TECHNOLOGY STANDARDS & INTEROPERABILITY

INNOVATION, CHOICE AND THE ROLE OF GOVERNMENTS

BSA
Business Software Alliance
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THE BENEFITS OF ICT

The integration of information and communications technologies (ICTs) into every aspect of modern life is generating huge gains for consumers and for the economy. Firms are using ICTs to become more competitive by using both their resources more efficiently and their employees more effectively. This drives productivity growth, resulting in real wage gains and prosperity for workers, and lower prices and more choices for consumers.

ICTs are doing more than just helping firms increase output and lower costs. New software and hardware tools are fueling follow-on innovation both within and outside the ICT industry – from transportation and manufacturing to agriculture, health care, education, and government. ICT innovations are enabling companies to transform business processes and are even creating whole new industries. Through improved ICT infrastructure and learning, governments are also giving their citizens the skills and tools to expand their opportunities, and develop new commercial ventures.

ICT systems have become significantly more diverse in the last decade, and ICT customers, including government procurement officers, have taken advantage of this situation by pursuing the best technological solutions available to meet their needs. Often that means acquiring hardware and software products from multiple vendors. Fortunately, the ICT industry has risen to the challenge by improving interoperability in this increasingly heterogeneous environment.

Recently, some governments have taken an interest in promoting ICT interoperability. Governments have two distinct interests in this area:

- As major customers of ICT systems, governments will often wish to consider interoperability along with other key factors (e.g., security, reliability, accessibility, overall value) when procuring products and services.

- As policymakers, governments will want to ensure that policies relating to interoperability promote innovation, consumer welfare, and competition.

We will examine the many facets of interoperability in more detail in order to provide a foundation for principles to guide government action in this area.
Technology Standards

Technology standards are a cornerstone of software and hardware development, and they play a key role in fostering healthy and competitive IT technologies. 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.

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.

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.

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 interoperability¹.

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

¹ 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”).
The goal of interoperability is clear: to enable the products and services that are components of ICT systems to work together. This increases consumer choice, value, and competition by removing technical impediments to the use of products and services from different vendors. Although the term “interoperability” has somewhat different meanings in different contexts, in the ICT sector it is generally understood to mean the ability of products and services to exchange and use data. For example, the EU Software Directive defines interoperability as “the ability to exchange information and use the information which has been exchanged,”\(^2\) while the U.S. E-Government Act of 2002 defines interoperability as “the ability of different operating and software systems, applications, and services to communicate and exchange data in an accurate, effective, and consistent manner.”\(^3\)

Critically, the goal of interoperability is not to achieve homogeneity of ICT products or services, or to speed their commoditization – quite the contrary. A successful interoperability solution is one that promotes the exchange and use of data between products and services while allowing maximum room for vendors to innovate and differentiate their offerings from those of other vendors. The specifics of a particular interoperability solution will depend on the characteristics of that technological environment and may evolve and change over time as the technology evolves and changes. But a common touchstone for all interoperability solutions is whether they ultimately enable innovation and promote consumer value through competition, differentiation and choice.\(^4\)

Interoperability is just one of many elements that users look for in an ICT product or service. Others include security, accessibility, reliability, privacy, overall value, and ease of use. Often, however, enhancing one of these elements may result in trade-offs with respect to others. For this reason, products vary in their level of interoperability, depending largely on customer needs and other factors. In some contexts, customers may place most importance on interoperability; in others, 


\(^{4}\)It is important to distinguish “interoperability” from “substitutability.” Substitutability means the creation of a product that duplicates the functionality of another product. Interoperability, by contrast, preserves the ability of developers to differentiate their own products from others in the market – thereby fostering creativity, innovation, competition, and enhanced consumer choice – while ensuring that software and systems can exchange data with one another.
Security or reliability may be paramount. In either case, it is important that customers have the freedom to choose products that fit their needs, and that vendors have the ability to respond to those needs.

