Request for Information: Effectiveness of Federal Agency Participation in Standardization in Select Technology Sectors for National Science and Technology Council's Sub-Committee on Standardization

Comments submitted by the Computer & Communications Industry Association

The Computer & Communications Industry Association is pleased to submit comments on agency participation in standards activity. With our longstanding commitment to "Open Market, Open Systems, Open Networks," CCIA has abiding interest in enabling standards and standards development in information and communications technology and its use throughout the economy. Our members are engaged in the development, marketing, and continuing enhancement of complex systems and services. They depend on standards and the healthy evolution of standards to promote interoperability, innovation, and new markets. Standards pose a number of policy challenges that should be addressed transparently and explicitly, especially given the global nature of supply chains and the widespread and expanding use of ICT in promoting growth and addressing the world's economic, social, and environmental challenges.

The Internet and the IETF

The development of Internet standards under of the Internet Engineering Task Force (IETF) remains the single most important case of federal agency support of standards. The Internet has transformed human activity in many respects, contributing dramatically to productivity growth and to the competitiveness of the U.S. economy. It has provided a platform for innovation that has continued to spawn new infrastructure, services, applications, and products well after the core standards were developed.

The success of Internet standards has also had social and political impacts that extend far beyond the original research constituency. Despite early support from the federal government, the IETF became a model for industry self-regulation as alternative to top-down policymaking. Its dramatic success, along with the work of other "consortia," has challenged the international standards system, leading to difficult questions about the meaning of "international standard."

In early critical years, most of the participants in the IETF were academics on government grants, researchers from the national laboratories, or technical staff of mission-driven agencies – although some were contractors or research staff in far-sighted companies. Because they all made practical use of the technology

and standards they were working on, IETF's processes were iterative, fast, and informed by practical experience. No standard could be adopted without at least two working implementations. Royalty-bearing technology was discouraged, and Internet protocols remained free for anyone to implement. Drafts, standards, and other documents were publicly available without charge. As a result, when data communications was taught in computer science courses, it was the TCP/IP suite that was taught.

Participation in the IETF was not restricted to U.S. experts, but the center of gravity remained squarely in the U.S. Researchers were supported by several mission agencies; DARPA supported coordinating functions at USC's Information Sciences Institute; and NSF subsidized the emerging infrastructure for higher education. Yet the IETF remained an informal bottoms-up effort that had no membership as such. Despite the government support, it became a model for "self-organization" and contributed to an ideal of industry self-regulation and governmental restraint that dominated Internet and electronic commerce policy for many years.[1] While this view was less appropriate for a more commercialized Internet, it nonetheless served to defer formal policymaking that might have inhibited the global growth of Internet services.

The success of the Internet testifies to the value of open access to standards. In part, this derived from the fact that the Internet enabled the World Wide Web, which was likewise a royalty-free environment that allowed anyone to build applications without asking permission.[2] During the 1980s and early 1990s, other agencies under the auspices of the NIST's Federal internetworking Requirements Panel were following Open Systems Interconnection (OSI) standards.[3] The ambitious OSI protocol suite was the product of the traditional international standards system and followed the vision for data networking of the state-owned and monopoly telcos dominant in that era. The IETF and the Internet protocols won out, because of their versatility, the support of the federal research agencies, and the fact that the standards were freely disseminated and usable.

It is important to reiterate that the U.S. government did not dictate the standards (and was in fact simultaneously dictating the wrong standards to federal agencies). Rather, federal research agencies were helping develop consensus around standards that would enable a transformation not only of research but of the whole economy. Although the Internet is an anomaly in many respects, it remains a compelling study in standards and innovation. It enabled thousands of small companies to spring up and offer low-cost service. It allowed for the rapid implementation of the World Wide Web as overlay service, along with hundreds

[1] Framework for Global Electronic Commerce, July 1997

[2] Unlike the IETF, the World Wide Web Consortium (W3C) was a membership organization that assessed dues, it adopted a policy on patents that was more explicitly royalty-free than IETF – albeit after some internal struggle (see http://www.w3.org/Consortium/Patent-Policy-20040205/).

[3] The requirements were modified in 1994 to permit use of Internet protocols. See http://www.osti.gov/bridge/servlets/purl/106597-YPV3Gd/webviewable/106597.pdf.

of software applications and millions of websites. Its open architecture and nonproprietary standards elicited a vast distributed outpouring of entrepreneurship and investment. Had royalties been imposed, the rollout of the technology would have been far slower and the need to negotiate license fees would have limited entry.

