

# Deloitte.

Technology, Media & Telecommunications

# Changing China

*Will China's technology standards  
reshape your industry?*



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# Foreword

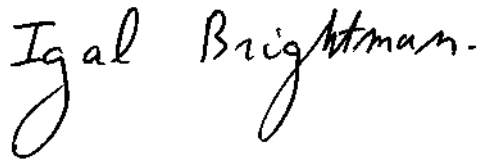
China's reputation as the world's leading low-cost manufacturer is well-established. Less well-known is China's growing influence on global standards development. From operating systems to 3G, China has already made an impact on standards. And its influence will continue growing, at least through 2010.

China's growing participation in standards development should not surprise. As the pre-eminent manufacturer of standards-based products, it is also a leading licensee. China's wish is both to reduce the outflow of licence fees, and also to earn some intellectual-based revenues of its own.

In this report, Deloitte's Global Technology, Media & Telecommunications practice identifies and analyzes China's influence on standards.

We recommend that global technology vendors stay abreast of China's emerging technology standards and their likely impact on world and sector markets. Vendors who focus only on immediate profits and near-term opportunities are likely to find themselves disrupted by new Chinese companies and their technologies.

I trust our report provides you with useful insight into one of the most important trends facing our industry this decade.



**Igal Brightman**

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# Introduction

Everyone recognizes China as a low-cost manufacturer and a huge potential market. But most do not realize China is emerging as a key player in shaping technology standards – standards that could define the nature of global competition in the technology, media and telecommunications sector for years to come. From operating systems and software applications to storage media, wireless communications and satellite positioning, Chinese government agencies and companies are looking to break the hold of developed economies on standards and working to shape new technology standards for economic advantage.

China is using its massive markets and spectacular growth as leverage in the standards war. The country's domestic market for electronic information products has grown from \$20.2 billion in 1999 to \$77.1 billion in 2002<sup>1</sup>. China is already the world's largest cellular mobile market, currently boasting 300 million subscribers<sup>2</sup>. China is also the world's leading manufacturer of DVD players, with 60 percent market share<sup>3</sup>. In PCs, the Chinese are expected to buy 27 percent of the world's total production of notebook computers – nearly a third more than last year<sup>4</sup>. Meanwhile, China's share of the global integrated circuit market is expected to increase from 13.7 percent in 2003 to 23.5 percent in 2008<sup>5</sup>.

China's desire to shape technology standards is neither surprising nor unusual. Like any government in a developing country, China wants to reduce its dependence on foreign companies and cultivate its own technology industries – moving its economy from low-tech commodities to high-tech products, based on a growing element of its own intellectual property, hopefully to fetch a premium in the global marketplace. As the world's leading producer of consumer electronics, Chinese companies would also like to reduce their royalty payments to foreign vendors. As prices at the consumer level continue to decline, royalty payments are an increasingly high percentage of total product cost. By defining standards for the Chinese marketplace, global royalty payments can be reduced and the local Technology, Media and Telecommunications industry can have a platform to develop new products and create new markets. Defining and owning new global standards also increases the national pride and prestige of China's high technology industry as it progresses to leading innovation in high technology.

Standards succeed by achieving a critical mass of acceptance – generally through pervasive, cost-effective proliferation. There are many paths to achieving critical mass. Many involve some combination of government mandate, government coalitions, private industry coalitions, and international standards bodies. The U.S. established its GPS standard through a government mandate and coordination that spanned multiple agencies (primarily the military). Europe established its GSM communications standard through government mandate and collaboration with private industry. The WiFi standard for wireless networking emerged from collaboration between industry coalitions and international standards bodies. China's government agencies and companies have learned from these examples to develop strategies to shape standards in multiple TMT sectors.

Global technology vendors must stay on top of China's emerging technology standards and their likely impact on world markets. They need to continuously gauge the potential impact, and carefully assess the strategic trade-offs. Vendors who only focus on immediate profits and near-term opportunities are likely to find themselves disrupted by new Chinese companies and technologies.



