industry, where judges might lack the appropriate expertise.

Neutrality: ADR can be neutral to the law, language and institutional culture of the parties, preventing any home advantage a party might enjoy in court-based litigation.

Cost and time efficiency: Rapid IPR dispute resolution is essential in the ICT industry where time delays can jeopardize entire projects or product lines. ADR can resolve conflict in short time-frames which the parties can adapt as necessary, often making use of fast-track methods such as 'expedited arbitration'. ADR also allows parties to avoid the very significant costs associated with multi-jurisdictional court proceedings.

Confidentiality: ADR proceedings and their results are confidential, allowing parties in conflict to find a solution amenable to both parties, without concern for its impact on public opinion or the views of other industry players. This is particularly beneficial in cases where commercial reputations and trade secrets are involved. (However, this might also be seen as a disadvantage in that other parties cannot learn from the outcome or refer to it in future conflicts. There are also public interest benefits to the transparency of judicial proceedings, particularly where a patent is subject to a successful invalidity challenge that may be binding in future cases, or where a RAND royalty to a particular portfolio is established).

Preserving long-term relationships: ADR mechanisms, mediation in particular, allow parties to preserve their business relationships as less confrontational forums allow for business interests to be taken into consideration in the interests of finding viable long-term solutions.

Finality and international enforceability of arbitral awards: Parties referring their disputes to arbitration benefit from the finality of arbitral awards. Unlike court decisions, arbitral awards are normally final, binding and not subject to appeal. In addition, the United Nations Convention on the Recognition and Enforcement of Foreign Arbitral Awards of 1958 provides for the recognition of arbitral awards on a par with domestic court judgments, without review of the merits of arbitral awards, which aids greatly in facilitating the enforcement of awards across borders.

Discussion as to whether SDOs should incorporate support for ADR is gaining momentum. A number of smaller standards bodies – such as the Digital Video Broadcasting Project (DVB Project), the Blu-Ray Disc Association (BRDA) and the Open Mobile Alliance (OMA) – have already included ADR methods in their IPR policies. Arguments for ADR were also lent further support by the FTC's identifying ADR as a means to facilitate RAND licensing agreements in the case of SEPs held by Google's subsidiary Motorola Mobility (although the implementer may also choose to go to a US District Court).[110] Finally, the Arbitration Center of the World Intellectual Property Organization (WIPO) has recently made available tailored model submission agreements that parties may use to refer a dispute concerning the adjudication of RAND terms to WIPO (Expedited) Arbitration. The WIPO model submission agreements seek to ensure a cost and time-effective RAND adjudication.[111]

[110] Motorola Mobility LLC and Google Inc., FTC File No. 121 0120 http://www.ftc.gov/opa/2013/07/google.shtm

[111] http://www.wipo.int/amc/en/center/specific-sectors/ict/frand/

However, there are some concerns with any approach that would make ADR mandatory (as opposed to a voluntary option). For instance, ADR, such as arbitration, typically is a voluntary process that requires the specific parties to agree on the process, scope, etc. RAND adjudications typically involve issues relating to the setting of RAND terms and conditions as well as issues relating to validity, infringement and enforceability of a range of patents (and any other issues the parties wish to raise that relate to their particular dispute). It may be difficult for the parties to agree on how all of these issues should be addressed.

In addition, many questions remain as to how larger SDOs should incorporate ADR mechanisms. These questions include, *inter alia*:

– Should ADR activities be conducted by SDOs internally, or should they remain the responsibility of external parties specialized in ADR?
– What is the appropriate scope of ADR procedures? Should they only determine RAND licensing fees, or should they also address questions related to the validity and infringement of SEPs?
– Should the use of ADR be mandatory (and for whom)? If so, how would such an obligation be enforced?
– What are the principles to inform arbitrators' rulings on RAND rates? Should (new) principles be developed?

Part IV – A closer look at ITU's standardization activities and its patent policy

Introduction and objectives of Part IV

ITU's predecessor, the International Telegraph Union, was formed in 1865, making ITU one of the first intergovernmental organizations ever established. Today, ITU has a global membership of 193 Member States and over 700 private-sector entities, as well as academia and research institutes. It is one of the primary SDOs in the ICT field, with over 4 000 international standards (ITU Recommendations) currently in force. Some of ITU's best known standards include those underpinning long-haul fibre-optic transport (SDH, OTN); fibre- or copper-based access networks through which end-users connect (xDSL, PON); and audiovisual coding (ITU-T H.323, ITU-T H.264, ITU-T H.265), to name just a few.

ITU standards development is driven principally by private-sector members that come together to develop the standards that the industry needs to progress. Standards work is initiated in response to contributions from members, and decisions to take on new work or approve standards are made by consensus. ITU's standards-approval process allows for participation by members not actively involved in the development of a standard, permitting all members to review proposed standards and submit comments or concerns.

ITU, ISO and IEC have developed a common patent policy and related guidelines, adopted in 2007. The policy rests on a commitment-based approach. A disclosure process aims to identify all patents essential to standards under development, and a commitment process seeks declarations from SEP holders that they are willing to grant licences to these patents on certain sought terms.

ITU generally receives between 50 and 150 statements a year indicating that a company (or other organization) believes it owns patents indispensable to ITU Recommendations. Each of these statements can list one or more individual patents (sometimes hundreds), and ITU also allows blanket claims in which the exact identities of SEPs are not specified.

In relation to SEP licensing commitments, ITU allows for companies to commit to licensing their SEP on either RAND or RF terms. Companies opting for RF terms do not waive all their rights to royalties, and are still entitled to demand non-monetary conditions in licensing contracts, provided that these conditions are not unreasonable or discriminatory. Companies opting for RAND terms reserve the right to demand royalty-bearing licences, provided that such licensing fees and all other terms and conditions are not unreasonable or discriminatory. Both RF and RAND commitments allow for reciprocity requirements, within certain limits. A patent owner can also declare that it is unwilling to grant licences to its SEPs, but such cases are fortunately very rare.