Global Implications

The Internet's success illuminates the potential economic significance of open standards – "open" in the sense of open access not just the limited focus on open process espoused by traditional standards organizations. The recent PCAST report, *Designing the Digital Future*, observes [p.16]: "The ecosystem that emerged from the open interfaces of the Internet has led to U.S. domination of innovation in that area." The report goes on to offer an economic rationale for open standards in embedded information technology: "If the United States creates the open architectures and standards, U.S. industry will gain an early advantage. NIST, in consultation with NSF, should lead an interagency effort to build consensus and fund reference implementations." At least where the fundamental management of research (i.e., data, information, knowledge) is involved, there is a strong case for federal support, and creating a critical mass of early-stage innovative activity within the U.S. clearly remains very much in the national interest.

Conversely, if other countries perceive that the US favors standards that favor U.S. companies, they may pursue alternative standards. The Technical Barriers to Trade Committee of the WTO has articulated principles for the development of international standards:

> All relevant bodies of WTO Members should be provided with meaningful opportunities to contribute to the elaboration of an international standard so that the standard development process will not give privilege to, or favour the interests of, a particular supplier/s, country/ies or region/s.[4]

Since patents offer a marketplace advantage as an incentive to innovation, royalty-bearing patents conspicuously favor the interests of particular suppliers. Even when patent holders are formally committed to licensing on reasonable and nondiscriminatory (RAND) terms, the licensing process is dispersed and opaque, allowing patent holders to deal with potential licensees one-on-one from a position of strength. This may not be a problem for similarly situated patent holders, especially if they too hold patents that are needed to practice the same standard. However, it disadvantages newcomers that wish to implement the standards but lack a portfolio of patents to trade.

[4] Technical Barriers to Trade Committee, World Trade Organization, *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.9

Conflicts between patents and standards have increased as U.S. policies encouraged a high volume of patenting. (From 1996 to 2002, the mission of the patent side of the USPTO was "to help our customers get patents.") In contrast to the highly focused technical dialog among experts that takes place within standards development processes, the proliferation of patents in the ICT sectors has made disclosure problematic and uncertain. As Frederick J. Telecky of Texas Instruments (TI) explained to the U.S. Federal Trade Commission:

> TI has something like 8000 patents in the United States that are active patents, and for us to know what's in that portfolio, we think, is just a mind-boggling, budget-busting exercise to try to figure that out with any degree of accuracy at all.[5]

The uncertainty of disclosure in the standards context is ironic in light of the public disclosure function that the patent system is designed to perform. Instead, this indeterminacy spills over into the process of standards development where it adds to opportunities for strategic behavior, including the ambush of standards by nonparticipating third parties.

Individual agencies cannot be expected to police standards efforts or to limit the proliferation of patents that may make standards setting treacherous in their field. However, the legitimacy and integrity of the standards development, including its relationship to patent policy and practice is a matter of a national and international concern, especially given how widely and deeply IT standards reflect and shape innovation policy, economic growth, and international trade.

In the past, the peculiarities of ICT standards played a far more limited role. Standards were set as technologies matured rather than in anticipation of new markets or in the expectation that they would continue to evolve over time. Moreover, the U.S. was by far the world's largest market, foreign producers had to accept U.S. practices if they wanted to export to the U.S. and realize the economies of scale if offered.

Today, China is the world's second largest economy and has an internal market that is potentially much larger than that of the U.S. Yet China is still a developing economy and can speak for the interests of other developing economies. From this perspective, China has promoted "indigenous innovation" policies for both patents and standards. On the patent side, it has emulated the high-volume, low-quality U.S. model but on its own terms through subsidies, procurement policies, and easy-to-get "utility model" patents.[6] On the standards side, it has pursued standards

[5] Frederick J. Telecky, "Statement at FTC/DOJ Hearings on Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy," FTC/DOJ hearings (February 28, 2002). Available at http://www.ftc.gov/opp/intellect/020228telecky.pdf.

and standards policies in ways that seek to exploit the scale economies of its internal market.

While China's interest in going it alone for certain standards has been criticized, it is not irrational, especial given that the lack of consensus on the meaning of "international standard." ISO's acceptance of OOXML as alternative to ODF for documents sets a precedent for multiple standards that may or may not be desirable. While multiple standards may compete with each other in certain ways, they may also be positioned to serve different interests. For example, one may be backward looking and oriented to legacy systems, while another is forward-looking, offering a target for migrating to a more elegant open standard. Similarly, a royalty-free alternative to a more established royalty-bearing standard may be more attractive for newcomers and developing economies. Standards do not vitiate principles of competition.