**Market-Driven Standards Development**

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.

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.

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.

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.

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.

**Paths to Interoperability**

While there are various complementary paths to achieving ICT interoperability, four of the most common ways in which ICT companies do so are:

- **Designing products or services to promote interoperability.** In response to customer demand, software and hardware companies

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5 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.
increasingly design their products to be interoperable with other products and services right “out of the box.” Other firms specialize in offering solutions (such as translators, converters, and gateways) that facilitate interoperability between systems from multiple vendors.

- **Intellectual Property (IP) licensing and technology sharing.** Many firms achieve interoperability by licensing IP rights needed to build particular interoperable solutions on either a royalty-free or fee-based terms. This makes it easier for other firms to develop interoperable products quickly and cost-effectively. Many firms go further and offer software development kits and other tools to facilitate the development of products that can seamlessly interoperate with their own.

- **Voluntary industry collaboration.** Two or more firms – sometimes partners, sometimes competitors – may also come together to collaborate and share technical information in order to develop interoperable products and solutions. Such efforts can be particularly effective where customers need a quick, flexible solution to the ways in which the products of particular vendors interoperate.

- **Technology standards.** Technology standards implemented in products and services likewise play a vital role in facilitating ICT interoperability. Although various types of standards are discussed in the next section, it is worth noting that voluntary industry-led efforts have proven to be most effective means of developing successful standards. Indeed, most of the widely adopted standards in existence today were developed through voluntary, supplier-led efforts – FireWire, WiFi, PDF, QFX, Flash, and Java are just a few well-known examples.

Because it is often impossible to know in advance whether users will find a given interoperability solution attractive, such solutions should be voluntary and driven by industry responding to customer needs. In ICT markets characterized by rapid innovation and short product life-cycles, there is no single path to interoperability. One vendor may use a tool or set of tools that are different from the approach taken by another vendor. Just as ICT products and services rapidly evolve through innovation, so must the approaches to interoperability between these products and services evolve through innovation.
These are complex, market-sensitive issues, and companies need freedom and flexibility to select the best solution for the specific purpose. This is particularly vital in the ICT arena since, as noted, interoperability is simply one of several factors that customers consider when selecting an ICT solution. Thus, as further discussed below, governments should promote competition between interoperability solutions by allowing the market to lead and refraining from seeking to direct this market development or picking technology winners and losers – both of which will deter innovation, competition, and consumer choice.

**Characteristics of Standards**

One way to achieve interoperability is through the development of standards, which are then implemented in relevant products and services. Standards are important because they provide a stable technical solution to a common problem. That solution can be produced by a single vendor, a number of vendors through a collaborative effort, an industry consortium, or a formal international standards body, to name a few.

While there are different types of standards, many fall into one of two broad categories. “Proprietary” standards are generally developed and maintained by a single entity or a group of cooperating companies, rather than by a formal standards body. Proprietary standards are often published and the intellectual property needed to implement them is made available on reasonable and non-discriminatory terms, which may or may not include payment of a royalty.

Another key type of standard is an “open” standard. Although views on what constitutes an open standard vary, there is fairly broad consensus that a standard which satisfy the following criteria qualifies as “open”:

1. It is developed through an open, voluntary, consensus-based process.

2. The specification is publicly available without cost or for a reasonable fee to any interested party;

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6 Some examples of proprietary ICT standards that are broadly deployed and have had a significant positive impact on interoperability include Adobe’s Portable Document Format (PDF), HP’s Printer Command Language (PCL), IBM’s Video Graphics Array (VGA), Sun’s Java, Hayes’ AT modem command set, IBM’s Systems Network Architecture (SNA), Microsoft’s Rich Text Format (RTF), Intel’s x86 architecture, and the Universal Serial Bus (USB), which was created by Intel, Compaq, DEC, IBM, Microsoft, NEC, and Northern Telecom.
3. Any patent rights necessary to implement the standard are available to all implementers on reasonable and non-discriminatory (RAND) terms, either with or without payment of a reasonable royalty or fee; and

4. The specification should be in sufficient detail to enable a complete understanding of its scope and purpose and to enable competing implementations by multiple vendors.

