

# **TECHNOLOGY STANDARDS & INTEROPERABILITY**

WHY WE SHOULD CARE ABOUT THEM



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**T**echnology standards are a cornerstone of software and hardware development, and they play a key role in fostering a healthy and competitive IT ecosystem. With the growing demand for interconnectivity, interoperability and sharing among hardware, software and IT services, the role of technology standards has only increased in importance in recent years. This is particularly true in the public sector, due to the need for better communication with citizens as well as among government agencies (intra and inter-governmental). For the private sector, the ability of a component or a product to interoperate with other components, products or services also has a significant impact on market demand.

***Technology standards play a key role in fostering a healthy and competitive IT ecosystem.***

The purpose of technology standards is to promote interoperability, efficiency, increased functionality, productivity and economic growth. Interoperable software, hardware and services spur innovation and competition, which lead to increased consumer choice, the creation of new markets, enhanced communication and technological progress. To reap these benefits, it is important to properly understand the nature and use of technology standards.

***Interoperable software, hardware and services spur innovation and competition.***

Technology standards are typically documented in written specifications that enable developers of software, hardware and services to make and distribute products or components that work with one another within a given context. This interoperability can take the form of information exchange (e.g., protocols or file formats), task performance (e.g., application programming interfaces or APIs) and other functions that allow systems and people to collaborate effectively.

***Technology standards enable products to work together...***

In addition to facilitating broader communication across platforms and devices, this interoperability also enables suppliers to develop their own implementations of a technology standard, which consumers can then choose among. All entities are not required to implement the standard in exactly the same way; technology standards make possible flexible implementations that best fit the task at hand while retaining interoperability<sup>1</sup>.

***... and enable suppliers to develop their own implementations for consumers to choose from.***

<sup>1</sup> This flexibility is not unique to the software industry. For example, the ISO open standard on metric screw threads dictates the dimension of a 2mm thread size (i.e., the “specification”), not how the screw is constructed or with what materials (i.e., the “implementation”).

**Standards create predictability, interoperability and competition without homogeneity.**

Standards thus create predictability, interoperability (which may in turn be achieved through various ways) and competition between implementations without imposing homogeneity.

## **MARKET-DRIVEN STANDARDS DEVELOPMENT**

**Voluntary processes ...**

The most effective means of fueling innovation through standards has been through voluntary processes. Indeed, most of the widely adopted technology standards in existence today have been developed through voluntary, supplier-led efforts<sup>2</sup>.

**... respond best to consumer demands.**

The marketplace – responding to consumer demands – is best situated to determine the appropriate timing for the development and promotion of a standard. Over the years, suppliers have been able to respond quickly to industry and consumer needs by developing standards that most effectively address interoperability issues and embrace the direction of the marketplace.

**Standards are developed ...**

These standards are typically – but not exclusively – developed and maintained by Standards Development Organizations (SDOs). Descriptions of some SDOs such as ANSI, Ecma, ETSI, IEEE-SA, ITU, GSC, CEN, ISO, IEC, IETF, W3C and OASIS can be found in **Appendix A**.

**... through a range of approaches.**

The range of standards organizations that exist today is reflective of the range of approaches to develop and deploy a standard in any particular field of interest. This diversity creates a richness in the marketplace of technology products.

**A successful standard is one that solves the problem for which it is intended.**

The method of development of a standard is not ultimately the critical factor that determines its acceptance. A successful standard is one that solves the problem for which it is intended. Typically, the development of such standards is achieved through a natural and dynamic process that is voluntary and responsive to market demands.

<sup>2</sup> UPnP, FireWire, PDF, QFX, Flash, Java and ZeroConf are just a few examples of widely-adopted technology standards originally developed by a single company or group of companies.