Upon completion of Part IV, the reader should have a good understanding of:

- Well-known ITU achievements in global ICT standardization;
- Key principles and provisions of the ITU-T/ITU-R/ISO/IEC Common Patent Policy; and
- The differences between the various options for licensing commitments, including reciprocity clauses.

13. ITU and its role in international standards development

ITU has a long history, being a direct descendent of the International Telegraph Convention of 1865 and thus one of the world's oldest intergovernmental organizations. Although the International Radio Telegraph Convention was established separately in 1906, the two conventions were merged in 1932 and the resulting organization was subsequently renamed the International Telecommunication Union (ITU) in 1934. Standards development has been one of ITU's core activities since its inception, but the organization differs from other standards bodies in one key respect, namely in that it is an intergovernmental organization founded on a treaty between nation states.

ITU has a public-private partnership of members that includes 193 Member States and over 700 private-sector entities, as well as academia and research institutes. It has a federated structure in which a General Secretariat supports membership-driven work undertaken in three specialized Sectors, each of which is also supported by its own secretariat. The Radiocommunication Sector (ITU-R) allocates global radio spectrum and satellite orbits, among other things; the Telecommunication Standardization Sector (ITU-T) develops the technical standards that ensure networks and technologies seamlessly interconnect; and the Telecommunication Development Sector (ITU-D) strives to improve access to ICTs for underserved communities worldwide.

ITU-T is responsible for the majority of ITU's standards work, although standards are also developed by ITU-R. This publication focuses on the ITU-T standardization process and its resulting international standards ('ITU-T Recommendations').

ITU-T Recommendations are developed within ITU-T study groups (Table 13-1), which assemble experts from around the world to develop the standards the ICT industry needs to progress.

Table 13-1 – Overview of current ITU-T study groups

ITU-T Study Group	Topics and responsibilities
2 (Operational aspects)	International telecommunication numbering system; and the management of telecom services, networks and equipment.
3 (Economic and policy issues)	Principles for the harmonization of global interconnection rates, the costs between telecommunication service providers when linking networks for the exchange of traffic.
5 (Environment and climate change)	ICT's relationship with electromagnetic effects, the environment and climate change.
9 (Broadband cable and TV)	Telecommunication systems in the distribution of television and sound programmes; and cable and hybrid networks as integrated broadband networks.
11 (Protocols and test specifications)	Signalling requirements and protocols; and test specifications focusing on global interoperability testing.
12 (Performance, QoS and QoE)	Models to evaluate performance, quality of service (QoS) and quality of experience (QoE).
13 (Future networks including cloud computing, mobile and next-generation networks)	Requirements and functional architectures of future networks including cloud computing, mobile and next-generation networks.

ITU-T Study Group	Topics and responsibilities
15 (Transport, access and home)	Optical transport networks; fibre- or copper-based access networks; smart grid; and home networks connecting in-premises devices and interfacing with the outside world.
16 (Multimedia)	Multimedia coding, terminals, systems and applications.
17 (Security)	Security, and technical languages and description techniques.

ITU-T Recommendations cover a wide range of ICT fields, but some of the best known are those underpinning copper- or fibre-based access networks (xDSL and PONs), long-haul optical transport and audiovisual coding. ITU-T Recommendations also govern international telecommunication numbering systems, e.g. the assignment of fixed and mobile telephony numbers in any country being based on Recommendation ITU-T E.164.

Optical transport and video coding standards

An estimated 95 per cent of international data traffic travels over undersea or terrestrial fibre-optic cables. These are the information superhighways that connect networks across continents and countries. Backbone optical transport networks carry traffic framed in standardized protocols that enable the interoperability of ICT networks and devices built and operated by numerous entities in a vast array of locations.

The ITU-standardized Optical Transport Network (OTN) provides a terabit-capable framework equipped to carry ever-rising volumes of data and video traffic. OTN supports legacy protocols such as SDH, but it is designed to transport new packet, data-centre and video protocols such as IP, MPLS, Ethernet, Fibre Channel, SDI, DVB-ASI, etc. This allows for the seamless convergence of operators' networks. OTN also offers the flexibility required to support future protocols as they emerge.

Audiovisual media coding standards are essential in allowing consumers to enjoy high-quality content received over telecommunication networks or stored on physical media (such as optical discs or flash memory). An important part of this coding is the compression of data that would otherwise have been much too large to transmit or store efficiently.

The ITU-T H.264 video compression codec, developed in collaboration with ISO/IEC JTC1, provided the common platform that foments the extraordinary innovation and growth seen in the video market over the last decade. It is widely used in modern Internet streaming services, as well as in physical storage such as Blu-ray discs. ITU-T H.264 offered the first truly scalable solution, and its dominance is such that many market players have adopted it to replace their own proprietary codecs.

ITU-T H.264 remains the most deployed video compression standard worldwide, now accounting for over 80 per cent of web video, and it continues to deliver excellent quality across the entire bandwidth spectrum – from high-definition television to videoconferencing and 3G mobile multimedia.

ITU-T H.265, the successor to ITU-T H.264, was approved in April 2013 and will considerably ease the burden on global networks where, by some estimates, video accounts for more than half of bandwidth use. ITU-T H.265 needs only half the bit rate of its predecessor and will provide a flexible, reliable and robust solution, future proofed to support the next decade of video.

14. ITU-T standardization process

ITU-T study groups are groups of experts volunteered by members to develop standards in a particular technical field. Central to the ITU-T standardization process is the concept of a 'contribution', the term used to describe a membership input to an ITU-T study group. The subject matter of contributions varies, but typically they are limited to suggesting new work areas, new Recommendations and changes to existing ITU-T Recommendations. The acceptance of a proposal in a contribution is dependent on that proposal finding consensus among a study group's participants.

