

# **Testimony before the U.S.-China Economic and Security Review Commission**

## **Hearing on Foreign Investment Climate in China**

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Thank you inviting me to testify before the Commission. I appreciate the opportunity to appear before you today to discuss the impact of Chinese government policies on the foreign investment climate in China.

I am President of the Information Technology and Innovation Foundation. ITIF is a nonpartisan research and educational institute whose mission is to formulate and promote public policies to advance technological innovation and productivity. Recognizing the vital role of technology in ensuring American prosperity, ITIF focuses on innovation and productivity issues, including in the context of foreign trade.

### **The Shift to “China Inc.” Through Indigenous Innovation**

From the early 1980s—when Deng Xiaoping made the decision to open China up to international investment—until the mid-2000s, the core economic development strategy for China was the active encouragement of foreign direct investment through a vast array of incentives, including tax incentives, free land, limited regulations and of course, government controls to keep the renminbi undervalued. The goal was to do whatever it took to induce foreign multinational corporations to move production to China. While the consequences of these policies might not have always been good for the U.S. economy, and especially for many U.S. production workers in traded sectors, U.S. multinational corporations benefited from access to a low-cost, global production platform. And Americans in their role as consumers benefited from lower cost goods. And while China occasionally engaged in policies that brought complaints from U.S. industry, by and large U.S. industry was satisfied with the relationship.

In 2006, that began to change. For that was when China made the strategic decision to shift to a “China Inc.” development model focused on helping Chinese firms, often at the expense of foreign firms. Chinese Communist Party leaders decided that attracting commodity-based production facilities from multinational corporations was no longer the goal. The path to prosperity and autonomy was now to be “indigenous innovation” (or in Chinese, *zizhu chuagnxin*) built around Chinese-owned firms.

The seminal document advocating this shift was “*The Guidelines for the Implementation of the National Medium- and Long-term Program for Science and Technology Development (2006-2020)*.” The so-called “MLP” sought to “create an environment for encouraging innovation

independently, promote enterprises to become the main body of making technological innovation and strive to build an innovative-type country.”<sup>1</sup> This was much more than a strategy to target some key areas where China had some preexisting capabilities. Rather, the MLP “must be made a national strategy that is implemented in all sectors, industries, and regions so as to drastically enhance the nation’s competitiveness.”<sup>2</sup> The MLP called on China to “master core technologies” in virtually every area Chinese state planners could imagine. Included were some 402 technologies, from intelligent automobiles to integrated circuits to high performance computers. After the MLP, China began to seek the capability to master virtually all advanced technologies, with the focus on Chinese firms gaining those capabilities through indigenous innovation.

Since 2006, China has shifted more to the Japanese and Korean model of development based on helping its own domestic companies grow by moving up the value chain and gaining global market share. The tactics involve massive government subsidies, theft of foreign know-how, and forced technology transfer in exchange for market access, massive export subsidies, and discriminatory government procurement. This is perhaps why, according to an ITIF study, China ranks as the most mercantilist nation in the world.<sup>3</sup> The goal is for Chinese companies to ultimately supplant foreign technology companies both in China and in markets around the world. As such, conflict now exists not just between American and Chinese workers; but between American companies and Chinese companies, just as it did between Japanese companies and American companies in the 1980s and 1990s.

### **Rising Attacks on Foreign Multi-National Corporations**

Since President Xi Jinping assumed power in 2012, China has rapidly accelerated its efforts to promote “indigenous innovation” but not just using the “carrot” to help Chinese firms but also the “stick” to harass foreign producers. Xi has stated that China must “master its own technologies” to not only promote growth, but national security.

And under President Xi the shift to indigenous innovation has taken another turn. Increasingly, foreign firms face outright discrimination by Chinese governments. The American Chamber of Commerce stated in China’s 12th annual “*Business Climate Survey*” that American business owners are increasingly concerned about discriminatory government regulations and other policies that favor domestic companies. The fact that these actions have targeted technology-based sectors such as autos, information technology and life sciences is no accident: these are key technology sectors that China is seeking mastery in.