## CHARACTERISTICS OF OPEN STANDARDS

While there are many ways of achieving widespread interoperability among technology standards, there is particular interest in “open standards”. Although there is no universally accepted definition of the term, all open standards have some characteristics in common:

- Open standards are **published without restriction** (e.g., potential implementers are not restricted from accessing the standard) in electronic or tangible form, and in sufficient detail to enable a complete understanding of the standard’s scope and purpose;
- Open standards are **publicly available without cost, or for a reasonable fee** for adoption and implementation by any interested party;
- Any patent rights necessary to implement open standards are made available by those developing the specification to all implementers on **reasonable and non-discriminatory (RAND) terms (either with or without payment of a reasonable royalty or fee)**; and
- Open standards are regularly developed, maintained, approved or ratified by **consensus, in a market-driven standards-setting organization** that is open to all interested and qualified participants. Standards can also develop by **consensus in the marketplace**.

It is important for governments to keep open standards clearly defined to reflect the commonly accepted understanding of the term. An unclear definition of the term, which diverges from understandings commonly employed by standards setting bodies worldwide, can cause confusion and undermine the success of standards efforts in the long term.

*Open standards is one way of achieving widespread interoperability.*

*Open standards should be clearly defined to reflect the commonly accepted understanding.*

An overly narrow definition or a mandate to only use certain technology standards could exclude many well-established technologies that are implemented on the basis of accepted open standards, thus hindering – rather than promoting – interoperability

*A narrow definition excludes many well-established technologies.*

among public administrations and with businesses and citizens. It would also work against governments by preventing them from procuring hardware, software and services that are based on some of the ICT markets' most widely supported open standards.

## OPEN STANDARDS AND GOVERNMENTS

***Governments play an important role in advancing open standards.***

Governments can play an important role in advancing open standards. Government policies that support the implementation or adoption of open standards – where open standards exist and are broadly supported by industry – will improve interoperability and benefit governments and consumers on the whole.

***Governments should avoid policies that discourage standards development.***

On the other hand, governments should avoid policies that inadvertently discourage the development and adoption of broad-based standards, either by mandating standards themselves or mandating those that have not achieved broad industry support<sup>3</sup>, or by reducing the economic incentives to participate<sup>4</sup>.

***Mandating standards results in ...***

Government-mandated standards in the technology industry can often result in a number of unintended consequences.

***... freezing innovation and diminishing incentives, and ...***

Mandated technologies and compulsory standards tend to freeze innovation and diminish incentives for investment in research and development. Such mandates also tend to “lock in” consumers to specific products that may quickly become outdated.

***... deprives consumers of new features.***

This deprives consumers of new features, increased functionality and efficiency, and possible benefits from new, lower-cost products. And in failing to fully reap the benefits of such quickly evolving technologies, certain market competitors are inadvertently disadvantaged and market acceptance and penetration of these technologies are hindered, preventing the market from developing into a multi-faceted and competitive environment.

<sup>3</sup> This, for example, may be appropriate for technology standards as they relate to public health and safety issues (e.g., aviation, medical equipment and cellular emission).

<sup>4</sup> Such undesirable policies may involve mandating the absence of royalties or other reasonable fees; government mandated standards-setting processes; compulsory ratification by a formal standards body; and other policies that interfere with choice, flexibility and responsiveness.

In contrast, market-led solutions are those most amenable to innovation and best able to respond rapidly to evolving consumer needs. Industry players should be encouraged to participate in the development of open standards, and to voluntarily contribute their best technology.

***Industry should be encouraged to voluntarily contribute their best technology.***

Standards are successful when they solve the problem for which they are intended. The development of such standards is achieved through a natural and dynamic process that is voluntary and responsive to market demands.

***Dynamic market-led solutions respond to consumer needs.***

## **DISTINGUISHING OPEN STANDARDS FROM OPEN SOURCE**

Governments should focus on the outcome that they desire from a particular standard (such as interoperability, diversity of vendors, and technological progress), rather than on the process used to develop that standard.

***Governments' focus should be on the outcome rather than the development process of a standard.***

While open source software (OSS)<sup>5</sup> is software that may be used to implement an open standard in a particular product or service, an open standard is a technical specification. Whether a standard qualifies as “open” has nothing to do with the development and licensing model of the software used to implement that standard, and the two should be clearly distinguished.

***Open source software should be clearly distinguished from open standards.***

In fact, open standards are neutral with regard to software development and licensing models, welcoming all models and favoring none. It is, therefore, equally feasible for an open standard to be implemented in proprietary software as in OSS.