Assisting in the organization of standardization work, a study group may be structured into a number of 'working parties' overseeing particular groups of 'questions'. Standardization work on a question is carried out by a 'rapporteur group', a team of experts tasked with drafting ITU-T Recommendations to meet a question's agreed objectives, taking into account guidance from other study group participants as well as from other relevant ITU expert groups.

Once the text of a draft ITU-T Recommendation is considered mature, it is submitted for review to a meeting of the overarching study group or working party. If agreed by the meeting, it is given 'consent' – meaning that the study group or working party has given its consent that the text is sufficiently mature to initiate a final review process leading to the approval of the ITU-T Recommendation. After a text has achieved consent (or is 'determined' in the case of standards that have regulatory implications), the Director of ITU-T's secretariat, the Telecommunication Standardization Bureau (TSB), announces the start of the applicable approval process (either TAP or AAP, as described below) by posting the draft text on the ITU-T website and calling for comments. This gives all members the opportunity to review the text.

Draft ITU-T Recommendations that have regulatory implications are subjected to an approval process termed the 'traditional approval process' (TAP). TAP contains a number of safeguards deemed necessary in the context of these regulatory implications, and, as a result, this process takes some time. However, the vast majority of ITU-T Recommendations are approved via the 'alternative approval process' (AAP), a fast-track approval procedure developed in the interests of delivering standards to market in the time-frame demanded by the ICT industry. This new procedure was introduced in 2001 when ITU-T conducted a major overhaul of its standards-development procedures, streamlining approval procedures and yielding an estimated 80-90 per cent reduction in the time taken to approve an ITU-T Recommendation.[112]

In both TAP and AAP, the 'last call' phase is a four-week period in which comments can be submitted by Member States and Sector Members. If no comments other than editorial corrections are received, the ITU-T Recommendation is considered approved. However, if any comments identify issues in need of further work, the study group chairman, in consultation with TSB, initiates a comment resolution process involving the experts concerned. A revised text is then posted to ITU-T's website for an 'additional review' period of three weeks. If no significant comments are received, the revised ITU-T Recommendation will be approved. If received comments point to issues in need of further work, the

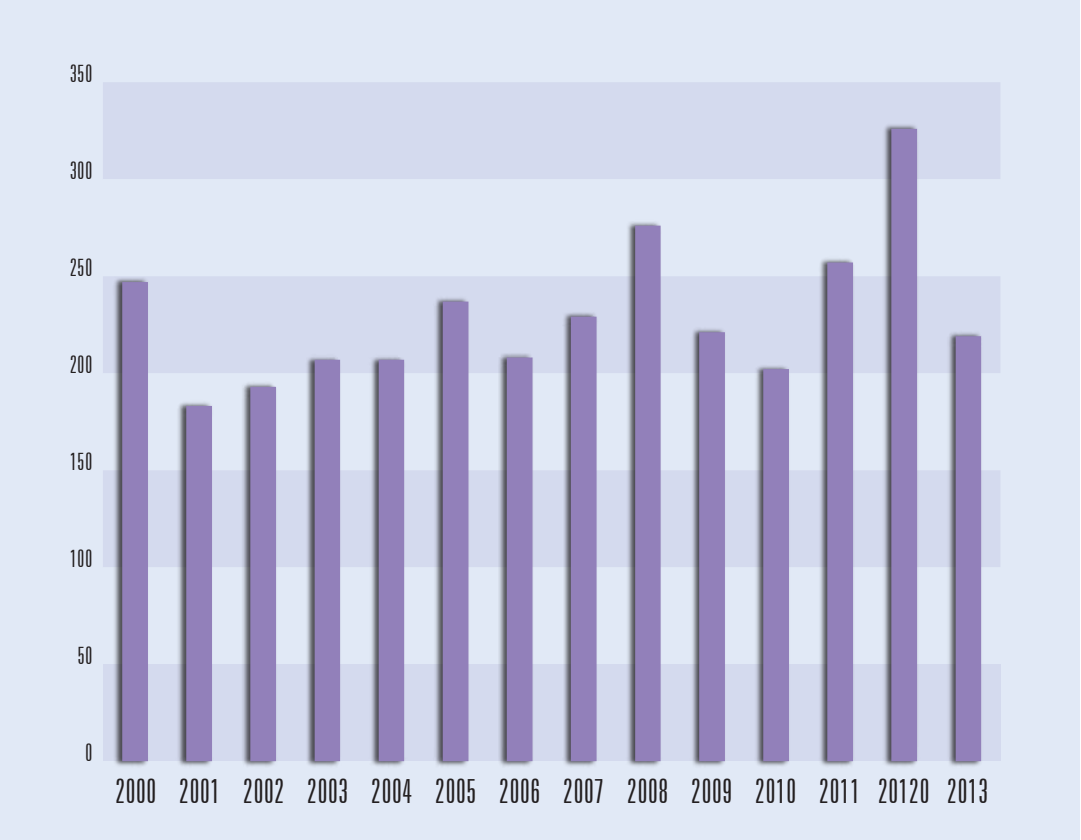
[112] Until the mid-1990s, ITU standards required, on average, between two and four years to be approved and published, but can today be approved in an average of two months or as little as five weeks through AAP.

draft text and all accompanying comments are sent to the next meeting of the relevant study group for further discussion and possible approval.

In cases where comments are received during the last call but the study group chairman sees that there is insufficient time for comment resolution and an additional review period, the draft Recommendation and unresolved comments may be sent directly to the next meeting of the study group for resolution and agreement.

Over the last decade, ITU approved between 183 and 326 new or revised ITU-T Recommendations each year, as illustrated by Figure 14-1.