China discriminates against foreign firms through a number of different means, including tax, transfer pricing, antitrust, visa, and customs laws. For example, as far back as 2009, *Compliance Week* noted, “The [Chinese] government does indeed seem to be giving the local companies a pass. While bureaucrats are raiding foreign-run factories, imposing sizable punishments on multinationals, and making demands on transactions that have little to do with China, enforcement of other domestic regulations come up almost comically short.” The article goes on to note, “While the regulators are going after foreign companies, they appear to be taking it easy on local enterprises... This double standard may indicate that the great enforcement crackdown is as much a matter of industrial policy as it is an effort to raise taxes and prevent economic concentration.”<sup>4</sup>

We saw this initially with how the Chinese government treated Google. Google pulled out of China because of discriminatory treatment. (It is even thought possible that China intentionally slowed down Google search results and disrupted service in other ways.)<sup>5</sup> As Nick Yang, cofounder of several Chinese technology companies, stated, “The Chinese government itself does not have a positive and supportive view of foreign search engine companies in China.”<sup>6</sup> Using the rationale of maintaining social control, the Chinese government also blocked U.S. tech companies Facebook and Twitter.

Around two years ago, the Chinese government added a new tactic directly attacking foreign companies. One basis of the attacks is that U.S. technology products were not secure and therefore the government had the right to intervene. One tool of these attacks is a propaganda campaign carried out in the state-controlled media, with multiple articles claiming that U.S. tech company products were not secure, with one government blog threatening “to severely punish the pawns of the villain.”<sup>7</sup> These attacks happened at the same time Xi took over the reins of a new Communist Party-led committee on cybersecurity. It's hard to underestimate the role of Edward Snowden's NSA revelations in this change of tactic. Before Snowden, the Chinese government was reticent to play this intimidation card. But Snowden gave the cover it needed for the Chinese government to claim the moral high ground and go after U.S. tech companies on trumped-up charges of lack of security.

In 2014, the Chinese central government ruled that government offices were prohibited from running Windows 8 (although many if not most Chinese government offices steal, rather than purchase Windows anyway). Soon after investigators from China's State Administration for Industry and Commerce raided Microsoft facilities in four Chinese cities, claiming it was investigating whether Microsoft violated China's anti-monopoly laws. The Microsoft case was not the first attack on U.S. technology companies. Over the last several years, virtually every leading American IT company has found itself in the Chinese cross hairs. Apple CEO Tim Cook was forced to publicly apologize for purported problems with iPhone warranties. Next up was Qualcomm and Cisco, with the National Development and Reform Commission claiming that both were monopolists. Around the same time, the Chinese government announced their “De-IOE campaign” to pressure Chinese companies to replace their IBM, Oracle and EMC products with Chinese made ones.

The harassment of Microsoft appeared to be a tit-for-tat response to the Justice Department indictment in 2014 of five Chinese military offices for hacking into U.S. companies' computers to steal trade secrets. Indeed, the Chinese government has shown time after time that it doesn't just act to even the score when the U.S. takes action against China; it responds with overwhelming force. But these and other trumped up charges are part of a broader effort by the Chinese government to hobble U.S. technology companies in China, promote China's domestic IT industry, and ultimately replace the U.S. as the world's IT leader. This high-tech harassment will in all likelihood continue until China finally gets what it wants: the complete replacement in China of foreign technology companies with Chinese ones.

It's easy for the Chinese government to use Chinese law as an industrial policy weapon, as there is no real rule of law and their regulations, like their anti-monopoly law, give the government carte blanche ability to go after any foreign company for almost any reason, trumped up or

legitimate. Indeed, China's 2007 anti-monopoly law is designed to treat legitimately acquired intellectual property rights as monopolistic abuse, with Article 55 stating, "This Law is not applicable to undertakings' conduct in exercise of intellectual property rights pursuant to provisions of laws and administrative regulations relating to intellectual property rights; but this Law is applicable to undertakings' conduct that eliminates or restricts competition by abusing their intellectual property rights."<sup>8</sup> And for the Chinese government, abuse means charging market-based IP licensing fees to Chinese companies. This provision has been used to take legal action against companies whose only "crime" is to be innovative and hold patents... Indeed, the Chinese law allows compulsory licensing of IP by a "dominant" company that refuses to license its IP if access to it is "essential for others to effectively compete and innovate."<sup>9</sup> And with the courts largely rubber-stamping Communist dictates, foreign companies have little choice but to comply. And all too often, complying means changing their terms of business so that they sell to the Chinese for less and/or transfer even more IP and technology to Chinese owned companies. All too often the Chinese government makes foreign technology companies "an offer they can't refuse."