***Open standards can be implemented by both proprietary and open source software.***

Some open source projects are closely associated with particular open standards (e.g., Apache with HTTP, or MySQL with SQL), and some standards even choose to release their reference implementations under open source licenses.

<sup>5</sup> “Open Source” is a software-licensing model where the source code of the software is typically made available royalty free to the users of the software, under terms allowing redistribution, modification and addition, though often with certain restrictions. The support, training, updates and other services for the software may be provided by a range of entities. Open source programs are often, though not exclusively, developed through a collaborative effort in which a number of persons, usually with no formal association with each other, contribute elements of the final software. Increasingly, software companies are also contributing programs developed in-house to the open source community.

***Availability of source code does not make an open standard.***

However, the mere availability of source code is neither necessary nor sufficient to make something a standard, much less an open standard.

***The marketplace provides the best evidence of the successful adoption of a standard.***

A successful standard is determined not by its method of development, but by whether the standard's technical specification is readily available for use by anyone (either free of charge or on reasonable terms), whether it is widely adopted, and whether its use solves the intended problem. The marketplace often provides the best evidence of the effectiveness of a standard, specifically whether the standard is widely adopted, ideally via multiple, independent implementations.

## **OPEN STANDARDS AND IP POLICIES**

***Standards bodies need to have IP policies for the technology contributed to the standards.***

One of the key aspects of standards relates to Intellectual Property (IP) policies. This is important because one objective of developing standards is to bring together and benefit from the best technology available to solve the problem that the standard is intended to address. To do so, it is paramount that standards bodies explicitly deal with how IP belonging to specific owners is to be dealt with.

***Effective IP protection leads to greater creativity, competition and economic success.***

Effective IP protection is a key driver of content and innovation. Indeed, economic analyses have demonstrated time and again that strong IP protection leads to greater creativity, competition and economic success.

***Strong IP protection encourages industry to participate with the best available technology.***

Software theft costs the industry billions, and given these losses, it is not surprising that content and services companies can be reluctant to join the online revolution. Thus, it is with strong IP protection that industry players are encouraged to participate in the development of open standards, and to voluntarily contribute their best technology.

***Royalty-free requirements would exclude many existing open standards.***

There are some who argue that open standards should by definition be royalty-free. However, such a royalty-free requirement will result in many existing open standards failing to meet the definition. It may also serve as a disincentive to IP rights holders' participation in standards setting processes.

At the outset, it should be clarified that RAND and royalty-free are not two entirely different concepts. Most IP policies of standards bodies allow for RAND licensing, with the possibility of either a reasonable royalty or a royalty-free provision as one of the possible RAND terms.

***Most standards bodies allow for RAND licensing including IEEE, ISO, IEC, IETF and ITU.***

Most major standards bodies, including the IEEE, ISO, IEC, IETF and ITU, permit standardization of technologies on RAND terms. More specialized standards-setting consortia in the IT industry have also adopted similar licensing policies<sup>6</sup>. The US Government<sup>7</sup> and the European Commission<sup>8</sup> have recognized the importance of the RAND approach as well. This longstanding practice is based on the recognition that RAND licensing appropriately balances the legitimate rights of patent owners, who contribute innovative technology to the standard, with the interests of implementers who wish to obtain access to essential patents on reasonable terms.

***RAND licensing recognizes the balance between patent owners and implementers.***

Many highly successful and widely deployed open standards developed by well-recognized bodies such as ECMA, ETSI, IEEE, IETF, ISO/IEC, ITU, OASIS, W3C and those accredited by ANSI involve patent licensing that is not royalty-free. Many open standards also involve field-of-use restrictions, reciprocity requirements, or other reasonable restrictions on use<sup>9</sup>. See **Appendix B** for a table of examples of such standards that are incorporated into IT products on the market today.

***Many successful open standards are not royalty-free.***

<sup>6</sup> These include OASIS, WS-I, the Liberty Alliance, UPnP, Bluetooth, MPEG-LA, the Digital Video Broadcasting (DVB) project, and the Open Mobile Alliance (OMA), among many others.