The form a standard takes may vary over the lifetime of the relevant technology. For instance, early in its lifecycle, a technology might appear as a proprietary standard offered by a single vendor or a small group of vendors. Later, once the standard has achieved a measure of success and stability in the marketplace, it might be submitted to a standards body such as ITU, ISO, IEEE, Ecma, or ETSI, for formal adoption as an open standard. Similarly, when technologies are relatively immature and experience periods of rapid innovation, with new solutions quickly supplanting older ones in the marketplace, formal standardization processes might simply be too slow to keep up with the pace of innovation.

Customers, of course, are focused primarily on whether any given interoperability solution works and is available to meet their needs. They are generally less concerned with the manner in which it was developed including how a standards component of that solution was developed. Under the market-led system in place today, consumers often have a choice of multiple standards solutions from multiple sources that have been developed using a variety of methods. This is innovation at work, and it is critically important that such innovation is allowed to proceed in order to promote interoperability.

Thus, care should be taken not to place too much emphasis on one form of standard over another as long as the ultimate level of desired interoperability is achieved. The test of any standard is whether it achieves the desired level of interoperability in a simple, efficient manner while leaving maximum opportunities for companies to expand and develop new technologies. Because it is impossible to predict how any specific solution will fare in the marketplace, policies should encourage competition between standards through voluntary, market-driven processes.

7 Two examples of this evolution are: the Simple Mail Transfer Protocol (SMTP), which evolved into a standard over time and is now available as an open standard; and Portable Document Format (PDF), which was developed by Adobe, became a popular proprietary standard, and soon will be submitted to ISO for adoption as an open standard. Other widely used ICT open standards that began life as proprietary standards include TCP/IP, HTML, and LDAP.
Governments can play an important role in advancing technology standards and interoperability. Government should affirm the principle of technology neutrality and allow public administrations to select software solutions and standards that best serve their specific needs.

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\(^8\), or by reducing the economic incentives to participate\(^9\). Governments should not pick winners in the marketplace under the guise of interoperability, or regulate technology in the name of interoperability.

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

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.

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.

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.

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.

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\(^8\) 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).

\(^9\) 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.
THE ROLE OF GOVERNMENT

As already noted, governments have two distinct interests in interoperability – as customers of ICT systems and as policymakers.

As ICT customers, governments should allow government users to choose the solutions that best meet their specific needs. Governments should avoid one-size-fits-all approach to interoperability that could prevent procurement of the best product at the best price. The focus should be on interoperability results, not on preferences for specific standards, processes or technologies. Procurement rules should leave room for competing interoperability solutions to develop and for agencies to shift to new solutions as technologies advance and needs change.

As policymakers, governments should promote innovation in interoperable technologies and competing products, consumer choice and competition. Governments should allow market forces to select the best interoperability solutions in individual cases, and not mandate a specific approach (such as a standard), except when the industry as a whole has backed a single, well-established standard, (e.g., HTTP or TCP/IP). Governments should also create incentives for innovation in interoperability technologies, including by ensuring respect for intellectual property rights in such technologies.

STANDARDS AND INTEROPERABILITY PRINCIPLES

To guide government action in this area, BSA members respectfully urge governments to adhere to the following principles:

1. Approaches to achieving interoperability should be driven by customer demand and market forces and take place through a range of methods.
2. Governments should not pick winners in the marketplace under the guise of interoperability.
3. Governments should promote innovation in the area of interoperability.
4. Governments should refrain from legislating or regulating technology in the name of interoperability.