### **Chinese Indigenous Standards Setting**

China has coupled its high-tech harassment with the aggressive development of indigenous technology standards, particularly for information and communications technology (ICT) products. Indeed, indigenous standards setting has become a core component of its industrial development and economic growth strategy. China has done so believing that indigenous technology standards will advantage domestic producers while blocking foreign competitors and reducing royalties Chinese firms pay for foreign technologies.

Most technology and product standards around the globe are developed through international, voluntary, industry-led efforts. Firms meet and agree upon standards that are then used throughout the world. But China has taken a different approach. China's government has sought to shape technology markets as best it can to afford advantages to Chinese enterprises. Indeed, since at least the 1990s, China's government has funded the pursuit of unique exclusionary standards embodying Chinese proprietary technology as part of that effort. China's institutions of standardization place the state at the center—making China's government the initiator, financier, and leader of most standardization projects.<sup>10</sup> As noted, China's animating goal has been to develop homegrown technology standards both as a way to gain competitive and, hopefully, monopolistic advantage, and to reduce Chinese dependence on foreign technologies and the royalties Chinese enterprises have to pay for those technologies.

As the "Study on the Construction of National Technology Standards System" released by the Standards Administration of China (SAC) in 2004 framed it, China's standards approach sought to: (i) lessen the "control of foreign advanced countries over the PRC [People's Republic of China]," especially "in the area of high and new technology"; and (ii) increase the effectiveness of Chinese technical standards as important protective measures or barriers to "relieve the adverse impact of foreign products on the China market."<sup>11</sup>

China's focus on developing technical barriers to trade, such as indigenous technology standards, only grew in importance after China joined the World Trade Organization in 2001, in part

because, as China scholar Dieter Ernst notes, “China’s accession commitments to the WTO have substantially reduced the use of most other trade restrictions such as tariffs, import quotas, and licensing requirements.”<sup>12</sup> More recently, China’s 12th Five-Year Plan (covering the years 2011 to 2015) proposed to “encourage the adoption and promotion of technical standards with indigenous intellectual property rights.”<sup>13</sup> As one Chinese official explains China’s prevailing view of technology standards: “Third tier companies make products; second tier companies make technology; first tier companies make standards.”

This mindset has led China to pursue an aggressive standards development strategy. In fact, by the late 2000s, China was launching well over 10,000 standards development, reform, or implementation projects per year.<sup>14</sup> While most of those standards are comparable or identical to international standards, the reality is that China continues to pursue unique national standards in a number of high technology areas, even where international standards already clearly exist.<sup>15</sup> As a result, China lags significantly behind other nations in developing a pro-innovation standards policy. In fact, according to the WTO, in 2007 only 46.5 percent of Chinese national standards were equivalent to international standards.<sup>16</sup> Moreover, as of 2007, approximately 14.5 percent of national standards, 15 percent of professional standards, and 19 percent of local standards in China were mandatory.<sup>17</sup> (And even voluntary standards can become mandatory if they are referenced as part of mandatory conformity assessment procedures.) Moreover, China does not have a history of allowing foreign participation in its standards-setting process. As noted, China drafts many of these standards without foreign, or even public, input. And in many cases, even if foreign representatives are allowed to participate at all, they can do so only as observers with no voting rights.

But because the Chinese government knows that it has considerable “market power” over foreign companies due to its sheer size, it knows that unless challenged by other governments or the WTO, it has leeway in unilaterally setting technology standards to favor domestic firms or to force foreign firms to pay licensing fees. And in no sector of the economy has the Chinese government been more aggressive in developing indigenous technology standards than with regard to information and communications technologies; it has developed its own standards in wireless networking, mobile television, wireless storage, computer security, terrestrial television, digital satellite television, Internet protocol television, video codecs, digital rights management, the Internet of Things, and many other technologies. (See Figure 1.)