<sup>7</sup> The US Government encourages federal use of “voluntary consensus standards” adopted through a process which includes “provisions requiring that owners of relevant intellectual property have agreed to make that intellectual property available on a non-discriminatory and royalty-free or reasonable royalty basis to all interested parties”. Source: OMB Circular A-119 (which describes the US policy toward “Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities”). <http://www.whitehouse.gov/omb/circulars/a119/a119.html>

<sup>8</sup> The European Commission has recognized the appropriateness of a RAND-based approach in its recommendation that all European standards organizations ensure “that any intellectual property rights (IPRs) that [standards] might contain can be used by market operators on fair, reasonable and non-discriminatory terms”. Source: General Guidelines for the Cooperation Between CEN, CENELEC and ETSI and the European Commission and the European Free Trade Association, 2003/C 91/04 at 91/11 (28 March 2003)

<sup>9</sup> For instance, Session Initiation Protocol (SIP), Dynamic Host Configuration Protocol (DHCP), WLAN protocol, XML Configuration Access Protocol (XCAP), Internet Key Exchange (IKE) and GSM.

***Major standards bodies allow for the inclusion of patents.***

Major standards organizations such as ANSI<sup>10</sup>, ECMA<sup>11</sup>, ETSI<sup>12</sup>, IEEE<sup>13</sup> and ITU<sup>14</sup>, allow for the inclusion of patents in their standards and for patent holders to license their essential patents on RAND terms. See **Appendix C** for a table that summarizes the IP policies of these key standards organizations.

***An environment that encourages voluntary participation and contribution is essential.***

It is important to create an environment that encourages the participation and contribution of technology owners in the standards setting process. Dissuading a technology owner from participating in the standards process may have the detrimental effect of establishing an inferior standard that does not reflect the best technology and engineering available. Such an environment represents a breakdown of the innovation cycle and is at odds with the current highly successful open standards and RAND model, under which thousands of standards have been developed and approved, and a remarkable level of competition, innovation and interoperability has been fostered.

***IP right holders should be free to decide how to license their IP assets.***

Ultimately, IP right holders should be left free to make their own decision as to whether they choose to license their IP rights on a royalty-free basis or to charge a reasonable royalty. Conversely, standards bodies need the flexibility to determine whether right holders should have the ability to charge a reasonable royalty or whether royalty-free licenses are appropriate given their particular domain.

<sup>10</sup> ANSI (Section 3.1.1 of ANSI Essential Requirements document (<http://www.ansi.org/www.ansi.org>), stating that essential patent holders may indicate that a license will be made available to implementers either on a royalty compensation-free basis or “under reasonable terms and conditions that are demonstrably free of any unfair discrimination”)

<sup>11</sup> ECMA (<http://www.ecma-international.org/memento/codeofconduct.htm>, Section 1.2(<http://www.ecma-international.org/memento/codeofconduct.htm>) (“A written statement from the patentee is required, according to which he is prepared to grant licences on a reasonable, non-discriminatory basis.”)

<sup>12</sup> ETSI ([http://www.etsi.org/legal/ipr\\_a.htm](http://www.etsi.org/legal/ipr_a.htm), Section 6.1) (holders of essential IPR must be prepared to grant “licences on fair, reasonable and non-discriminatory terms and conditions under such IPR.”)

<sup>13</sup> IEEE (<http://standards.ieee.org/guides/bylaws/sect6-7.html#6http://standards.ieee.org/board/pat/guide.html>) (letter of assurance that essential patent holders are encouraged must to file with IEEE affords them the following option: “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 comply with the [Proposed] IEEE Standard.”)

<sup>14</sup> ITU (<http://www.itu.int/ITU-T/dbase/patent/patent-policy.html>, Section 2.2 (“The patent holder is not prepared to waive his rights but would be willing to negotiate licenses with other parties on a non-discriminatory basis on reasonable terms and conditions. Such negotiations are left to the parties concerned and are performed outside the ITU-T.”)

## LEGITIMATE ROLE OF PATENTS IN INTEROPERABILITY AND INNOVATION

Much has been debated about software patents and its role with respect to interoperability and innovation. In many regards, improvements can and should be made to the current patent system. Technological progress is dynamic and the patent systems, in order to promote innovation, need to evolve accordingly.