Figure 14-1 – New and revised ITU-T Recommendations approved, 2000-2013



15. ITU-T/ITU-R/ISO/IEC Common Patent Policy and related Guidelines[113]

Almost all SDOs have established policies governing the inclusion of patented technology in standards. The ITU-T/ITU-R/ISO/IEC Common Patent Policy was adopted in 2007, and recent work has targeted the development of measures to improve this policy.

15.1 History and evolution

ITU began discussing the issues associated with the inclusion of patented technology in its standards in the early 1970s, but as technology and business strategies evolved, the number of SEPs and their importance has grown in significance. The first version of an ITU patent policy was developed in 1985, based largely on best practices established by certain ITU-T study groups. Later, during the 1990s, it became apparent that the issues surrounding patents and standards were arising more frequently and becoming even more complex. In response, the ITU Director of TSB's Ad Hoc Group on IPR was established as a forum for experts from the ITU membership and invited guests to provide input and guidance on these issues.

Two other large, international SDOs – ISO and IEC – found themselves in a similar position and were also evaluating their IPR policies. Against the backdrop of increasing ICT convergence, the three organizations saw benefits to harmonizing their IPR policies and orchestrated this harmonization through their World Standards Cooperation (WSC) initiative. After considerable discussion, WSC announced in March 2007 that it had agreed a Common Patent Policy for ITU/ISO/IEC.[114]

The ITU-T/ITU-R/ISO/IEC Common Patent Policy allows for companies' innovative technologies to be included in standards as long as intellectual property is made available to all standards implementers on RAND terms and conditions.

15.2 Scope and key concepts

The overriding objective of the ITU patent policy is 'that a patent embodied fully or partly in a Recommendation/deliverable must be accessible to everybody without undue constraints'.

IPR policies are usually either participation- or commitment-based. ITU's policy, much like those of other large SDOs, is commitment-based. The policy encourages the early disclosure and identification of patents that might be essential to standards under development. As part of that disclosure, SEP holders are asked to provide a statement regarding their willingness to license their SEPs to standards implementers. The policy thus seeks to improve the efficiency of ITU standards development and avoid conflict stemming from patent-rights disputes.

[113] The comments made in this Section are based on the ITU-T/ITU-R/ISO/IEC Common Patent Policy and related Guidelines as they stood at 31 March 2014. The opinions expressed herein are those of the authors and do not necessarily represent the views of the ITU. Nothing in this Section is to be considered as an authoritative interpretation of the ITU-T/ITU-R/ISO/IEC Common Patent Policy and related Guidelines as this publication is only intended for educational and informational purposes.

[114] Although ITU, ISO and IEC share a common policy, parts of the policy are specific to each of the SDOs.

The harmonized ITU/ISO/IEC approach to the treatment of patents comprises:

– Common Patent Policy for ITU-T/ITU-R/ISO/IEC ('Patent Policy').
– Guidelines for Implementation of the Common Patent Policy for ITU-T/ITU-R/ISO/IEC ('Guidelines'). These guidelines are intended to clarify and facilitate implementation of the Patent Policy.
– Patent Statement and Licensing Declaration Form ('Declaration Form').

While the Patent Policy has remained unchanged since its adoption in 2007, the Guidelines and various declaration forms have been updated over time.

This publication focuses on the Patent Policy, but ITU has also adopted *Software Copyright Guidelines* and *Guidelines related to the inclusion of Marks* which provide study groups with guidance in relation to the incorporation in standards of material under copyright or trademarks, service marks and certification marks.

The Patent Policy, in keeping with most commitment-based IPR policies, has two main building blocks: disclosure rules, and licensing commitments. Disclosure refers to standardization participants' alerting ITU of the existence of any patents or pending patent applications that might lead to a standard incorporating SEPs once approved. Licensing commitments are made in response to the request that SEP holders provide ITU with a declaration of their willingness to license SEPs to all standards implementers on RAND or RF terms. Such disclosures and licensing commitments are effected through ITU's Patent Statement and Licensing Declaration Form.

