

## International Standardization Trends in China

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### Abstract

In China, independent technological innovations are progressing in accordance with the National Guideline for Medium and Long-term Plan for Science and Technology Development, announced by the State Council of the People's Republic of China in 2006. In the context of such innovation, standardization activities are under way in various industrial fields, with specific goals set for each area of technology. Standardization in the communications industry is being implemented by the China Communication Standards Association (CCSA). This article reviews recent developments in the CCSA's standardization activities and explains the structure of the Chinese standardization system and recent trends in the communications industry.

*Keywords: standardization trend, CCSA, M2M*

### 1. Introduction

Chinese telecommunications technology has made remarkable strides in recent years. Information and communications technology (ICT) is rapidly becoming widespread, with the number of mobile phone subscribers and broadband subscribers respectively reaching about 1.1 billion and 175 million as of the end of 2012. Standards have played an important role in the diffusion of broadband. The national compulsory standard GB<sup>\*1</sup> 50846-2012 Design Specification for FTTH (fiber to the home) Facilities in Residential and Construction Areas, enacted this year on April 1, deserves particular attention. The specification makes FTTH wiring compulsory for each household in new multi-unit apartments and residential buildings in cities where FTTH is available. The enforcement of this compulsory standard is expected to make FTTH even more widespread.

In addition to the promotion of broadband, systematic measures are being devised in a variety of fields following the uniquely Chinese model in which political instruction is given by the government on which direction to take. In China, the central government lays out its policies every five years and determines which areas to focus industrial development

on. The period from 2011 to 2015 is covered by the 12th Five-Year Guideline, which is focusing on seven industrial fields as key areas: energy conservation/environmental protection, next-generation information technology, biotechnology, the production of cutting-edge equipment, new energies, new materials, and cars employing new energy sources. Macro-development plans to develop the industrial fields established in the Five-Year Guidelines are also subsequently announced with the release of each set of guidelines. In response to these development plans, ministries, agencies, and local governments also set numerous guidelines and plans that include numerical targets and conceptual levels to be achieved by the end of the 12th Five-Year Guideline period (that is, by the end of 2015) [1].

Having joined the WTO (World Trade Organization) in 2001, China is working to ensure transparency in its compulsory standards, optional standards, and conformity evaluation procedures in accordance with the TBT (Technical Barriers to Trade) agreement imposed on member countries. At the same time, it will need to establish domestic regulations by incorporating international standards and guidelines.

\*1 GB stands for *Guobiao*, Chinese for *national standard*.

## 2. National Guideline for Medium and Long-term Plan for Science and Technology Development

In February 2006, China officially announced its National Guideline for Medium and Long-term Plan for Science and Technology Development—a mid- to long-term plan for scientific and technological fields—as a national strategy to cover the period until 2020, and has steadily been implementing it. This plan's four pillars are independent innovation, leaps in key areas, support for development, and drive toward the future. China will promote original innovation (leveraging China's own capacity for innovation), collective innovation (that is, capacity for innovation by leveraging resources it holds intellectual property rights to), and re-innovation (that is, capacity for innovation brought about by the introduction of new technologies) and basic technological research. In doing so, China is aiming to bring about new breakthroughs, support sustainable social development, and aid the diffusion of basic research and cutting-edge technologies.

In this context, specific key areas and high-priority tasks have been established and are steadily being implemented.

## 3. 12th Five-Year Guideline for Standardization

Since the announcement of the 12th Five-Year Guideline for Standardization (December 2011) in the standardization field, a wide array of standardization activities have been underway in China in line with its long-term targets. Examples of the key areas of standardization in the next-generation information technology industry are listed in **Table 1**.

China is working on international standardization with unprecedented energy, and the number of posts assumed by Chinese industry leaders in organizations such as ISO (International Organization for Standardization), IEC (International Electrotechnical Commission) and ITU (International Telecommunication Union) has been rising year after year.