***Improvements are needed in the current patent system.***

While some may assume that small and independent developers face a huge challenge to avoid infringing a patent, in reality, patent protection is critical to enable start-up software firms attract venture capital and to prevent competitors from simply adopting the inventions of small companies and supplanting them through stronger marketing efforts.

***Patents are critical for start-up software firms.***

There are also some who believe that patents make it more difficult to achieve IT interoperability. It is important to understand that patent protection can facilitate the development and adoption of high-quality, broadly available technology standards.

***Patents facilitate development and adoption of standards, ...***

Patent protection encourages innovators to contribute key and leading-edge technologies to standards-setting organizations, as well as with partners, customers and others, even competitors. Patents enable broad industry use of the technology through licensing<sup>15</sup> without requiring inventors to forfeit their ability to obtain a reasonable financial return on such contributed technology.

***... and encourage innovators to contribute leading-edge technologies.***

In addition, a prerequisite for patent protection is that the inventor discloses a clear and precise description of the invention. To obtain patent protection, an inventor must be willing to disclose a description of the invention to the world-at-large. This enables others to understand the inner workings of the invention and to develop interoperable products and services. It also enables further innovation to be built on top of the invention.

***Patent protection requires disclosure, which enables further innovation.***

<sup>15</sup> RAND licensing offers the right balance of encouraging innovators to contribute to the standards-setting process while allowing reasonable terms to be determined in a consensual process with other participating stakeholders and taking into account other important principles such as non-discrimination, reciprocity, the need to maintain interoperability, and so on.

***Standards processes can facilitate widespread adoption, while enabling patent rights to be maintained.***

Experience has demonstrated that participants in the standards setting process can maintain and exercise patent rights, including patent rights in software-based technologies, without preventing the widespread adoption of such standards by vendors and users. One should recognize that there is a valuable and legitimate role played by patents in fostering greater interoperability and innovation.

***The success of a standard depends on many factors.***

## **CONCLUSION**

While standards in general play an important role in enabling interoperability, which type of standard is appropriate and successful ultimately depends on many unique factors (e.g., the specific technology, market and timing involved).

***Voluntary efforts and processes are the most effective.***

Voluntary, supplier-led standards efforts are typically the most effective at addressing interoperability issues and securing widespread adoption. It is important to clearly distinguish open source software, which may be used to implement an open standard, from the open standard itself. Government agencies also have a role to play, but are most effective when facilitating voluntary processes rather than imposing rigid mandates.

***An understanding of standards is essential for a healthy marketplace.***

A mature, balanced understanding of the purpose and practice of standards – including the important role of open standards – is essential for a competitive marketplace and technology industry. In turn, a healthy IT ecosystem based on voluntary standards has proven best able to help customers achieve their desired goals of interoperability, flexibility and accessibility.

## APPENDIX A

### Examples of Standards Development Organizations

**American National Standards Institute (ANSI).** “ANSI is a private, non-profit organization that administers and coordinates the US voluntary standardization and conformity assessment system. The Institute’s mission is to enhance both the global competitiveness of US business and the US quality of life by promoting and facilitating voluntary consensus standards and conformity assessment systems, and safeguarding their integrity.”<sup>16</sup>

**Ecma International.** “Ecma International is an industry association founded in 1961 and dedicated to the standardization of Information and Communication Technology (ICT) and Consumer Electronics (CE). The aims of Ecma are to develop, in co-operation with the appropriate National, European and International organizations Standards and Technical Reports in order to facilitate and standardize the use of ICT and CE; to encourage the correct use of Standards by influencing the environment in which they are applied; and to publish these Standards and Technical Reports in electronic and printed form; the publications can be freely copied by all interested parties without restrictions.”<sup>17</sup>

**European Telecommunications Standards Institute (ETSI).** “ETSI is an independent, non-profit organization, whose mission is to produce telecommunications standards for today and for the future. Based in Sophia Antipolis (France), ETSI is officially responsible for standardization of ICT within Europe. These technologies include telecommunications, broadcasting and related areas such as intelligent transportation and medical electronics.”<sup>18</sup>

