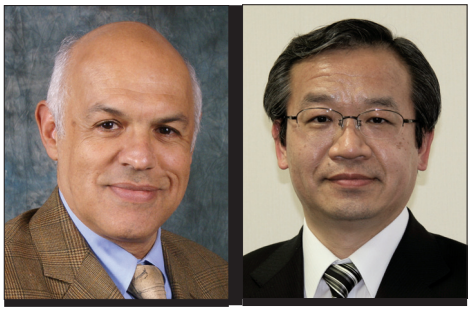
STANDARDS DYNAMICS FOR DIGITAL BROADCASTING, INTERNET ADDRESS AUTHENTICATION, AND LOW-RATE PERSONAL AREA NETWORKS



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Under the title of dynamics of standards, some academic programs in business and management have begun to consider the challenges of tracking and implementing continuous changes in devices, technologies, and standards on telecommunication networks and services [1]. Standards are designed to ensure interoperability, but because they are voluntary, they can contribute to the fragmentation of markets. The following selection of articles illustrates how necessary technological improvements may also pose critical issues for global networks.

Hu *et al.*, from the University of Washington, United States, and Telepath Technologies,[1] China, present the new Chinese standard for broadband digital radio (BDR)[2] in their article, "System Design for Broadband Digital Radio Broadcasting." The standard is designed to meet the service requirements for in-band on-channel (IBOC) operation (i.e., using the existing FM/AM broadcast bands). They present performance data using simulations with a prototype built on a platform from Microsoft. An important and unique characteristic of the Chinese standardization system, implicitly demonstrated in this article, is that contributions from researchers in universities and public research institutions can be as significant, if not more so, than contributions from the industry. Furthermore, as explained by Ernst [2], Chinese standards are of four distinct categories: national standards, sector/industry/ministerial standards, local standards at the provincial level, and enterprise standards for a specific firm. National standards, in turn, can be compulsory or voluntary. Chinese national voluntary (GB) standards are recommendations that are implemented, if at all, after their adoption by the supervising administrations and ministries. For the case at hand, standards in the broadcast industry typically require approval from the State Administration of Radio, Film, and Television of China (SARFT). For example, in 2006 SARFT selected the China Mobile Multimedia Broadcasting (CMMB) protocol for mobile television and multimedia broadcasting. Even though it is just a "GY" and not a "GB" specification, it is now the actual broadcasting standard in China. Because there are several digital audio standards around the world [2] as well as *de facto* standards for satellite radio in the United States, global manufacturers will have to manage this diversity in their product portfolios in an economic way.

The second article deals with supplemental authentications of IP source addresses. In 2008, the IETF initiated the Source Address Validation Improvements (SAVI) project to come up with additional protections from source spoofing. The outcome of that project is currently undergoing final review to be adopted as an IETF standard. The technique is based on complementing ingress filtering at the prefix level with a screening in the layer 2 switch directly connected to the network node. Some commercial switches already offer proprietary mechanisms to bind an IP address with a physical port on the attached switch. A standardized mechanism should allow the interoperability of devices from different manufacturers, particularly when the binding of layer 2 and layer 3 addresses is done automatically by inspecting the messages exchanged during the configuration of the nodes. Bagnulo and García-Martinez from the University Carlos III, Spain, in "SAVI: The IETF Standard for Address Validation," present an integrated view of the proposed standard based on stable draft documents, and compare the different SAVI solutions in terms of functionality and complexity. Once SAVI-compatible products are commercially available, network operators and service providers will have to select from among the various SAVI solutions and manage their gradual introduction in nodes and switches to complement the current method of address authentication.

The last two articles, by Chin-Sean Sum *et al.* from the National Institute of Information and Communications (NICT) of Japan, relate to the use of TV white space (TVWS) for smart utility networks (SUNs). TVWS is a generic name for the spectrum of radio frequencies located between existing TV stations that can be reused for broadcast TV or for unlicensed communication with low-power wireless devices. SUNs use telemetry and data communication to improve the operational efficiency of utilities, and the mission of IEEE 802.15.4g

[1] *Telepath is a fabless company focusing on mobile chipsets.*

[2] *These systems are also known as digital audio broadcasting (DAB) or digital radio mondiale (DRM).*

is to ensure the interoperability of SUNs operating in the available unlicensed frequency bands. Task Group IEEE 802.15.4m was established in 2011 to investigate low-rate wireless personal area networks (LR-WPANs) in the TVWS. "Design Considerations of IEEE 802.15.4m Low Rate WPAN in TV White Space" describes how 802.15.4m is adapting the various physical (PHY) and media access control (MAC) layers of IEEE 802.15.4 to TVWS and modifying the network topology of IEEE 802.15.4 to achieve optimal performance. "An Interference Management Protocol for Multiple Physical Layers in IEEE 802.15.4g Smart Utility Networks" contains a proposed protocol to protect from interference among the various PHY layers used in SUN systems in close proximity. It should be noted that the frequency bands of IEEE 802.15.4g SUNs differ according to regional regulations, and there are currently three PHY layer designs. Clearly, some coordination and negotiation are needed, for both product development and service introduction.

It is our hope that the articles presented will give the readership of *IEEE Communications Magazine* a good understanding of current issues in the standardization of information, communication, and broadcast technologies on a worldwide basis. The editors would like to express their gratitude to the reviewers, listed below in alphabetical order, for their assistance in making the selections and their generous advice to prospective authors on how to improve their submissions to meet the goals of the Standards Series.

REFERENCES

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[2] D. Ernst, "Indigenous Innovation and Globalization: The Challenge for China's Standardization Strategy," UC Institute on Global Conflict and Cooperation, La Jolla, CA and the East-West Center, Honolulu, HI, 2011, available from http://www.eastwestcenter.org/publications/indigenous-innovation-and-globalization-challenge-chinas-standardization-strategy.
[3] D. Bodson, "Digital Audio Around the World — Existing Broadcast Technology Standards," *IEEE Vehic. Tech. Mag.*, vol. 5, no. 4, 2010, pp. 24–30.

BIOGRAPHIES

MOSTAFA HASHEM SHERIF (ms5285@att.com) has been with AT&T in various capacities since 1983. He has a Ph.D. from the University of California, Los Angeles, an M.S. in the management of technology from Stevens Institute of Technology, New Jersey, and is a certified project manager of the Project Management Institute (PMI). Among the books he authored are *Protocols for Secure Electronic Commerce* (2nd ed., CRC Press, 2003), *Paiements électroniques sécurisés* (Presses polytechniques et universitaires romandes, 2006), and *Managing Projects in Telecommunication Services* (Wiley, 2006). He is a co-editor of two books on the management of technology published by Elsevier Science and World Scientific Publications in 2006 and 2008, respectively, and is the editor of the *Handbook of Enterprise Integration* (3rd ed., Auerbarch, 2009).

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