Standards Policy as Public Policy

These concerns go well beyond the professional and institutional perspectives that inform traditional standards institutions and international standards system. The U.S. government's reliance on private-sector initiatives and ANSI has, for the most part, worked well. However, there are two major challenges:

First, the globally oriented consortia (including IETF) that drive innovation in information technology, especially in software, do not fit within ANSI. Since the consortia encourage participation from outside the U.S., they do not want to appear tied to national standards organizations, including ANSI. Most of these bodies originate from the U.S. because that is the center for innovation within the sector. Ironically, they represent an extreme form of the bottom-up approach characteristic standards development in the U.S., yet they do not fit with ANSI national orientation or ANSI as a route to international standards organizations.

Second, there is no locus for developing national public policy. NIST does not have a legislative mandate to develop public policy. The State Department must represent U.S. policy in international treaty organizations such as the ITU but it has little expertise in standards and is not engaged in policy development. In any case, ISO and IEC are not treaty organizations, so the U.S. is represented there by ANSI. In short, the bottoms-up approach has left a policy vacuum.

[6] Utility model patents are available in many countries, although the Chinese enthusiasm for them appears unique. Over 98% of the nearly 350,000 granted in 2010 were awarded to domestic applicants.

ANSI is not constituted to develop or even debate public policy. It has a national policy committee, but its documents are accessible only to members.[7] Its accredited committees and organizations represent the technical professionals within member companies who engage as technical experts while keeping legal and business issues at a distance. It focuses on policy as a matter of process rather than substantive policy.

ANSI's *United States Standards Strategy* is less a strategy than a set of aspirational statements.[8] It makes vigorous claims for the importance of standards and the need to communicate their importance, yet it offers no policy analysis. It simply defers to patents, as if there were no economic tension between patents and standards or vulnerability of investments in standards-based products. It does not address the policy considerations around RAND and RF licensing, nor does it address royalty stacking and non-participant ambush. Although ANSI calls for a sector-based approach, it fails to articulate any differences between sectors or what such differences might imply, such as the magnified strategic importance of standards in complex technologies and ecosystems.

The NTTAA and Circular A-119

The National Technology Transfer and Advancement Act of 1995 and OMB Circular A-119 are focused on a problem of another era. Today, government agencies rarely set standards on their own. Yet standards development is important strategically in ways that were less apparent in the early 1990s, and in retrospect, one of the less appreciated benefits of NTTAA was that it helped integrate and expand the U.S. market.

Beyond eliminating barriers between government-specific and industry consensus standards, Circular A-119 gives little guidance concerning the nature of the government's interest in standards and how this should be reflected in agency practices. A sophisticated approach would take a nuanced look at the factors favoring and disfavoring different forms and degrees of government participation – at least providing a framework for agencies to consider in spending scarce public resources. These factors might include:

Need for cross-industry participation Government involvement may be necessary for overcoming the coordination problems and costs in getting industries to work together on common standards problems. This provides justification for advancing standards for the electronic health records, the Smart Grid, and cybersecurity.

[7] http://www.ansi.org/standards_activities/domestic_programs/governance_committees/about_nic.aspx?menuid=3
[8] http://www.ansi.org/standards_activities/nss/usss.aspx

Potential economic and social impact A standard with vast potential may not command a critical mass of interest from private participants. This may be because the payoffs are too remote and contingent – or dependent on further innovation. The remote but powerful payoffs from the early Internet exemplify this problem.

Low barriers to innovation In areas such as software where the costs of entry and innovation can be low, it may be desirable to have standards that do not impose an entry fee.

Proximity to scientific research As the major funder of scientific research, the federal government has an interest in the efficiency of research infrastructure, including the standards used to support collaborative activities.

Communications with citizens Where the government is engaged with the public,[9] a strong case can be made for the importance of royalty-free open access. Conversely, where the government is seeking off-the-shelf equipment for internal use, much as a private firm would do, the case for open access is weak.

Need for multiple sources The Department of Defense insists on multiple sources for mission-critical applications. Even though the government can avoid the severe risks associated with injunctions, agencies should consider the dangers of lock-in to particular vendors.

Established government functions In many areas – national defense, emergency preparedness, public health, veteran's services – the dominant role of the government is well established, and a leading role in standards development necessarily follows, even though government-specific standards are probably not desirable.

Different factors may call for different policy tools. Direct participation may be practical in some contexts. In others, a redirection of existing funding to university researchers may be more appropriate. In yet others, a procurement preference may be effective.

These examples are illustrative of the kind of useful but not binding guidance that OMB could offer. It would also be helpful to develop an analytic framework that explains the value of standards in economic terms and in terms of the "market failure" and systems rationales for government involvement. As an example of the analytic framework needed for standards policy, the NSTC Subcommittee on Standards may wish to consider the work commissioned by the U.K. government, at least as a

[9] See the Obama administration's Open Government Initiative and its focus on transparency, participation, and collaboration: http://www.whitehouse.gov/open

starting point.[10] There is a wealth of research on standards by U.S. academics but the lack of analysis directed at policymakers should be remedied under the auspices of NIST, the Department Commerce, and the Subcommittee on Standards.