**IEEE Standards Association.** “The Institute of Electronic and Electronics Engineers Standards Association (IEEE-SA) is the leading developer of global industry standards in a broad-range of industries, including Power and Energy, Biomedical and Healthcare, Information Technology, Telecommunications, Transportation, Nanotechnology, and Information Assurance. For over a century, the IEEE-SA has offered an established standards development program that features balance, openness, due process, and consensus. The Association was responsible for producing the prominent 802 Standards for Local and Metropolitan Area Network Wireless and Wired.”<sup>19</sup>

**International Telecommunication Union (ITU).** “The ITU is unique among international organizations in that it was founded on the principle of cooperation between governments and the private sector. With a membership encompassing telecommunication policy-makers and regulators, network operators, equipment manufacturers, hardware and software developers, regional standards-making organizations and financing institutions, ITU’s activities, policies and strategic direction are determined and shaped by the industry it serves.”<sup>20</sup>

<sup>16</sup> [http://www.ansi.org/about\\_ansi/overview/overview.aspx?menuid=1](http://www.ansi.org/about_ansi/overview/overview.aspx?menuid=1)

<sup>17</sup> <http://www.ecma-international.org/memento/index.html>

<sup>18</sup> [http://www.etsi.org/about\\_etsi/5\\_minutes/home.htm](http://www.etsi.org/about_etsi/5_minutes/home.htm)

<sup>19</sup> <http://standards.ieee.org/sa/sa-view.html>

<sup>20</sup> <http://www.itu.int/aboutitu/overview/role-work.html>

**Global Standards Collaboration (GSC).** “The GSC is an initiative of the ITU, ETSI, the US’ Committee T1 and the Japanese TTC. GSC provides for the regular exchange of work programmes and other information in a number of agreed high-interest technical areas, and has attracted a growing number of other participants from around the world. As its name implies, its goal is to promote global standards in these areas of common interest. The participating standards organizations include: Australian Communications Industry Forum Ltd (ACIF), Association of Radio Industries and Businesses (ARIB) from Japan, Alliance for Telecommunications Industry Solutions (ATIS) from the US, China Communications Standards Association (CCSA), ETSI, ICT Standards Advisory Council of Canada (ISACC), ITU, Telecommunications Industry Association (TIA) from the US, Telecommunication Technology Association (TTA) from South Korea, and Telecommunication Technology Committee (TTC) from Japan.”<sup>21</sup>

**European Committee for Standardization (CEN).** “CEN promotes voluntary technical harmonization in Europe in conjunction with worldwide bodies and its partners in Europe, and the conformity assessment of products and their certification. In 1998, CEN adopted a new strategic vision and direction with respect to the challenges and opportunities affecting European standardization up to 2010. Its strategic objectives include: helping the specific needs of different sectors or ‘business domains’; producing high quality reference documents; projecting European standardization in the international arena; contributing to the enlargement of the Union and supporting conformity assessment and certification in Europe.”<sup>22</sup>

**International Organization for Standardization (ISO).** “ISO is a network of the national standards institutes of 156 countries, on the basis of one member per country, with a Central Secretariat in Geneva, Switzerland, that coordinates the system. ISO is a non-governmental organization: its members are not, as is the case in the United Nations system, delegations of national governments. Nevertheless, ISO occupies a special position between the public and private sectors. This is because, on the one hand, many of its member institutes are part of the governmental structure of their countries, or are mandated by their government. On the other hand, other members have their roots uniquely in the private sector, having been set up by national partnerships of industry associations. Therefore, ISO is able to act as a bridging organization in which a consensus can be reached on solutions that meet both the requirements of business and the broader needs of society, such as the needs of stakeholder groups like consumers and users.”<sup>23</sup>

**International Electrotechnical Commission (IEC).** “The IEC is the leading global organization that prepares and publishes international standards for all electrical, electronic and related technologies. These serve as a basis for national standardization and as references when drafting international tenders and contracts. Through its members, the IEC promotes international cooperation on all questions of electrotechnical standardization and related matters, such as the assessment of conformity to standards, in the fields of electricity, electronics and related technologies. The IEC