The number of patent applications has also been rapidly increasing in a variety of fields, with the number of international applications filed in 2012 under the PCT (Patent Cooperation Treaty) reaching 18,627 (up 13.6% over 2011), placing China in fourth position behind the U.S., Japan, and Germany [2]. China has also made its presence felt in the field of technological development. Representative examples of standards recently proposed by China to international

standardization institutions include TD-SCDMA (Time Division-Synchronous Code Division Multiple Access), IGRS (Intelligent Grouping and Resource Sharing), WAPI (Wireless-LAN (local area network) Authentication and Privacy Infrastructure) and TD-LTE (Time-Division Long-Term Evolution).

## 4. Standardization in China

Standardization in China is prescribed by law in the Standardization Law of the People's Republic of China (PRC) (enacted in 1989). All standards currently in effect were established based on this law. These regulations classify Chinese standards into four types: national standards, departmental standards (industry standards), local standards, and corporate standards [1]. Each type of standard is further divided into compulsory standards and optional standards (recommended standards). Standardization documents for compulsory national standards are identified by a code number preceded by GB, whereas those for optional standards are indicated by GB/T. Thus, the status of the standards that are established can be understood by looking at their codes [1].

National standards are established and managed by SAC (Standardization Administration of China), an external bureau of the AQSIQ (General Administration of Quality Supervision, Inspection and Quarantine of PRC), while industry standards are enacted and managed by the central government's relevant departments for each industry. Communications-related standardization is carried out under the lead of MIIT (Ministry of Industry and Information Technology). Regional standards are those established by individual regions (provinces, autonomous regions, and directly controlled municipalities), and are managed by the standards office of each region's Bureau of Quality and Technical Supervision.

The organizations that oversee the various standards are shown in **Fig. 1**. Note that SAC is a member institution of ISO/IEC.

## 5. China Communications Standards Association (CCSA)

### 5.1 Overview

CCSA was founded in 2002 as the only standardization institution in charge of standards in the Chinese communications industry [3]. CCSA members come from diverse fields in the communications industry, for example, research institutions, communications carriers, vendors, and universities. The

Table 1. Key points for standardization of next-generation IT industry.

Item	Descriptions
Information network infrastructure and next-generation mobile communication	- Establish standards concerning the optical transmission of high-speed multi-services. - Establish standards for the reinforcement of 2G and 3G mobile communication technology, 4G mobile communication, CDMA communication, digital honeycomb communications, network security, optical fiber, the union of fixed and mobile networks, wireless LAN, wireless broadband access, short-distance communication, etc.
Next-generation Internet core equipment and smart terminals	- Establish standards for improved network equipment efficiency and security, IPv6, domain systems and security, software switch security, Internet data centers, individual information processing equipment, e-books, etc.
Triple play	Establish standards for home networks, audio codecs, video codecs, basic standards and contents security shared by bidirectional digital television platforms and integrated systems, content formats for streaming media, network television, multimedia telephones, standards of interactive services among third screens (television, personal computers and mobile phones), IP phones, smart television connection standards and network transmission security standards for triple play
Integrated circuits and new-type displays	Establish standards for smart card web servers, electronic ID systems operable with smart cards, general IC card and smart card security and system security; electricity semiconductor, MEMS product and process standards; standards for 3D display comfort, compatibility and conversion, and new displays such as digital cinema, hi-vision TV, flat displays and laser displays.
High-end servers	- Establish standards for evaluating the performance of high-performance computers and servers, as well as for energy-saving features and electrical properties. - Push forward with studies on the high-end server standards required for applications such as Internet data centers, domain services and cloud computing.
High-end software and digital virtualization	Establish standards for operating systems, Chinese software formats, document layout, new-type databases, middleware, high-end software such as built-in type software, digital content management and protection, digital storage and interoperability, union of multi-media codecs, computer graphic modeling and simulation, environment data expression, virtual reality/augmented reality/mixed reality and digital content aggregation delivery platforms.
Software service and network added-value services	Establish standards for the plan, design and supervision of information system projects, governance and management of IT outsourcing, IT operation and maintenance, IT services, software services; added-value web service standards for Internet content filtering, interoperability, privacy protection, development and use of information resources, etc.
<i>Wulianwang</i> (a network that links objects):	- Establish and revise standards for the application of wulianwang to fields such as traffic, public safety, agriculture, environmental protection and forestry. - Establish key basic standards for wulianwang, and standards for sensor networks, automatic identification technologies and unified resource identifiers. - Use for RFID army standards.
Cloud computing	Establish standards for cloud computing terminology and reference models, cloud data management and storage, cloud platform interfacing and virtualization, next-generation search engines, next-generation network operating systems, mass storage systems, and intelligent mass data