15.3 Disclosure of SEPs

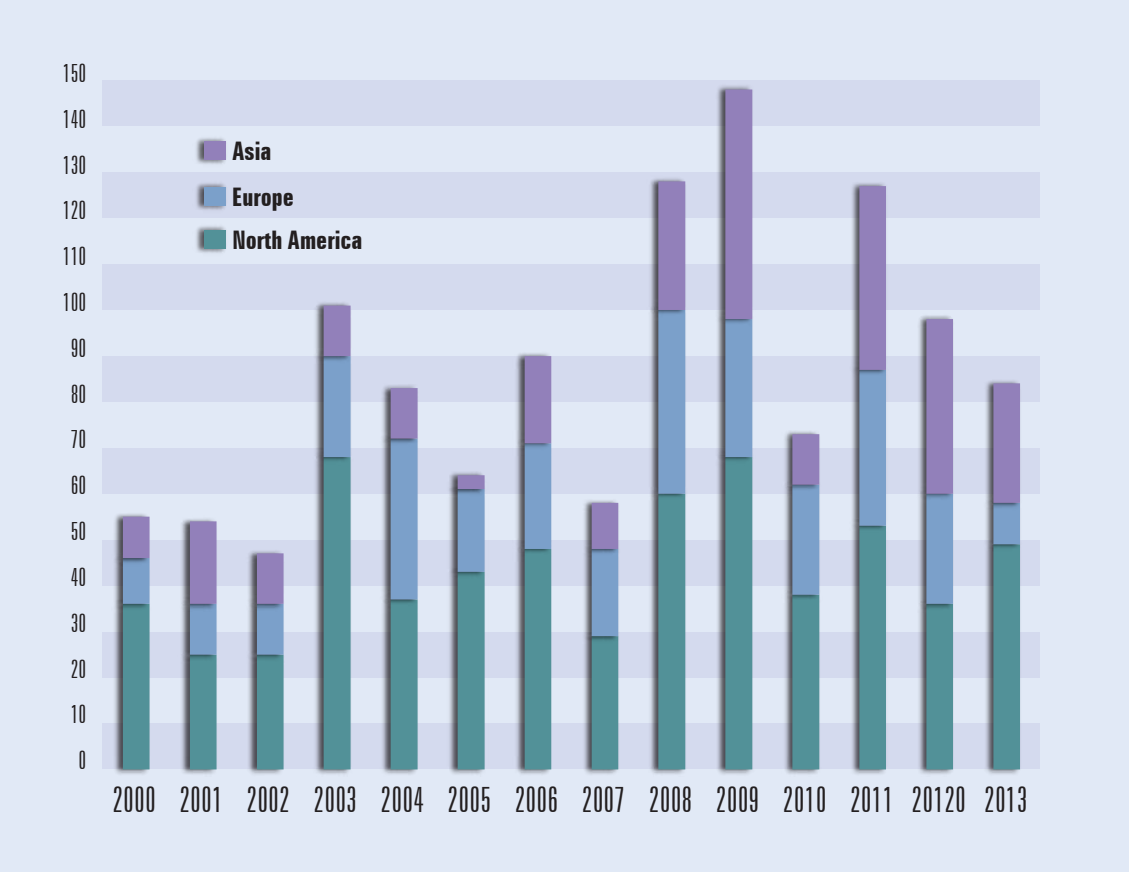
The general disclosure rule in the Patent Policy reads: *'[A]ny party participating in the work of ITU, ISO or IEC should, from the outset, draw the attention of the Director of ITU-TSB, the Director of ITU-BR, or the offices of the CEOs of ISO or IEC, respectively, to any known patent or to any known pending patent application, either their own or of other organizations'*. The Guidelines further explain that information should be provided 'in good faith and on a best-effort basis' but there is no requirement that participating patent holders conduct patent searches in order to make more definitive disclosures.

As disclosure is encouraged early in the standards-development process, before the text of a standard matures, it is very possible that disclosed patents will not be essential to the final version of a standard. This uncertainty is magnified by the possibility that disclosed patent applications will have their scope narrowed during the patent prosecution process, resulting in the granted patent not being essential to the standard. There is also the risk that the final version of a standard will differ substantially from earlier versions, thereby covering patents or pending patent applications not initially considered relevant to a standard under development. These limitations are the result of a trade-off made by the Patent Policy: to seek disclosures late in the standards-development process might result in higher 'quality' disclosures, insofar as there will be a higher likelihood of disclosed patents actually being standard-essential; however, at this stage, undesirable consequences can result from the discovery that patented technology is not available on the sought RAND or RF terms.

ITU receives several dozen patent declarations each year in response to its disclosure rules, an increasing number of which come from Asia (see Figure 15-1). When considering these numbers, it is important to note that a single declaration can sometimes identify hundreds of patents believed

to be essential to a standard under development. Moreover, as ITU allows parties to submit 'blanket declarations', some declarations will not specify whether they relate to a single patent or to a large patent portfolio.

Figure 15-1 – Number of patent declaration statements by regional origin, 2000-2013



Note: No patent declarations received from Africa, Australia or South America.

To whom does the disclosure rule pertain?

The disclosure rule pertains to any party participating in ITU standardization work. This encompasses work undertaken in study groups and their subordinate groups or other expert groups of ITU-T and ITU-R, as well in countries' processes to determine national positions on draft ITU standards. Parties not participating in ITU standardization work may also disclose potential SEPs, but are under no obligation to do so.

Disclosure of another party's patents

ITU's SEP disclosure process does not confine itself to patents owned by companies making disclosures. The Patent Policy also encourages disclosures of SEPs 'of other organizations'. It is often difficult for a company to assess whether other companies own potential SEPs, but such information is very relevant to the work of ITU, especially if the identified SEP owner is not a participant in ITU standardization work and is thus not itself subject to any disclosure obligations. If a 'third party' is reported to own a potential SEP, ITU will ask the company in question if it agrees with the analysis that its patent(s) might become standard-essential and whether it is willing to submit a Patent Statement and Licensing Declaration Form. However, if the third-party company is not a participant in the ITU standardization process, it is under no obligation to respond.

At what point in time should disclosure occur?

The Patent Policy encourages early disclosure, stating that disclosure should be made 'from the outset', and the related guidelines offer more extensive guidance in this respect. If not from the outset, given that the first draft of a standard might be too vague or substantially different from the final standard, the Patent Policy's wording implies that disclosure should be made as early as possible during a standard's development. Disclosures made early in the process provide study groups with key information that could affect the future course of a standard's development, also giving ITU time to determine whether holders of potential SEPs are willing to grant licences to their patented technology should their patents be found essential to an approved standard.

Disclosure after approval of a standard

If, after a standard is approved, a participant becomes aware that it holds SEPs or that it has filed patent applications which could result in SEPs, that participant should still make a disclosure. Disclosures should be made whenever a party participating in the standardization process becomes aware that it holds SEPs or potential SEPs.

How disclosures are made

A participant must use a pre-defined declaration form to make a disclosure, sent to the Director of TSB or BR (see Figure 15-2). This form helps to populate patent information databases with clear, consistent information. Attention should be given to supplying contact information that will remain valid over time. In particular, multinational companies are especially encouraged to provide the same contact information on every declaration form they submit.

Chairmen of study groups and their subordinate groups, or other expert groups of ITU-T and ITU-R, will ask during meetings whether participants have knowledge of any potential SEPs. Responses will be recorded in the meeting's report, but disclosures must also be made officially, using the declaration form.