# Tracking Chinese standards initiatives

Standards are established in a market place when a critical mass of vendors and customers adopt a particular technology. In the short-term, China has a number of options to promulgate unique technology standards. It can offer a low-cost substitute to a standard that already exists. It can establish a new standard in its own market, then export that standard after achieving critical mass and economies of scale. Or it can join an international coalition, using the appeal of its domestic market as a source of leverage.

As we illustrate below, Chinese government agencies and companies are undertaking all of the above strategies. In the short-term, China is most likely to succeed in defining standards where its large domestic market, low cost base and tightly coordinated government initiatives provide a unique advantage. But China is not just competing with foreign governments and companies on standards. It is competing with itself. China's central, regional and local governments are all vying for influence, along with China's consumers and privately-held companies. Other important sources of influence include international standards bodies, capital markets, foreign customers and consumers, and even the World Trade Organization. Thus participants in China's growing markets for technology, media and telecommunications must consider all the forces at play in shaping the adoption of new technologies.

As Chinese government agencies and its homegrown technology industry learn to shape and control standards over the long-term, it may not matter who wins in the short-term. China will gradually shift the TMT competitive landscape over years or decades. By working with current standards, China's government and high technology industries can realize immediate benefits such as: attracting investment capital, building technology know-how, and using its market leverage to negotiate lower prices from foreign vendors. At the same time, by learning how to work within China, and with international bodies to influence long-term standards China's technology industries are poised to move from catch-up to leadership.

## Technology

### Operating systems

The Chinese government recently announced a major commitment to Linux and announced it was drafting a new "standard" specifically for the Chinese market that might be made compulsory for all IT vendors and service providers. This standard may provide vendors and providers with a new opportunity to source software to meet China's particular cost and security needs. In a related development, the Chinese Software Industry Association is teaming up with Japan's IT Services Industry Association and the Federation of Korean Information Industries<sup>5</sup>.

The Chinese software industry is still in its infancy and China wants to source software or create its own software industry that is affordable to the masses. Last November, Sun Microsystems<sup>7</sup> announced a multiyear, multimillion dollar deal to provide Sun's Java Desktop to an estimated 200 million Chinese workers at an affordable price. Java Desktop is a toolkit that includes a graphical user interface, the StarOffice 7 productivity suite, the Mozilla web browser, and specialized applications for e-mail and instant messaging.

### Radio Frequency Identification (RFID)

In early 2004, China established a working group to draft and develop national standards for RFID tag technology. Some reports indicate the group is adhering to international standards, while others suggest the group is planning to go its own way. An incompatible RFID standard could pit the interests of China's emerging IT industries against the interests of major purchasers of Chinese products. Major foreign companies spent \$438 billion dollars on Chinese goods last year, giving them tremendous leverage over China's business practices. Wal-Mart, which is the leading proponent of global RFID standards, spent \$15 billion by itself – and expects to increase its annual purchases from China to at least \$25 billion over the next few years. The market power of buyers and their interests for specific standards may prevail over the proprietary interests to develop a Chinese RFID standard.

## Media

### EVD

Chinese companies are trying to promote a successor to the DVD optical disk standard, called Enhanced Versatile Disc (EVD)<sup>8</sup>. Chinese companies are constrained by hefty DVD royalties, which range from \$15 to \$22 on players that today often retail for less than \$60. In 1999, the State Economic and Trade Commission helped create Beijing E-World, a 13-member consortium led by China's leading maker of DVD players, Jiangsu Shinco Electronic Group Company. The consortium holds the EVD patents, and collect royalties.

EVD provides a better picture and sound than DVD – although its superior performance is most evident when used with a high-definition television (HDTV). However, an EVD player costs roughly \$240<sup>9</sup> (compared to \$85 for an average DVD player in China) and requires an expensive HDTV for maximum performance. An even bigger challenge for EVD is compiling a critical mass of content – especially given the wide range of material already available on competing formats.