Source (in simplified Chinese) at <http://images.mofcom.gov.cn/lczx/accessory/201201/1325841074090.pdf> from p. 14 onwards

IC: integrated circuit

MEMS: microelectromechanical systems

ID: identification

RFID: radio frequency ID

IPv6: Internet Protocol version 6

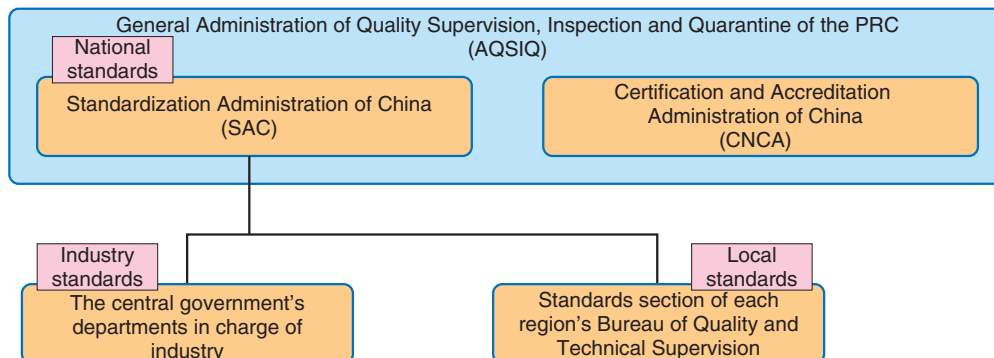


Fig. 1. Government bodies responsible for standards in China.