Figure 15-2 – Extract from the Patent Statement and Licensing Declaration Form, in which a submitter selects licensing options

Licensing declaration:

The Patent Holder believes that it holds granted and/or pending applications for Patents, the use of which would be required to implement the above document and hereby declares, in accordance with the Common Patent Policy for ITU-T/ITU-R/ISO/IEC, that (check one box only):

☐ 1. The Patent Holder is prepared to grant a Free of Charge license to an unrestricted number of applicants on a worldwide, non-discriminatory basis and under other reasonable terms and conditions to make, use, and sell implementations of the above document.

Negotiations are left to the parties concerned and are performed outside the ITU-T, ITU-R, ISO or IEC.

Also mark here __ if the Patent Holder's willingness to license is conditioned on Reciprocity for the above document.

Also mark here __ if the Patent Holder reserves the right to license on reasonable terms and conditions (but not Free of Charge) to applicants who are only willing to license their Patent, whose use would be required to implement the above document, on reasonable terms and conditions (but not Free of Charge).

☐ 2. The Patent Holder is prepared to grant a license to an unrestricted number of applicants on a worldwide, non-discriminatory basis and on reasonable terms and conditions to make, use and sell implementations of the above document.

Negotiations are left to the parties concerned and are performed outside the ITU-T, ITU-R, ISO, or IEC.

Also mark here __ if the Patent Holder's willingness to license is conditioned on Reciprocity for the above document.

☐ 3. The Patent Holder is unwilling to grant licenses in accordance with provisions of either 1 or 2 above.

In this case, the following information must be provided to ITU, and is strongly desired by ISO and IEC, as part of this declaration:

- granted patent number or patent application number (if pending);
- an indication of which portions of the above document are affected;
- a description of the Patents covering the above document.

Free of Charge: The words "Free of Charge" do not mean that the Patent Holder is waiving all of its rights with respect to the Patent. Rather, "Free of Charge" refers to the issue of monetary compensation; *i.e.*, that the Patent Holder will not seek any monetary compensation as part of the licensing arrangement (whether such compensation is called a royalty, a one-time licensing fee, etc.). However, while the Patent Holder in this situation is committing to not charging any monetary amount, the Patent Holder is still entitled to require that the implementer of the same above document sign a license agreement that contains other reasonable terms and conditions such as those relating to governing law, field of use, warranties, etc.

Reciprocity: The word "Reciprocity" means that the Patent Holder shall only be required to license any prospective licensee if such prospective licensee will commit to license its Patent(s) for implementation of the same above document Free of Charge or under reasonable terms and conditions.

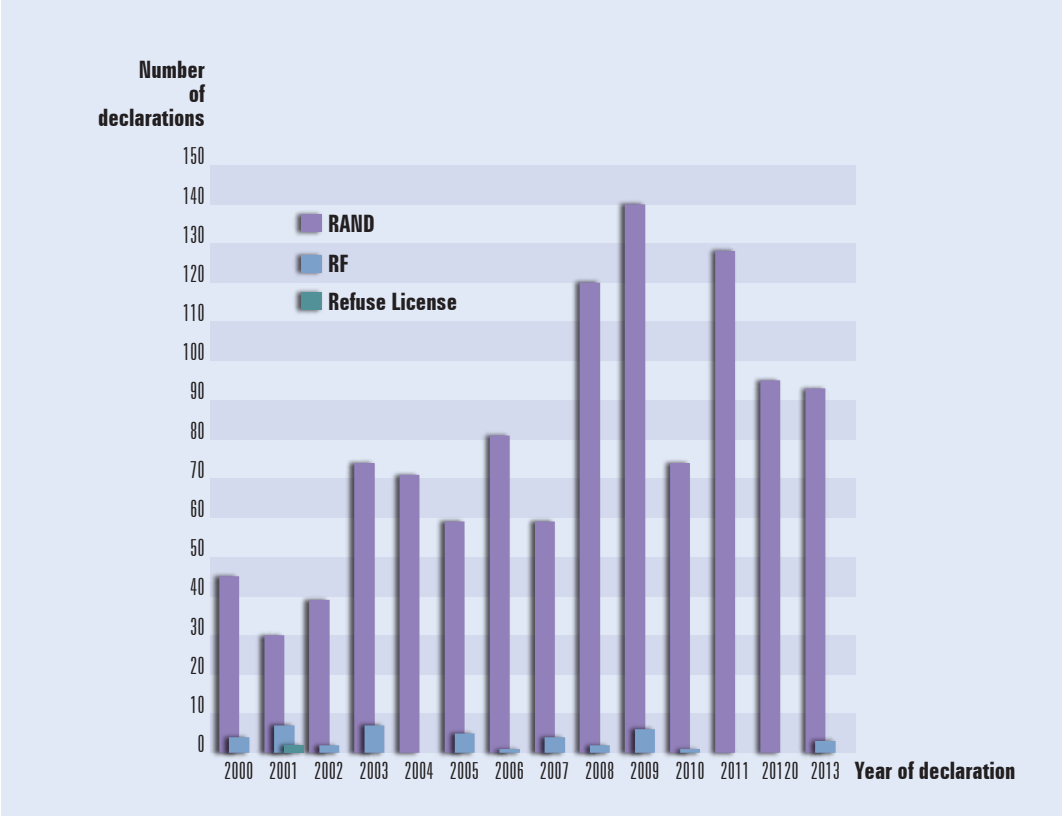
Patent: The word "Patent" means those claims contained in and identified by patents, utility models and other similar statutory rights based on inventions (including applications for any of these) solely to the extent that any such claims are essential to the implementation of the same above document. Essential patents are patents that would be required to implement a specific Recommendation | Deliverable.

15.4 Licensing commitments for declared SEPs

The Patent Policy seeks commitments from owners of disclosed SEPs that they will license their SEPs to standards implementers on RAND or RF terms.