<sup>21</sup> <http://www.gsc.etsi.org/Presentation/home.htm>

<sup>22</sup> <http://www.cenorm.be/cenorm/>

<sup>23</sup> <http://www.iso.org/iso/en/aboutiso/introduction/index.html#two>

charter embraces all electrotechnologies including electronics, magnetics and electromagnetics, electroacoustics, multimedia, telecommunication, and energy production and distribution, as well as associated general disciplines such as terminology and symbols, electromagnetic compatibility, measurement and performance, dependability, design and development, safety and the environment.”<sup>24</sup>

**Internet Engineering Task Force (IETF).** “The IETF is a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. It is open to any interested individual. The IETF Mission Statement is documented in RFC 3935. The actual technical work of the IETF is done in its working groups, which are organized by topic into several areas (e.g., routing, transport, security, etc.). Much of the work is handled via mailing lists. The IETF holds meetings three times per year.”<sup>25</sup>

**World Wide Web Consortium (W3C).** “The W3C is an international consortium where Member organizations, a full-time staff, and the public work together to develop Web standards. W3C’s mission is to lead the World Wide Web to its full potential by developing protocols and guidelines that ensure long-term growth for the Web. W3C primarily pursues its mission through the creation of Web standards and guidelines. Since 1994, W3C has published more than ninety such standards, called W3C Recommendations.”<sup>26</sup>

**Organization for the Advancement of Structured Information Standards (OASIS).** “OASIS is a not-for-profit, international consortium that drives the development, convergence, and adoption of e-business standards. The consortium produces more Web services standards than any other organization along with standards for security, e-business, and standardization efforts in the public sector and for application-specific markets. Founded in 1993, OASIS has more than 5,000 participants representing over 600 organizations and individual members in 100 countries.”<sup>27</sup>

<sup>24</sup> <http://www.iec.ch/about/mission-e.htm>

<sup>25</sup> <http://www.ietf.org/overview.html>

<sup>26</sup> <http://www.w3.org/Consortium/>

<sup>27</sup> <http://www.oasis-open.org/who/>

**APPENDIX B****Examples of Widely Used Standards**

Standard	Maintained by Non-Profit	Available Free of Charge or Nominal Fee?	Copy and Distribute at no or nominal fee?	Patents irrevocably available royalty-free?	Free from constraints on Re-Use?
3GPP	Yes (ETSI)	Yes	No	No (RAND patent pool)	No
AVC/H.264 <sup>I</sup>	Yes (ISO)	No	No	No (RAND)	No
DHCP <sup>II</sup>	Yes (IETF)	Yes	Yes	No (RAND)	No
DVB MHP <sup>III</sup>	Yes (ETSI)	Yes	No	No (RAND)	No
ebXML	Yes (OASIS)	Yes	Yes	No (RAND)	No
GSM	Yes (ETSI)	Yes	No	No (RAND)	No
IEEE 1394 <sup>IV</sup>	Yes (IEEE)	Yes	No	No (RAND) <sup>V</sup>	No
IEEE 802.1X <sup>VI</sup>	Yes (IEEE)	Yes	No	No (RAND)	No
Liberty Alliance 1.0 (ID-FF 1.0) <sup>VII</sup>	No (Liberty Alliance)	Yes	No	Maybe <sup>VIII</sup>	No
MPEG-2	Yes (ISO)	No	No	No (RAND)	No
MPEG-4 <sup>IX</sup>	Yes (ISO)	No	No	No (RAND)	No
OMA DRM 2.0 <sup>X</sup>	No (Open Mobile Alliance)	Yes	Yes	No (RAND) <sup>XI</sup>	No
SNMPv3 <sup>XII</sup>	Yes (IETF)	Yes	Yes	No (RAND)	No
WLAN <sup>XIII</sup>	Yes (IETF)	Yes	Yes	No (RAND)	No
XML Configuration Access Protocol <sup>XIV</sup>	Yes (IETF)	Yes	Yes	No (RAND)	No
XrML	No <sup>XV</sup>	Yes	No	No (RAND)	No