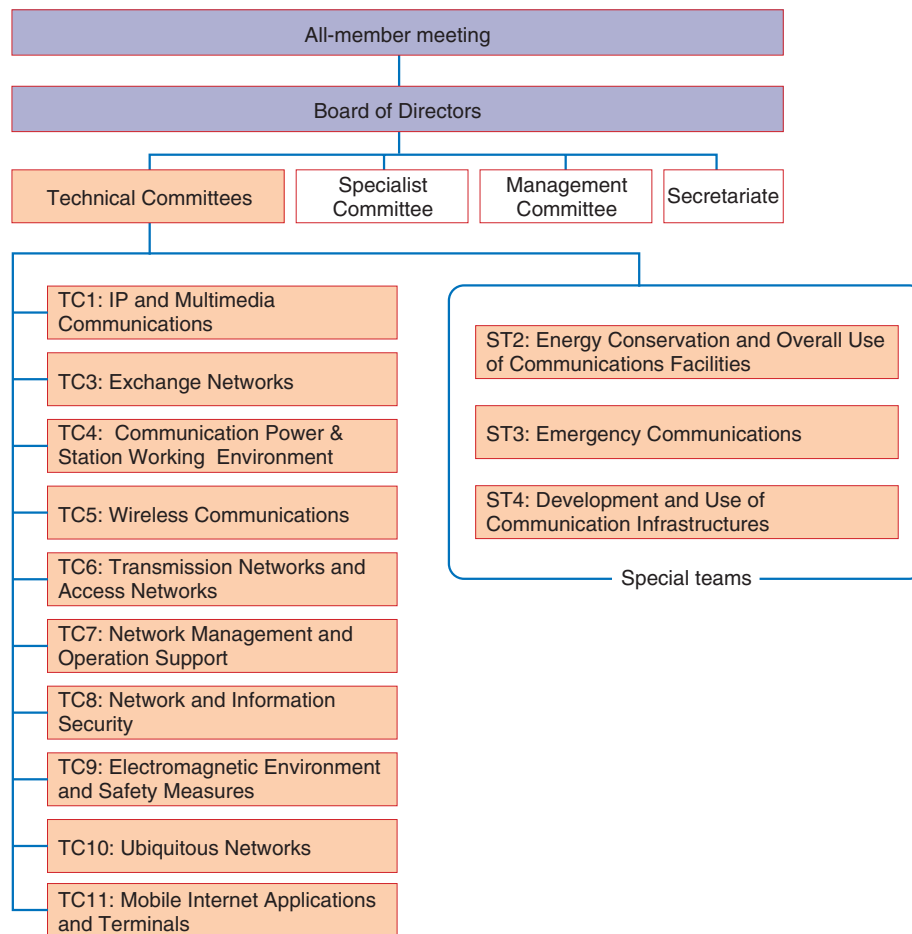


Fig. 2. Organizational structure of CCSA.

membership is divided into full members, affiliate members, and observers. In recent years, the number of members has been on the rise, and in 2012 there were 7 affiliate members, 29 observers, and 1 specialist member in addition to 279 full members.

In addition to carriers and vendors, CCSA's standardization activities revolve around CATR (China Academy of Telecommunication Research of MIIT)—China's only government-funded institution for research on telecommunications. CATR is engaged in providing support for government measures on communications as well as consulting and certification services. At the same time, it is actively involved in CCSA's domestic standardization activities carried out by Technical Committees (TCs) and in international standardization activities carried out by ITU-T.

## 5.2 Organizational structure and work on domestic standardization

At CCSA, TCs have been established in ten fields. They are working on various standardization efforts ranging from optical access to IPTV (Internet Protocol television), IPv6 (Internet Protocol version 6), and the Internet of Things (IoT). In addition to TCs, Special Teams (STs)—study groups on specific subjects—have also been set up. The CCSA's organizational structure is shown in **Fig. 2**, and the areas that each TC's Working Group (WG) is focusing on are listed in **Table 2**.

In 2013, certain fields were identified as key areas. These were: Broadband China, TD-LTE, cloud computing, IoT, Internet datacenters, SDN (software-defined networking), next-generation satellite communications, information safety, and industry regulations. In terms of numerical targets, 400 projects in total are to be completed, including national standards,

Table 2. Areas of focus for TC WGs.

Study group		Subject studied	Study group		Subject studied
TC1	WG1	IP networks and equipment	TC7	WG1	Wireless communication management
	WG2	IP services and applications		WG2	Transmission network and access network management
	WG3	Content protection		WG3	General
	WG4	New technologies and international standardization	TC8	WG1	Wired network security
	SWG2	IPTV		WG2	Wireless network security
		WG3		Security management	
TC3	WG1	Networks in general	WG4	Security infrastructure	
	WG2	Signaling protocols	TC9	WG1	Magnetic coupling of telecommunications facilities
	WG4	Services and applications		WG2	Anti-thunderstorm damage measures for telecommunication systems
		WG3		Electromagnetic radiation and safety	
TC4	---	---	TC10	WG1	General
TC5	WG3	Wireless LAN and wireless access		WG2	Applications
	WG4	cdmaOne/CDMA2000		WG3	Networks
	WG5	3G security and encryption		WG4	Development of technology and standardization
	WG6	Beyond3G		TC11	WG1
	WG8	Frequency	WG2		Service platforms and their applications
	WG9	TD-SCDMA/WCDMA	WG3		Terminals
	TC6	WG10	Satellite/microwave communication		
WG1		Transmission networks			
WG2		Access networks			
WG3		Optical fiber/optical cables			
	WG4	Optical devices			

TD-SCDMA: time-division synchronous CDMA  
WCDMA: wideband CDMA

industry standards, association standards, and research reports.