Disclosures and licensing commitments are made using the same Declaration Form. Participants and members are obligated to submit this form.[115] Owners of disclosed SEPs also have the freedom to indicate that they are unwilling to license their SEPs on the sought RAND or RF terms. Such a decision has significant impact on the development of a standard – making it necessary to remove features demanding the use of the particular patented technology, or sometimes to withdraw work on a standard entirely – but one of the chief purposes of a patent policy is to make such positions known early, allowing time for appropriate measures to be taken in response. Fortunately, refusals to submit licensing commitments are rare, as can be seen in Figure 15-3.

Figure 15-3 – Type of received licensing commitments, by year



[115] Third parties, however, are not obligated to submit such a form, even if ITU requests them to do so: SDO policy is simply not binding on such third parties.

Commitment to license on royalty free (RF) terms

The first selection box in Figure 15-2 provides the exact text of an organization's commitment to license their potential SEPs on RF terms (the document refers to RF as 'free of charge', which has the same meaning). The text notes that, despite the commitment to free-of-charge licensing, SEP licences can be granted 'under other reasonable terms and conditions'. The Declaration Form includes a definition of the term 'free of charge', which explains that the patent holder does not waive all rights with respect to its patent, and is still entitled to require that standards implementers 'sign a licence agreement that contains other reasonable terms and conditions such as those relating to governing law, field of use, reciprocity, warranties, etc.' However, owners of potential SEPs are not permitted to stipulate other terms and conditions not compatible with RAND. This approach is also known as RAND-RF or RAND-zero.

The SEP holder has the opportunity to use a checkmark to indicate that their willingness to license implementers is conditional upon 'reciprocity' in terms of others' granting licences to SEPs relevant to the specified standard. This is intended to prevent a standards implementer from obtaining a licence from the SEP holder while in parallel refusing to grant licences to their own SEPs in relation to the same standard. Having a licence conditioned on reciprocity means that the SEP holder will only be required to license a standards implementer if that implementer agrees to license its own SEPs for the same standard on RF or RAND terms. When making a general commitment to license implementers on RF terms, the SEP owner also has the opportunity to use a checkmark to indicate that it will instead offer a RAND licence (not 'free of charge') to any implementers only willing to offer a reciprocal royalty-bearing RAND licence.

Commitment to license on RAND terms

The second selection box in Figure 15-2 provides the exact text of an organization's commitment to license their potential SEPs on RAND terms. In contrast to RF commitments, SEP owners making RAND commitments reserve the freedom to require royalty-bearing licences (that is, demanding monetary compensation from licensees).

Just as with RF commitments, the SEP holder has the opportunity to use a checkmark to indicate that its willingness to license implementers is conditional upon 'reciprocity' in terms of others' granting licences to SEPs relevant to the specified standard.

No willingness to license

The last selection box in Figure 15-2 provides the exact text of an organization's refusal to commit to licensing their potential SEPs on RF or RAND terms. Regardless of whether the patent owner is unwilling to license SEPs or only willing to license SEPs on terms other than RF or RAND, the availability of licences as desired by ITU is not achieved. In such cases, ITU requires[116] that the patent holder provide the following information as part of the Declaration Form:

- Granted patent number or patent application number (if pending)
- An indication of which portions of the standard are affected
- A description of the patents essential to the standard.

[116] Again, strictly speaking, ITU cannot require such a thing from third parties not bound by its policies. However, if a third party believed to own SEPs is not willing to submit this form, ITU becomes aware of the possible lack of licences on the desired terms and can take appropriate steps in response.

In addition, ITU requires that the patent holder fill out the table on the third page of the Declaration Form to identify the titles of the relevant patents or patent applications as well as their status (granted or pending), country and number. ITU requires this additional information in order to inform the relevant study groups and their subordinate groups, or other expert groups of ITU-T and ITU-R, to ensure that appropriate action can be taken in response. Such action will generally include a review of the affected Recommendation or its draft to remove the cause of the refusal to license potential SEPs, or to examine and clarify the technical considerations causing the refusal.

A patent holder may not modify the Declaration Form

Patent holders submitting a Declaration Form are not permitted to include additional provisions, conditions or modifications over what is provided for by the options on the Declaration Form. The patent holder must check a box corresponding to one of the three options offered by the Declaration Form, and may check sub-options, if applicable.

A patent holder may submit multiple Declaration Forms

A patent holder may submit multiple Declaration Forms for the same Recommendation if:

– The patent holder wishes to identify several patents and would like them classified according to different options on the Declaration Form; or,

– The patent holder wishes to classify separate aspects of a complex patent according to different options on the Declaration Form.

A Declaration Form, once submitted, is irrevocable

The licensing commitment embodied by the Declaration Form remains in force unless it is superseded by another Declaration Form containing more favourable licensing terms and conditions from a licensee's perspective. In other words, a patent holder can:

– Change its licensing commitment from option 3 to option 1 or 2;

– Change its licensing commitment from option 2 to option 1; or,

– Un-check one or more sub-options contained within either option 1 or 2.

However, obvious errors such as typographical mistakes in a standard or patent reference number can be corrected at any time.

The General Patent Statement and Licensing Declaration Form

In addition to the '*Patent Statement and Licensing Declaration*' form, ITU also has a '*General Patent Statement and Licensing Declaration*' form ('General Form'). The General Form gives patent holders the ability to make a general licensing declaration in relation to patent-protected material contained within any of their contributions to ITU standardization work. By submitting a General Form, patent holders declare their willingness to license any eventual SEPs arising as a result of their contributions' proposals being reflected in Recommendations. The General Form includes two options similar to the first two options on the Declaration Form, but differs from the Declaration Form in that it applies to any Recommendation rather than one specifically.

The General Form is *not* a replacement for the Declaration Form in the case of a specific Recommendation. A patent holder having already submitted a General Form should also submit a Declaration Form for potential SEPs relevant to a specific Recommendation.