EVD is not the only technology aiming to be the successor to DVD. In December 2003, the DVD Forum, an international association of electronics makers and movie studios, approved a new high-definition standard developed by Toshiba and NEC called HD DVD. That critical endorsement effectively puts HD DVD ahead of all other standards, including EVD and another competing standard called Blu-ray endorsed by Sony, Matsushita, and Philips Electronics.

### Audio video coding

China is developing its own standard technology for compressing audio and video. The new standard, called AVS, is competing with MPEG-4 and H.264 to replace the current worldwide compression standard, MPEG-2. Compression standards are a strategic building block, influencing a wide range of technology components from codec chips and mobile networks to digital televisions, high-definition optical disks and broadband network applications. Several chip companies have already voiced support for the AVS standard.

China's AVS codec is a product of the AVS Workgroup<sup>10</sup>, a consortium of 50 universities, governmental organizations and companies being supervised by the Chinese Academy of Sciences.

AVS is expected to be compatible with H.264, but as an independent standard will free Chinese companies from their dependence on foreign compression standards. China's compression technology will carry a license fee of 1 Yuan (12 cents), compared with \$2.50 per system charged by the owners of MPEG<sup>11</sup>.

EVD is currently based on MPEG-2, but a switch to AVS is expected – allowing Chinese manufacturers to produce state-of-the-art video players based entirely on Chinese technology standards.

## Telecommunications

### Cellular networks

China has its own globally approved standard for 3G and, as the world's largest market for mobile communications, is well-positioned to take a lead role in defining the 4G standard. China's new 3G standard is known as TD-SCDMA (Time Division Synchronous Code Division Multiple Access). China is actively testing TD-SCDMA in conjunction with the U.S.' CDMA2000 and Europe's W-CDMA, the two technologies currently used by China's cellular carriers. The GSM Association, responsible for development of W-CDMA, and the GSM Association are working jointly to ensure interoperability and international roaming between their respective 3G standards<sup>12</sup>.

Government mandate – by itself – is generally not enough to establish a 3G standard, prompting China to employ a more sophisticated combination of techniques. TD-SCDMA was developed as a joint venture between China's Academy of Technology and Siemens, with Chinese technology vendors, including Huawei and Lenovo, also supporting. TD-SCDMA has already passed one major hurdle – ratification by the International Telecommunications Union (ITU).

China's own cellular carriers will collectively work with all three 3G standards, although the principal technologies will be the more established standards, W-CDMA and CDMA 2000. That approach illustrates China's transition to a market economy. Chinese carriers, like any other publicly-traded companies, are as concerned about profits and stock price as they are about helping the government establish standards.

Looking forward, China remains well-positioned to create a major 4G standard. The country's cellular market – the world's largest – is still growing, while its companies and technologies become increasingly sophisticated. China has also learned a lot from its TD-SCDMA effort. It has gained valuable experience working with international standards bodies and promoting a telecommunications standard – and dramatically improved its capabilities in chipset engineering, next-generation handset development, market and technical standards testing, and spectrum management.



That experience is already paying off. In December 2003, China began a three-year test of 4G mobile phone technology. 4G phones and devices are expected to reach speeds of 100 Mbit/s, enabling video conferencing, high resolution movie transmission, and high speed internet access. China's 4G project is a collaborative effort between researchers in China, Japan and Korea, using a common Asian language format, and is intended to counter western 4G standards being conducted under the auspices of the ITU<sup>13</sup>. Chinese participants include the China Academy of Telecommunications Research, the Beijing University of Post Telecommunications, and several Chinese carriers. Japanese participants include NTT, KDDI, Hitachi, NEC and Fujitsu.

#### **Wi-Fi networks**

China developed its own security standard, Wireless Authentication Privacy Infrastructure (WAPI), and told all WiFi vendors they would have to comply by June 1, 2004. Foreign vendors would also be required to cooperate with 24 Chinese companies selling WAPI-based equipment. China argued it was a matter of national security. Western companies responded with concerns about free trade and protection of intellectual property. China eventually announced that it would suspend its demand indefinitely. The current WiFi market in China is only \$50 million, but is projected to reach \$500 million by 2007<sup>14</sup>.