In recent years, China has pushed forward with technological development concerning its *wulianwang*\*<sup>2</sup> and Broadband China, treating this development as a national policy. Technological standards in these fields are also being studied intensively.

*Wulianwang* is the subject of wide-ranging studies, from the distribution of sensor information to the exchange of information between smart city platforms. The TC10 Technical Committee on ubiquitous networks, established in 2010, has been actively working on the standardization of sensor networks, M2M (machine-to-machine) communications, and smart cities. The *wulianwang* that China aims to create will leverage the necessary applications to enrich people's lives, which places the focus of discussions on the study of applications. Furthermore, Broadband China includes the study of FTTH and IPv6, and CCSA's involvement in IPv6 is especially active, with initiatives such as the management of the world's largest IPv6 network.

In recent years, standardization work has intensified further, with a total of 646 drafts completed in

2012 (national standards, industry standards, technical reports on communication standards, and research reports). Also, documents in the communication technology field drafted over the ten years since the CCSA's establishment include 2,663 industry standards, 506 national standards, 96 technical reference documents, and 115 technical reports.

At the NTT Group, observers from NTT are participating in TC10, and observers from NTT DOCOMO are taking part in TC5, TC10, and TC11, gathering information on the progress of communications standardization in China.

### 5.3 Cooperation with international standards institutions

CCSA is actively engaged in cooperative initiatives with international standardization institutions and standardization conferences. For example, one can get an idea of the significance of its role from the number of articles contributed to international

\*<sup>2</sup> *Wulianwang*: a network linking objects. The concept is similar to that of the Internet of Things (IoT); China's *wulianwang*, however, is used as a keyword to indicate a wider scope than IoT.

standardization bodies over the ten years up to 2012, which is in excess of 40,000; reportedly, the acceptance rate for the recommendation is also rising each year. CCSA is also trying to widen the scope of its activities, for instance, by proposing the launch of various new Focus Groups (FGs) in ITU-T. China's role as a global leader in standardization is beginning to become apparent; over 40 key personnel are reported to have been appointed at international standardization organizations, and several hundred Chinese representatives are working as editors of standards. China has made its presence especially felt in the ITU-T's FG-M2M field, where it has proposed the launch of an FG and obtained the chairman's appointment. The FG-M2M field is related to *wulianwang*, which is the focus of much development in China.

In addition, China is actively involved in *oneM2M*, a new M2M standardization body whose establishment was agreed upon by six standardization bodies: ARIB (Association of Radio Industries and Businesses), ATIS (Alliance for Telecommunications Industry Solutions), CCSA, ETSI (European Telecommunications Standards Institute), TIA (Telecommunications Industry Association), and TTA (Telecommunications Technology Association), and in fact hosted a oneM2M conference in Beijing in December 2012 [4].

China has also formulated a large number of proposals in oneM2M; at the 2nd conference held in December 2012, it submitted 12 contributions, including China's standard *Ubiquitous Network Terminology*. This series of initiatives shows China's intention to lead discussions outside of the conventional framework of standardization bodies.

## 6. Conclusion

Despite the effects of various internal and external issues, China's economy is continuing to grow steadily, and remarkable developments are being achieved in the ICT field. In particular, a variety of systematic initiatives such as the mid- to long-term development plans for 2006–2020 and the 12th Five-Year Guideline are being pushed forward in the fields of science and technology in order to achieve technological innovations originating from China. The same goes for standardization. China is focusing particular efforts on standardization in the communications field and is making vigorous advances: in 2012, 44 out of 211 standards in the 19 industrial fields established by the MIIT were communications-related, accounting for 21% of the total.

At the NTT Beijing Representative Office, we will continue to gather information on standardization trends in the Chinese telecommunications industry on behalf of the NTT Group, and to pursue and promote new cooperative relationships with China.

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