It is also important to note that the General Form does not imply SEP disclosure. Companies can submit this form even if they do not believe that they own potential SEPs. It differs from the Declaration Form in this respect, which does imply disclosure of what is believed to be a potential SEP.

Like the Declaration Form, once a General Form has been submitted, it becomes irrevocable. A General Form remains in force unless it is superseded by another General Form containing more favourable licensing terms and conditions from a licensee's perspective (such as a move from RAND to RF, for instance).

Transfers and assignment of declared SEPs

A patent holder participating in ITU standardization work that assigns or transfers ownership or control of declared SEPs is required to make reasonable efforts to notify the assignee or transferee of related licensing commitments. In addition, if that patent holder identified specific patents to ITU, they must have the assignee or transferee agree to be bound by the same licensing commitments for the same patent(s). If that patent holder did not identify specific patents to ITU, they must make reasonable efforts to have the assignee or transferee agree to be bound by the same licensing commitment for the same patent(s); however the patent holder is not required to conduct a patent search. By complying with these requirements, the patent holder discharges its obligations in relation to its licensing commitments after the transfer or assignment of the patents.

ITU's Patent Information database

ITU maintains a publicly available 'Patent Information' database composed of information communicated to ITU by means of Declaration Forms and General Forms submitted by patent holders. Cover sheets of all new and revised ITU-T and ITU-R Recommendations, where appropriate, urge users to consult the ITU Patent Information database.

ITU does not guarantee the accuracy or completeness of the Patent Information database, as it only reflects information communicated to ITU. Inaccuracy or incompleteness could occur for several reasons:

– Declaration Forms might relate to patents not found to be essential
– Participants might not be aware that they own SEPs
– SEP holders might not be participating in the ITU standardization process.

The Patent Information database is thus best viewed as a means of raising flags that alert study group participants and standards implementers to the possibility that certain patent holders may own SEPs for which they have made licensing commitments. In the interests of maintaining an up-to-date ITU Patent Information database, patent holders should inform ITU of any changes or corrections to any previously submitted Declaration Forms or General Forms, especially with regard to the contact details provided.

ITU is not involved in evaluating a patent's relevance, nor is it involved in evaluating a patent's essentiality in relation to any Recommendations.

Conduct at meetings

Study groups and their subordinate groups, or other expert groups of ITU-T and ITU-R, will consider information relating to potential SEPs as part of their standardization efforts. However, these groups are not permitted to take any position regarding the essentiality, scope, validity or specific licensing terms of disclosed patents. The details of the arrangements arising from SEPs, such as specific licensing terms or royalties, are the responsibility of the parties involved.

ITU will not interfere with negotiations nor settle disputes

ITU will not interfere with licensing negotiations between SEP holders and standards implementers, nor will it engage in settling any disputes between such parties. All licensing negotiations and dispute resolutions are the responsibility of the parties involved.

15.5 Recent steps aimed at improving the Common Patent Policy

The TSB Director's Ad Hoc Group on IPR plays an advisory role to the Director of TSB on questions of relevance to patents' inclusion in standards, aiming to protect the standardization ecosystem, clarify its patent policy and limit abuse of the system.

The Ad Hoc Group was formed in the early 1990s, and has served ITU's membership well for more than 20 years, assessing information drawn from the collective input of industry participants to submit insightful feedback and numerous proposals leading to the development and amendment of ITU's patent policy and related guidelines.

ITU organized a high-level Patent Roundtable in October 2012[117] – assembling industry players, regulators, patent offices, government representatives and experts in intellectual property law – to examine the effectiveness of RAND-based patent policies and to explore possible solutions to the challenges posed by the interplay of the standards and IPR systems.

The Patent Roundtable came in response to concerns raised by competition authorities, particularly in the US and Europe, regarding the increase in standards-related patent litigation in the ICT industry as well as the possible use of SEPs to exclude competitors from a market.

Regulators had also expressed concerns regarding the possible use of SEPs to pressure standards implementers into accepting higher royalties in bilateral licensing negotiations – also referred to as patent hold-ups – an act which undermines the aims of RAND-based patent policies to the disadvantage of standards implementers, hurting consumers, who ultimately shoulder these higher costs.

As a result of the Patent Roundtable, the TSB Director requested the TSB Director's Ad Hoc Group on IPR to begin an accelerated series of meetings in an effort to produce a recommendation aimed at providing high-level principles clarifying the meaning of 'reasonable' in the RAND context and the conditions under which companies that have made RAND commitments should be allowed to seek injunctive relief.

[117] ITU Patent Roundtable, Geneva, Switzerland, 10 October 2012: http://www.itu.int/en/ITU-T/Workshops-and-Seminars/patent/Pages/default.aspx.

Questions for consideration

Part I:

1. What would you consider the most important benefits of standardization? What would be the most dangerous risks from over-standardization in a specific sector?
2. What would you consider the most important elements of 'openness' in industry standards?
3. In your opinion, which types of standards are the primary drivers of innovation?
4. What should be the criteria for evaluating the 'success' of a standard?

Part II:

1. Why is the relationship between patents and standards the subject of debate?
2. Why do companies contribute their technology to SDOs?
3. How do SDOs strike a balance between the interests of patent holders and implementers of the standard?
4. Name and explain three specific issues arising from the incorporation of patents in standards.

Part III:

1. What are the main purposes of the IPR system?
2. What are the main purposes of competition law?
3. How are the IPR system and competition law relevant to the ICT standardization ecosystem?
4. What are the main challenges faced by the IPR system and competition law in relation to the aims of ICT standardization?

Part IV:

1. What are the key elements of the ITU-T/ITU-R/ISO/IEC Common Patent Policy?
2. What are the principal benefits of this Patent Policy? What are the risks attached to its provisions?
3. Does ITU take part in licensing discussions between SEP holders and implementers? Why?

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