#### **Satellite positioning systems**

As with operating systems, China recently tilted the balance of power in satellite positioning – choosing Europe's Galileo system over the U.S. military's Global Positioning System. China already has its own satellite positioning system, Beidou, but the system only covers China and its neighboring areas. China's support for Galileo is a big step toward its acceptance as a global standard, and reaffirms China's interests in space technologies.

The Galileo project began in March 2002 and is expected to be operational in 2008. Fifteen European Union countries are investing €3.6 billion to build Galileo's network of 30 positioning satellites. In September 2003, China and Europe established a joint training center to educate staff and organize bilateral exchange.

China's push into satellite positioning systems has enormous commercial and geopolitical ramifications – as well as possible military ramifications. In many ways, Galileo – which is purportedly for civilian use only – is a reaction by the Europeans and Chinese against the notion that only one country can know the precise position of any object on earth. Europe enlisted China's aid to gain leverage in its negotiations with the U.S. and Russia, and sees huge commercial applications in China's mobile market and growing number of transportation vehicles. The U.S. has consistently resisted Galileo for technical reasons – raising issues about frequency sharing and interference – but the real issue is most likely concern about Galileo's potential military applications. GPS gives the U.S. military a decisive advantage – allowing pinpoint accuracy for weapons guidance and troop positioning.

# Pathways to disruption

China is beginning to use its huge market size and growing technological prowess to strategically define national standards for information technology. Taking the initiative allows China to address its security concerns while supporting the growth of local high tech industries based on Chinese standards. Developing standards helps Chinese companies acquire technological know-how, and creates a potentially lucrative source of licensing revenue.

As China's markets grow and its IT standards take root, Chinese firms will be in a better position to disrupt global IT markets. We expect Chinese manufacturers to begin by building a critical mass of support at home, then exporting their new technologies to emerging markets such as Southeast Asia and the Middle East that are still in the early stages of adopting new information technologies. Indeed TCL and Huawei have recently announced joint ventures and alliances with Alcatel<sup>15</sup>, Thomson<sup>16</sup> and 3Com<sup>17</sup>, a major benefit of this being easier access to foreign markets. Chinese products and standards will start at the low end, but will steadily improve – with Chinese companies eventually competing in every

country and market segment around the world. Technology vendors who fail to anticipate this long-term global disruption could find themselves at a significant disadvantage.

China's big push into standards is not without risk. It creates a classic tension between government policy and market forces. China's efforts will be most effective when its standards initiatives align with market forces, international standards, and the interests of multi-national coalitions. The government's efforts will be least effective when they conflict with what most customers want within China or in world markets – market forces are often too powerful to overcome.

Chinese companies and consumers are becoming more powerful every day – a trend that can help or hurt foreign companies. Firms with a strong base of support among Chinese companies and consumers are in the best position to promote their own standards. Those lacking widespread support would be wise to cooperate instead of compete.

# Thinking strategically about China's standards

An effective standards strategy focuses on creating customer commitment and growing a critical mass of technology adopters in the context of a particular market. In China, foreign vendors can choose from four basic strategies. They can **partner with standards setters**. They can **compete selectively**, focusing on areas where standards are harder to mandate. They can **innovate specifically for the Chinese market**. Or they can **seed emerging markets** to encourage growth and establish early control. They can also mix-and-match the four basic strategies to fit the unique requirements of a specific opportunity.

## Partner with the Standard Setters

Partnering is often the best strategy when the government – or another company – controls the critical standards, or when time to market is paramount. Partnering is also a good approach for industries that are highly regulated, such as mobile communications and satellite positioning.

Siemens' decision to develop TD-SCDMA in partnership with Chinese firms gives it an edge in the Chinese telecommunications market, as it transitions to 3G. Siemens took a risk by sharing its technology, but gained early access to a the world's largest communications market. Japanese companies – NTT, KDDI, Hitachi, NEC and Fujitsu – are partnering with China on 4G for similar reasons, recognizing that an early presence in the world's largest cellular market gives their burgeoning standard a greater chance for acceptance.