### **What’s Behind the Shift in Chinese Strategy?**

At one level, this shift of Chinese strategy to not just proactively favor its own domestic companies but to actively attack foreign companies seems perplexing. Why alienate the very companies that can provide needed investment in your country? The answer appears to be that the Chinese leadership feels that now is the time for Chinese companies, particularly technology companies, to achieve global leadership positions and that a key way to do this is to step up attacks on foreign technology companies, in part to hobble them, but to also extract concessions from them, particularly on intellectual property licensing terms and on tech transfer conditions, including “requiring” U.S. tech companies to partner with Chinese-owned technology companies as the solution to end their government harassment. With regard to domestic standards setting, in many cases China is trying to strip others’ intellectual property from these standards in order

to avoid paying royalties. At the same time, if they are to succeed in their “going out” policy, which seeks to encourage Chinese firms to become multinational with global reach and global brands, they feel that aggressive action against competitors is warranted.

### **Why This Strategy Hurts the U.S. and Global Economies**

These Chinese policies toward U.S. MNCs clearly damage U.S. MNCs. They weaken their competitive position in not just the Chinese market but global markets. They reduce sales. They reduce profits, especially related to the ability to monetize investments made in the production of intellectual property.

But some argue that we shouldn’t worry if U.S. firms are harassed by the Chinese government. Only they will get hurt and that it serves them right anyway for investing there in the first place. This view ignores the fact that the health of the U.S. economy is still based significantly on the health of U.S. multinationals, even ones that have moved much of their actual production offshore. The rapid decline of U.S. tech companies in China directly threatens the long-term economic prosperity and national security of the United States. If these policies are allowed to continue, we may soon see more U.S. tech companies falling behind, replaced by their Chinese competitors. For example, in 2014, the Chinese State Council released a strategic plan to dominate the global semiconductor supply chain by 2030. And while a company like Baidu is not likely to replace Google in America or Europe, it is intensely fighting for market share in other contested markets like Africa. As a thought experiment, what world would be better for America: a world where U.S. tech companies control 30 to 40 percent of the global market or one where they control 5 to 10 percent? Clearly the latter scenario is one of real decline for U.S. economy and national security.

These Chinese actions also harm the global innovation system—and especially markets for innovative products such as ICTs—in a variety of ways. Their standards policies fragment global markets, reducing scale. This is problematic because most ICT products exhibit high fixed costs (it costs a lot to develop the first product) but lower marginal costs (it costs less to produce subsequent products). Balkanized markets mean higher global costs of production which mean both higher prices and lower profits, the latter of which is important because companies need to earn profits in order to reinvest them in the risky and expensive investments required to produce the next generation of innovative technologies, such as next-generation semiconductors or mobile phones. Chinese IP policies, including harassment designed to force foreign MNCs to license IP at a steep discount also reduces the returns from innovation, making it harder to invest in the next round of innovation. In other words, because innovative industries principally compete not by making existing products cheaper but by inventing next-generation versions of the product (e.g., Intel competes not by making existing semiconductors cheaper and cheaper over time, but by inventing next-generation microprocessors), profits from one generation of innovation are vital to financing investment in the next.

Indigenous technology standards also add unnecessary costs for enterprises developing ICT products, such as by forcing them to develop a variety of versions of mobile phones or tablet computers to accommodate differing wireless network technology or encryption standards in different countries. And because those dollars could have gone into lower prices or investments

in innovation and technology development instead of accommodating differing technology standards, countries' requirements for indigenous technology standards lower the global stock of innovation, to the detriment of all consumers globally.

### **Why Do U.S. Firms Accept Such Abuse?**

Few U.S. multinationals are likely happy with how they are being treated in China. Indeed, there appears to have been a marked shift in attitude of U.S. multinationals doing business in China over the last decade. This has shifted from an attitude of "it's a nation with problems, but the market is so big and fast growing that we will put up with it" to "this is fundamentally unacceptable behavior."