It is our hope that the examples submitted under the Subcommittee's will help illuminate the full range of options for government agencies to contribute to standards development in a meaningful way. Suggested guidelines can help define standards as an important element of a national innovation strategy. In this regard, we note that the administration recently revised its foundation document, A Strategy for American Innovation, and Congress recently enacted the America COMPETES Reauthorization Act, which calls for a study and strategy on "innovative capacity and international competitiveness." The Commerce Department has asked for input.[11]

Patents and Standards

The USPTO has already identified standards as a major component of its own economic research agenda, specifically, "examining the role of IP in de facto standards, standard setting and standards policy."[12] This issue has not been effectively addressed despite a dramatic and unbroken rise in the number of patent disclosures in standards organizations during the 1990s and 2000s.[13] The conflict plays out in debates over ex-ante licensing, RAND vs. RF licensing, patent ambush, patent reform, and public procurement.

For example, in the recent revision of the European Interoperability Framework, debate centered on the definition of "open standard," which had been defined as meaning royalty-free under the first version of the EIF in 2004. In December 2010, the second version of the EIF retreated into a more nebulous definition that hinges on the effects on open source software. Yet the PCAST report, *Designing the Digital Future*, also

[10] G. M. Peter Swann, The Economics of Standardization: Final Report for Standards and Technical Regulations Directorate, Department of Trade and Industry, December 2000, available at http://www.berr.gov.uk/files/file11312.pdf. (References available as separate document at http://www.berr.gov.uk/files/file11316.pdf.) See also Paul Temple, Robert Witt, Chris Spencer, Knut Blind, Andre Junjmittag and G. M. Peter Swann, The Empirical Economics of Standards. DTI Economics Paper No. 12, June 2005, available at http://www.bsi-global.com/upload/Standards & Publications/Government/Empirical_Economics.pdf; G. M. Peter Swann, The Economics of Standardization: An Update, at http://www.bis.gov.uk/assets/biscore/innovation/docs/e/10-1135-economics-of-standardization-update.pdf

[11] See Federal Register, Vol. 76, No. 24, February 4, 2011, p. 6395, http://www.gpo.gov/fdsys/pkg/FR-2011-02-04/pdf/2011-2558.pdf

[12] See http://www.uspto.gov/ip/officechiefecon/index.jsp

[13] See Timothy S. Simcoe and Mark Rysman, International Standardization as a Strategic Tool, IEC, 2006, p. 91, Figure 1, available at http://www.iecchallenge.org/papers/pdf_iecchallenge/simcoe.pdf

released in December affirms the broader understanding of "open" as royalty-free,[14] as does a U.K. policy released in January.[15]

Traditional standards organizations focus on openness in terms of the process of developing standards. They often discount or avoid the question of open access, whether in terms of either implementation of the standard or access to documentation. Most standards organizations depend on sales of documentation as a revenue source and most defer to the patent interests of member companies.

Yet the decision to make a standard royalty-free favors rapid and widespread uptake of standard: There is no skewing of competition among implementations in favor of dominant patent holders. The process is less like to be slowed by participants jockeying for inclusion of patented technology. A large survey undertaken for the European Commission's Directorate General for Enterprise and Industry[16] suggests that royalty-free policies are gaining in popularity and will be more common in the future.

Whether that is the case or not remains to be seen. However, the significance of open standards needs to be better understood, especially in terms of how two superficially contradictory characteristics are reconciled: the encouragement of international trade and the national advantage argued by PCAST.

In information and communications technology, standards are the classic embodiment of collaborative innovation and economic interdependency. They deserve attention at the highest policy level because of the importance of economic growth and leadership.

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by
Brian Kahin
Senior Fellow

[14] See Brian Kahin, Open Standards and the Royalty Problem, opensource.com, January 20, 2011, http://opensource.com/law/11/1/open-standards-and-royalty-problem
[15] http://www.cabinetoffice.gov.uk/sites/default/files/resources/PPN%203_11%20Open%20Standards.pdf
[16] See DG Enterprise and Industry study on the interplay between standards and intellectual property rights, http://ec.europa.eu/enterprise/policies/european-standards/standardisation-policy/policy-activities/intellectual-property-rights/index_en.htm; preliminary results from the commissioned survey by are available at http://ec.europa.eu/enterprise/policies/european-standards/files/standards_policy/ipr-workshop/ipr_presentation_interim_results_23-11-2010_en.pdf

Computer & Communications Industry Association
900 17th St., NW, Suite 1100
Washington, DC 20006
202-783-0070x101
bkahin@ccianet.org