As China's software industry grows, software associations in Korea and Japan are partnering with the Chinese – helping the government achieve its goal of establishing a viable and successful Chinese software industry.

Where appropriate, companies that are currently part of international standards bodies should consider inviting Chinese participation in future standards development.

Of course, partnering is not without its risks. In April 2004, On2 Technologies, a U.S. maker of video compression software, filed multiple breach-of-contract claims against China's EVD consortium, seeking payment of more than \$5.7 million in minimums and source code fees. According to On2, the company submitted source code for its VP5 codec so it could "be part of the China National Standard." As the On2 case illustrates, firms looking to enter the Chinese market through partnering must carefully assess the risks – particularly the risk of sharing technology and other intellectual property.

### Compete selectively

The second strategy for dealing with standards is to focus on a market niche where local standards are weak or hard to enforce. For example, China's RFID and EVD standards are both being powerfully influenced by entities outside of China – making it hard for the Chinese government agencies to successfully mandate and deploy a standard. For RFID, much of the power to adopt the standard lies with major customers – especially Wal-Mart – and other companies who spent more than \$438 billion on Chinese goods last year. For EVD, success hinges on establishing a critical mass of compelling content attractive to Chinese consumers – content from Hollywood to Bollywood.

China's burgeoning market economy is also a challenge to standards mandated by government agencies. Chinese companies and consumers are starting to set their own *de facto* standards, for example, favoring Western cellular standards (W-CDMA and CDMA2000) over China's home-grown TD-SCDMA – creating opportunities for companies to circumvent government-supported standards.

### Innovate for Chinese markets

The third response to standard setters is through sheer innovation and technical superiority. Products that fill an unmet need – or that differentiate themselves by providing superior functionality on top of a prevailing standard – are likely to succeed in the marketplace.

UTStarcom, a U.S. provider of telecom switching solutions, used this approach to successfully compete in China. The company targeted remote areas that were not being served by local Chinese firms or other multinational corporations – designing a cordless phone system that allowed wireline carriers to offer city-wide wireless

services at a lower cost than cellular mobile. In 2003, UTStarcom's global revenue grew by more than 100 percent, or \$1 billion, with 80 percent of its sales generated in China.

LSI Logic succeeded by carefully blending Chinese and foreign standards. In November 2003, the company announced it was supplying the EVD consortium with chips to encode and decode high definition video<sup>18</sup>. The proprietary chips supported China's EVD standard, but the underlying compression architecture was based on traditional MPEG-2 instead of the new Chinese standard AVS.

Microsoft's R&D center in Beijing is leading to a number of innovations in speech recognition, wireless and multimedia technologies that can enable Microsoft to well serve China's consumers.

### Invest to seed markets

The fourth strategy is to get into the market early, before standards have a chance to take root. Many of China's technology industries are still in their infancy, with little critical mass or infrastructure. By making strategic, long-term investments, companies can help these markets develop and influence emerging standards.

Microsoft is trying to increase its presence in China's fledgling software industry by seeding the market with money and software. The company is spending \$750 million<sup>19</sup> to build a technology center that will expose Chinese hardware and software engineers to Microsoft technology. The company is also donating \$25 million over the next three years to develop software schools, and another \$10 million over the next five years to put Microsoft products in elementary schools. By training China's next generation of engineers and consumers, Microsoft hopes to create a critical mass of knowledge and support for its products – establishing itself as China's *de facto* standard for software.

Intel's investments so far include four Research and Development centres and one chip assembly plant, in Shanghai. A second chip assembly plant is due to open in Chengdu in mid-2005. However, the company is also using Intel Capital to create a supporting ecosystem for the company's internet strategy. The company is making strategic investments in companies that deliver products, services and infrastructure based on Intel-endorsed standards and that support Intel-based architectures. Specific investments include Comlent, a company that focuses on wireless communication and satellite positioning systems, and STUC iFLYTEK, a company that provides Chinese written and spoken language processing technology.