But why don't U.S. companies just pack up and leave when confronted with capricious and detrimental government actions? This kind of discrimination if implemented by a smaller nation would be rejected out of hand by multinational corporations. For example, while the forced technology transfer practices of a nation like Argentina are onerous, their economy is small enough that many companies would rather give up on the Argentinean market than succumb to the strong arm tactics. U.S. multinationals have much less room to maneuver with China since it is the world's second largest economy. This is why, in a 1999 survey of U.S. executives doing business in China by the U.S. Bureau of Industry and Security, "the majority of industry representatives interviewed for this study clearly stated that technology transfers are required to do business in China."<sup>18</sup> Foreign companies capitulate because they have little choice; they either give up their technology or lose out to other competitors that are willing to make the essentially Hobson's choice. Industrial organization economists refer to this type of market as monopsonistic: having one buyer that can set largely whatever terms it wants against competitive sellers.

Conceivably if another large nation, such as India, were to emerge as having a favorable business climate for investment—that is, good infrastructure, low taxes, rule of law, protection of IP, and a welcoming attitude toward FDI—U.S. and other foreign multi-nationals would, at least at the margin, likely shift investment to that nation. But to-date no large nation, including India, appears close to being able or willing to do that. Moreover, virtually no U.S. company is prepared to walk away from the Chinese market, particularly given the pressures from shareholders for short-term returns. Our companies have to make returns this quarter; Chinese firms sometime in the next quarter century. In addition, because of the competitive rivalries between U.S. technology firms, firms often look at aggressive Chinese actions taken against their U.S. counterparts as serving their own strategic interests (at least in the short term).

### **What Should the U.S. Government Do?**

The first step for any long-term response on the part of the U.S. government to this harassment of U.S. companies is to realize that this is now a core part of the Chinese government strategy and it will not change unless the Chinese government realizes that the strategy has costs. This is not principally about us being patient while the Chinese government realizes the error of their ways. It is about making it clear to them that this kind of behavior is unacceptable. This means realizing that America is in a trade war and a long-term fight for leading the global technology industry—a war we could very well lose unless we escalate our response. Fighting back has

risks, but so does appeasement: the significant weakening of U.S. competitiveness and lost jobs. The Chinese have shown that they will respond to pressure, but only if it's serious and done in concert with our allies.

The first key step will be for the administration to make fighting this high-tech harassment a higher foreign affairs priority than issues like climate change, human rights, or North Korea. For the Chinese government has learned that it can take these steps largely with impunity, suffering only criticisms from U.S. government officials at forums like the S&ED.

The second step will be changing how the U.S. government fundamentally thinks about and acts on trade enforcement. Congress should pass legislation creating within the Office of the U.S. Trade Representative (USTR) a Chief Trade Enforcement Officer and a Trade Enforcement Working Group, institutionalizing within USTR the function of trade enforcement, making it clear that at least one portion of USTR is expected to play the role of the bad cop. In addition, those agencies devoted to engaging with foreign nations on diplomatic, security, and financial concerns (such as the Departments of State, Judiciary and Treasury) should be relegated to an advisory capacity in the interagency trade process. Too often agencies like the Departments of Treasury, Justice, and State veto strong action against China either out of ignorance of what their real end game is or out a desire to not rock the boat. Enforcement should be left to those agencies that are equipped to do it best and have the largest stake in a strong and globally competitive U.S. economy, in particular, the Department of Commerce and USTR.

Equally important are additional resources for enforcement. In USTR's defense, bringing trade enforcement actions is time consuming and expensive. For the year 2015, the Obama Administration requested \$56 million for USTR, but both the House and Senate proposed underfunding that by between \$1 million and \$2.5 million. Not only is that far below what is needed for trade enforcement, but it reflects the mistaken belief that our economic competitiveness does not need to be protected. In fact, Congress should increase the USTR budget by around \$30 million to fulfill the need for this new Chief Trade Enforcement Officer and an associated Working Group staff of around 50 to 100.

USTR also needs to become more assertive in bringing enforcement cases against China. Companies are often reluctant to initiate complaints because they know that they will face retribution from the Chinese government. The U.S. government should address this conundrum by making it national policy for USTR to bring cases whenever U.S. interests are being hurt, even if U.S. companies don't want them to proceed.

The U.S. government also needs a national trade enforcement strategy that gives guidance to agencies, including the Department of Commerce and USTR, but also others, on what the enforcement priorities should be. Trade enforcement is reactive, treating "potato chips" the same as "computer chips." While there are strong political pressures on USTR to treat agricultural and commodity-based cases the same as high-tech one when it comes to trade enforcement, the reality is that the damage to the U.S. economy from losing tech-based output is significantly larger than losing commodity-based output.