More specifically:

5. Governments should not legislate or regulate compulsory licenses on patents, copyrights, trade secrets and other forms of intellectual property to achieve interoperability.
6. Governments, in their role as ICT customers, have an interest in ensuring interoperability, but these objectives should be pursued within the context of specific procurements and the functional goals the government seeks to meet, not as a blanket policy, and should leave room for emerging solutions to develop.
7. Governments should not establish preferences for standards based on whether the standard has been developed within or adopted by established standards setting bodies.
**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.

While open source software (OSS)\(^{10}\) 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.

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. 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.

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

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

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\(^{10}\) “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.
Open Standards and IP Policies

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 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.

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.

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 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.11 The US Government12 and the European Commission13 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

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11 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.

12 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 nondiscriminatory 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

13 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)
standard, with the interests of implementers who wish to obtain access to essential patents on reasonable terms.

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. See Appendix B for a table of examples of such standards that are incorporated into IT products on the market today.

Major standards organizations such as ANSI, ECMA, ETSI, IEEE and ITU, 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 summaries the IP policies of these key standards organizations.

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.

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

15 ANSI (Section 3.1.1 of ANSI Essential Requirements document (http://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.”)

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

17 ETSI (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.”)

18 IEEE (http://standards.ieee.org/guides/bylaws/sect6-7.html#http://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.”)

19 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.”)
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.

**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.

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.

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.

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 without requiring inventors to forfeit their ability to obtain a reasonable financial return on such contributed technology.

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.

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20 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.
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.

**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, supplier-led standards efforts are 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.

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 environment 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.”

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.”

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.”

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.”

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.”

21 http://www.ansi.org/about_ansi/overview/overview.aspx?menuid=1
22 http://www.ecma-international.org/memento/index.html
23 http://www.etsi.org/about_etsi/5_minutes/home.htm
25 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.”

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.”

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.”

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 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.”

**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.”

**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.”

**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.”

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30 [http://www.ietf.org/overview.html](http://www.ietf.org/overview.html)
31 [http://www.w3.org/Consortium/](http://www.w3.org/Consortium/)
## APPENDIX B

Examples of Widely Used Standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>Maintained by Non-Profit</th>
<th>Available Free of Charge or Nominal Fee?</th>
<th>Copy and Distribute at no or nominal fee?</th>
<th>Patents irrevocably available royalty-free?</th>
<th>Free from constraints on Re-Use?</th>
</tr>
</thead>
<tbody>
<tr>
<td>3GPP</td>
<td>Yes (ETSI)</td>
<td>Yes</td>
<td>No</td>
<td>No (RAND patent pool)</td>
<td>No</td>
</tr>
<tr>
<td>AVC/H.264</td>
<td>Yes (ISO)</td>
<td>No</td>
<td>No</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
<tr>
<td>DHCP</td>
<td>Yes (IETF)</td>
<td>Yes</td>
<td>Yes</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
<tr>
<td>DVB MHP</td>
<td>Yes (ETSI)</td>
<td>Yes</td>
<td>No</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
<tr>
<td>ebXML</td>
<td>Yes (OASiS)</td>
<td>Yes</td>
<td>Yes</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
<tr>
<td>GSM</td>
<td>Yes (ETSI)</td>
<td>Yes</td>
<td>No</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
<tr>
<td>IEEE 1394</td>
<td>Yes (IEEE)</td>
<td>Yes</td>
<td>No</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
<tr>
<td>IEEE 802.1X</td>
<td>Yes (IEEE)</td>
<td>Yes</td>
<td>No</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
<tr>
<td>Liberty Alliance 1.0 (ID-FF 1.0)</td>
<td>No (Liberty Alliance)</td>
<td>Yes</td>
<td>No</td>
<td>Maybe</td>
<td>No</td>
</tr>
<tr>
<td>MPEG-2</td>
<td>Yes (ISO)</td>
<td>No</td>
<td>No</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
<tr>
<td>MPEG-4</td>
<td>Yes (ISO)</td>
<td>No</td>
<td>No</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
<tr>
<td>OMA DRM 2.0</td>
<td>No (Open Mobile Alliance)</td>
<td>Yes</td>
<td>Yes</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
<tr>
<td>SNMPv3</td>
<td>Yes (IETF)</td>
<td>Yes</td>
<td>Yes</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
<tr>
<td>WLAN</td>
<td>Yes (IETF)</td>
<td>Yes</td>
<td>Yes</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
<tr>
<td>XML Configuration Access Protocol</td>
<td>Yes (IETF)</td>
<td>Yes</td>
<td>Yes</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
<tr>
<td>XrML</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No (RAND)</td>
<td>No</td>
</tr>
</tbody>
</table>
## Appendix C