## APPENDIX C

### IP Policies of some Standards Organizations

Standards Organization	Copyright Policy: Limits on copying / distribution / modification of the specifications?	Patent Policy: RAND Licensing?	Patent Policy: Royalty-free licensing requirement?
American National Standards Institute (ANSI)	Yes	Yes	No
CableLabs (OpenCable)	Yes	Yes	No
Digital Video Broadcasting Project (DVB)	Yes	Yes <sup>xvi</sup>	No
ECMA International	Yes	Yes	No
European Committee for Standardization (CEN)	Yes	Yes <sup>xvii</sup>	No
European Telecommunications Standards Institute (ETSI)	Yes	Yes <sup>xviii</sup>	No
GlobalPlatform	Yes	Yes	No
Institution of Electrical and Electronics Engineers (IEEE)	Yes	Yes	No
International Organization for Standardization (ISO) / International Electrotechnical Commission (IEC) Joint Technical Committee (ISO/IEC JTC1)	Yes	Yes	No
International Telecommunication Union (ITU)	Yes	Yes	No
Internet Engineering Task Force (IETF)	Yes	Yes	No
Organization for the Advancement of Structured Information Standards (OASIS)	Yes	Yes	No
The Open Group (formerly Directory Interoperability Forum)	Yes	Yes	No
World Wide Web Consortium (W3C)	Yes	Maybe	Yes <sup>xix</sup>

- <sup>I</sup> Also ISO/IEC IS 14496-10; audio-video format.
- <sup>II</sup> Dynamic Host Configuration Protocol.
- <sup>III</sup> Digital Video Broadcasting, Multimedia Home Platform.
- <sup>IV</sup> High speed data transfer.
- <sup>V</sup> Portfolio license with flat fee of \$0.25/device, available through MPEG LA.
- <sup>VI</sup> Port based network access control for wireless access.
- <sup>VII</sup> And ID-WSF Interaction Service v1.0; identity for web services.
- <sup>VIII</sup> Royalty-free by default, but RAND as alternative; RAND Reservations by various parties, see, e.g., Necessary Claims Disclosure Notices By Citigroup, Inc. (<http://www.projectliberty.org/specs/Citigrouptable.php>) and Sony Corporation (<http://www.projectliberty.org/specs/Sonytable.php>).
- <sup>IX</sup> Also ISO/IEC 14496-2:2001 [Part 2 Visual dated 2001-12-01], 14496-2:2001/Amd.1:2002 [Studio profile dated 2002-02-01], or 14496-2:2001/Amd.2:2002 [Streaming video profile dated 2002-02-01].
- <sup>X</sup> DRM for mobile devices.
- <sup>XI</sup> MPEG LA has issued a call to form a new patent pool.
- <sup>XII</sup> Simple Network Management Protocol Version 3.
- <sup>XIII</sup> See Telecom Italia's Statement About IPR Related to WLAN Access (<http://www.ietf.org/ietf/IPR/telecom-italia-ipr-wlan-access.txt>).
- <sup>XIV</sup> See Nokia Statement on Patent Licensing (<http://www.ietf.org/ietf/IPR/NOKIA>); Nokia's Statement About IPR Claimed in draft-ietf-scon-cpcp-xcap-00 (<http://www.ietf.org/ietf/IPR/nokia-ipr-draft-ietf-xcon-cpcp-xcap-00.txt>).
- <sup>XV</sup> Currently maintained by ContentGuard, but being reviewed for standardization by OASIS & MPEG.
- <sup>XVI</sup> Non-exclusive, non-transferable, world-wide licenses on RAND terms; third party to submit an equivalent undertaking.
- <sup>XVII</sup> RAND to entire world required or standard may be withdrawn.
- <sup>XVIII</sup> RAND, but standard may be adopted even if patentee refuses to license.
- <sup>XIX</sup> While the W3C patent policy generally requires royalty-free licensing, it also allows a patent holder to refuse to license its essential patents by making timely disclosures of them, and also allows for the inclusion of RAND-based technologies in W3C standards in certain circumstances. See Sections 4 and 7 of the W3C Patent Policy (<http://www.w3.org/Consortium/Patent-Policy-20040205/>).



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