The United States also needs to better empower multinational companies with tools to better resist forced technology transfer. Congress should pass legislation that allows firms to ask the Department of Justice for an exemption to coordinate actions regarding technology transfer and investment to other nations. For example, if companies in a similar industry can agree that none of them will transfer technology to China in order to gain market access then the Chinese government will have much less leverage over them. The same would be true if companies agreed that they would not invest in China until China improved its intellectual property protections. This could be modeled in part on the 1984 National Cooperative Research Act, which led to an explosion of consortium-based research activity by removing a defect of antitrust law which suggested that collaborative joint research efforts among corporations were potentially collusive. For those who worry that extending this kind of cooperative tool to foreign tech transfer would somehow be anti-consumer, it's important to note that this would not apply to pricing issues, but only to tech transfer issues where companies could point to coercive action in foreign markets.

Congress also needs to ensure any future bilateral trade and investment treaty with China contain strong and enforceable provisions against forced technology and R&D transfer. In 2010, Premier Wen Jiabao announced, "We will ... enable foreign businesses to get national treatment like their Chinese counterparts." Yet, China's system of investment screening is discriminatory, and would constitute a denial of national treatment under U.S. investment treaties and free trade agreements. China bound certain rights of establishment when joining the WTO, namely those for which it scheduled commitments under the General Agreement on Trade in Services (GATS). In the WTO Doha Development Round, a key sticking point has been Chinese unwillingness to expand its GATS commitments. Thus, Chinese statements that it gives non-discriminatory treatment to foreign businesses are not accurate. The Office of the United States Trade Representative is negotiating a Bilateral Investment Treaty (BIT) with China. It is not clear that this treaty will contain the provisions needed to actually end pressured technology transfer. Congress should make it clear to USTR and the administration that no treaty is given preference to a treaty that does not firmly stop this practice. Congress should also make it clear that it will not judge any administration by whether a BIT with China is concluded, but rather by if the United States made a strong effort to conclude a treaty that provided full protection against mercantilist practices like forced transfer of R&D. Without this assurance, administrations will feel pressure to sign agreements just for the sake of signing agreements and being able to "check the box." technology transfer.

A second way is to help U.S. firms take collective action. As discussed above, one key part of China's mercantilist strategy is to tie market access to technology transfer. Foreign companies often agree to it because they don't really have a choice; they either give up their technology or their access to the world's fastest growing market, and in the process lose out to competitors who are willing to make the essentially Hobson's choice. Industrial organization economists refer to a market like this as monopsonistic: where one buyer can largely set whatever terms it wants to competitive sellers. One avenue is to pressure China through the WTO. However, this practice has been going on for years and to date not a single case has been brought, in part because Chinese officials deny any quid-pro-quo technology-transfer arrangement. We need a supplemental approach. Congress should pass legislation that allows firms to ask the Department of Justice for an exemption to coordinate actions regarding technology transfer and investment to other nations. For example, if companies in a similar industry can agree that none of them will

transfer technology to China in order to gain market access then the Chinese government will have much less leverage over them. The same would be true if companies agreed that they would not invest in China until China improved its intellectual property protections. For those who worry that this would be somehow anti-consumer, it's important to realize that this would not apply to pricing issues.

Finally, Congress needs to take steps to reform the way in which the national security system collects information. However, the reforms discussed by the Obama administration to date do not go far enough to establish the types of structural reforms needed to protect the economic interests of the United States. Specifically, Congress should clearly and unequivocally state that the policy of the U.S. government is to strengthen, not weaken, cyber security and renounce the practice of having intelligence agencies work to introduce backdoors and other vulnerabilities into commercial products. In addition, the President should work with other countries to establish common rules on when intelligence communities can access foreign data so as to promote zones of free trade in digital goods and services. Such a change in policy will not necessarily change Chinese high-tech harassment in the short term, but it will enable the United States government to more effectively challenge their rationales for it.

In summary, it's not too late to protect global innovation and U.S. from these unfair attacks from China. But absent concerted action soon, we will have to live with the long-term negative consequences on the U.S. economy and national security capabilities.