### IP Policies of some Standards Organizations

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>American National Standards Institute (ANSI)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CableLabs (OpenCable)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Digital Video Broadcasting Project (DVB)</td>
<td>Yes</td>
<td>Yes&lt;sup&gt;XVI&lt;/sup&gt;</td>
<td>No</td>
</tr>
<tr>
<td>ECMA International</td>
<td>Yes</td>
<td>Yes&lt;sup&gt;XVII&lt;/sup&gt;</td>
<td>No</td>
</tr>
<tr>
<td>European Committee for Standardization (CEN)</td>
<td>Yes</td>
<td>Yes&lt;sup&gt;XVIII&lt;/sup&gt;</td>
<td>No</td>
</tr>
<tr>
<td>European Telecommunications Standards Institute (ETSI)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>GlobalPlatform</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Institution of Electrical and Electronics Engineers (IEEE)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>International Organization for Standardization (ISO) / International Electrotechnical Commission (IEC) Joint Technical Committee (ISO/IEC JTC1)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>International Telecommunication Union (ITU)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Internet Engineering Task Force (IETF)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Organization for the Advancement of Structured Information Standards (OASIS)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>The Open Group (formerly Directory Interoperability Forum)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>World Wide Web Consortium (W3C)</td>
<td>Yes</td>
<td>Maybe</td>
<td>Yes&lt;sup&gt;XX&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td>---</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Also ISO/IEC IS 14496-10; audio-video format.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Dynamic Host Configuration Protocol.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>High speed data transfer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Portfolio license with flat fee of $0.25/device, available through MPEG LA.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI</td>
<td>Port based network access control for wireless access.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VII</td>
<td>And ID-WSF Interaction Service v1.0; identity for web services.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIII</td>
<td>Royalty-free by default, but RAND as alternative; RAND Reservations by various parties, see, e.g., Necessary Claims Disclosure Notices By Citigroup, Inc. (<a href="http://www.projectliberty.org/specs/Citigrouptable.php">http://www.projectliberty.org/specs/Citigrouptable.php</a>) and Sony Corporation (<a href="http://www.projectliberty.org/specs/Sonytable.php">http://www.projectliberty.org/specs/Sonytable.php</a>).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>DRM for mobile devices.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XI</td>
<td>MPEG LA has issued a call to form a new patent pool.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XV</td>
<td>Currently maintained by ContentGuard, but being reviewed for standardization by OASIS &amp; MPEG.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XVI</td>
<td>Non-exclusive, non-transferable, world-wide licenses on RAND terms; third party to submit an equivalent undertaking.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XVII</td>
<td>RAND to entire world required or standard may be withdrawn.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XVIII</td>
<td>RAND, but standard may be adopted even if patentee refuses to license.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XIX</td>
<td>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 (<a href="http://www.w3.org/Consortium/Patent-Policy-20040205/">http://www.w3.org/Consortium/Patent-Policy-20040205/</a>).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Business Software Alliance (www.bsa.org) is the foremost organization dedicated to promoting a safe and legal digital world. BSA is the voice of the world’s commercial software industry and its hardware partners before governments and in the international marketplace. Its members represent one of the fastest growing industries in the world. BSA programs foster technology innovation through education and policy initiatives that promote copyright protection, cyber security, trade and e-commerce.