### Possible strategies for foreign vendors

Partner with standards setters	Compete selectively	Innovate for Chinese markets	Invest to seed markets
<ul style="list-style-type: none"> <li>When there are regulatory and market gatekeepers</li> <li>When time to market is paramount</li> </ul>	<ul style="list-style-type: none"> <li>When standards are difficult to mandate</li> <li>When supporting ecosystems are outside China</li> </ul>	<ul style="list-style-type: none"> <li>When there is a specific market opportunity</li> <li>When the vendor can innovate over and above the standard</li> </ul>	<ul style="list-style-type: none"> <li>When there is little critical mass and standards are weak or non-existent</li> <li>When markets need long-term development</li> </ul>

Source: Deloitte Research, 2004

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# Looking ahead

China's efforts to define and influence technology standards raises a host of questions. Will China continue to push for its own standards – and can government mandate prevail over market forces – or will the country's efforts fade over time? Which of the many Chinese standards will be truly world-class: will we see dominant Chinese standards in WiFi, 4G, Linux, or possibly even a Galileo-inspired Chinese satellite positioning system? How long will it take for China to evolve from being the world's best manufacturer to its leading technology innovator? If a standard is successful in China will it be exported to other markets – and how will Chinese standards affect the development and use of technology around the world?

No one can answer those questions, but one thing we can say with certainty is that China is simply too important and powerful to ignore. Technology companies must carefully monitor China's actions, assess the implications of Chinese standards, and amend their strategies accordingly. Companies that do not may find themselves locked out of the world's largest and fastest-growing market, or worse, unable to compete in a global marketplace increasingly defined by standards that originate in China.

# Notes

- <sup>1</sup> Data from China's Ministry of Information Industry.
- <sup>2</sup> Source: Wall Street Journal, June 18th, 2004.
- <sup>3</sup> Source: CBS News, November 28th, 2003.
- <sup>4</sup> Source: IDC, 2003.
- <sup>5</sup> Source: IC Insights and Semiconductor Manufacturing International Corporation Form F-1A, March 5th, 2003.
- <sup>6</sup> Sources: IDG News, April 9th, 2003; ZDNet, April 1st, 2004.
- <sup>7</sup> Source: Sun Microsystems, November 17th, 2003.
- <sup>8</sup> For more information, see China Daily, October 28th, 2003.
- <sup>9</sup> Source: People Daily, January 10th, 2004.
- <sup>10</sup> For more information, go to: <http://www.av.org.cn/en/index.asp>.
- <sup>11</sup> Source: EE Times, October 3rd, 2003.
- <sup>12</sup> Source: GSM Association, June 15th, 2004.
- <sup>13</sup> Source: The Korea Herald, November 16th, 2003.
- <sup>14</sup> Source: IDC and Warren's Consumer Electronics Daily, February 25th, 2004.
- <sup>15</sup> Source: The Standard, April 26th, 2004.
- <sup>16</sup> Source: China Daily, November 4th, 2003.
- <sup>17</sup> Source: 3Com, March 19th, 2003; for discussion, see Forrester, March 21st, 2003.
- <sup>18</sup> For more information see: [http://www.lsilogic.com/technologies/industry\\_standards/enhanced\\_versatile\\_disc\\_evd.html](http://www.lsilogic.com/technologies/industry_standards/enhanced_versatile_disc_evd.html)
- <sup>19</sup> Source: Associated Press, June 27th, 2002.

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## About TMT

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"2004 TMT Trends Annual Report: Igniting Innovation"

"Cautious optimism: a global survey of CEOs in the Deloitte Technology Fast 500"

"Convergence is dead: long live convergence"

"Making the off-shore call: The road map for communications operators"

"Wire-line predictions 2004"

"Mobile and Wireless predictions, 2004"

"Waking up to Competition in the Telecom Sector: 2003 Deloitte Global Telecommunications Operator Survey"

"The Deloitte Telco Index: A Review of the Global Telecommunications Industry"

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