Technology-Product Category	International Standard(s)	Chinese Standard(s)
Wireless—Home Networking (Local Area Network Encryption)	Wi-Fi (i.e. IEEE 802.11i)	WAPI
Wireless—Metro Area Network	WiMAX	McWill
Mobile Telephony	WCDMA, CDMA2000, LTE	TD-SCDMA, TD-LTE
Mobile TV	DVB-H, T-DMB, MediaFLO	CMNB, T-MMB, CDMB, DMB-T, CMB
Radio Frequency Identification	ISO 18000 and others, EPC/GS1, Uid	NPC
Security—Personal Computers	TPM (Trusted Protocol Manager)	TCM (Trusted Cryptographic Manager)
Consumer Electronics—Terrestrial TV	DVB-T	DTMB (Compulsory)
Consumer Electronics—Satellite DTV	DVB-S	ABS-S
Consumer Electronics—IPTV	Open IPTV	CCSA
Digital Video Players	SVCD, DVD, Blu-Ray, HD-DVD	VCD 3.0, CVD, EVD, HDV, HVD, CBHD
Video Codec	Various MPEG formats	AVS
DRM (Digital Rights Management)	Marlin, OMA DRM, or DTCP-IP	China DRM
Home Networking	DLNA, UPnP, KNX, ECHONET	IGRS, ITopHome
Digital Trunking	TETRA, iDEN	GoTa, GT800
Document Formatting	ODF, OOXML	UOF
Mobile Phone Charging	None	YD/T 1591-2006

Unique Chinese Standards Development Efforts (1993-2010)

**Figure 1: Chinese Technology Standards<sup>19</sup>**

## Endnotes

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- <sup>3</sup> Michelle Wein, Stephen Ezell, and Robert Atkinson, “The Global Mercantilist Index: A New Approach to Ranking Nations’ Trade Policies,” (Washington, DC: Information Technology and Innovation Foundation, 2014).
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- <sup>7</sup> <http://thediplomat.com/2014/06/china-steps-up-attacks-on-us-tech-firms/>
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- <sup>13</sup> Terence P. Stewart et al., *China’s Support Programs for High-Technology Industries Under the 12th Five-Year Plan* (Law Offices of Stewart and Stewart, June 2011), 86.
- <sup>14</sup> Michael Murphree and Dan Breznitz, “Standardized Confusion? The Political Logic of China’s Technology Standards Policy” (working paper, Industry Studies Association Conference, May–June, 2011), 24, <http://www.industrystudies.pitt.edu/pittsburgh11/documents/Papers/PDF%20Papers/5-1%20Murphree.pdf>.
- <sup>15</sup> Office of the United States Trade Representative (USTR), “2014 National Trade Estimate Report on Foreign Trade Barriers” (USTR, May 2014), 63.
- <sup>16</sup> Scott Kennedy, Richard P. Suttmeier, and Jun Su, “Standards, stakeholders, and innovation: China’s Evolving Role in the Global Knowledge Economy” (Special Report no. 15, National Bureau of Asian Research, September 2008), 24, [http://www.nbr.org/publications/specialreport/pdf/Preview/SR15\\_preview.pdf](http://www.nbr.org/publications/specialreport/pdf/Preview/SR15_preview.pdf); Breznitz and Murphree, “The Rise of China in Technology Standards,” 36.
- <sup>17</sup> World Trade Organization, “Restructuring and further trade liberalization are keys to sustaining growth” (news release, WTO, June 2, 2010), [http://www.wto.org/english/tratop\\_e/tpr\\_e/tp330\\_e.htm](http://www.wto.org/english/tratop_e/tpr_e/tp330_e.htm).
- <sup>18</sup> U.S. Bureau of Industry and Security, “Technology Transfer to China,” (overview, U.S. Department of Commerce, Washington, D.C.: 1999), <http://www.bis.doc.gov/defenseindustrialbaseprograms/osies/defmarketresearchrpts/techtransfer2prc.html#techtransferpreprocesses>
- <sup>19</sup> National Science Foundation, Science and Engineering Indicators: 2014 (Appendix Table 6-25: Exports and imports of ICT products, by region/country/economy: selected years, 1997-2012), <http://www.nsf.gov/statistics/seind14/content/appendix/at.pdf>