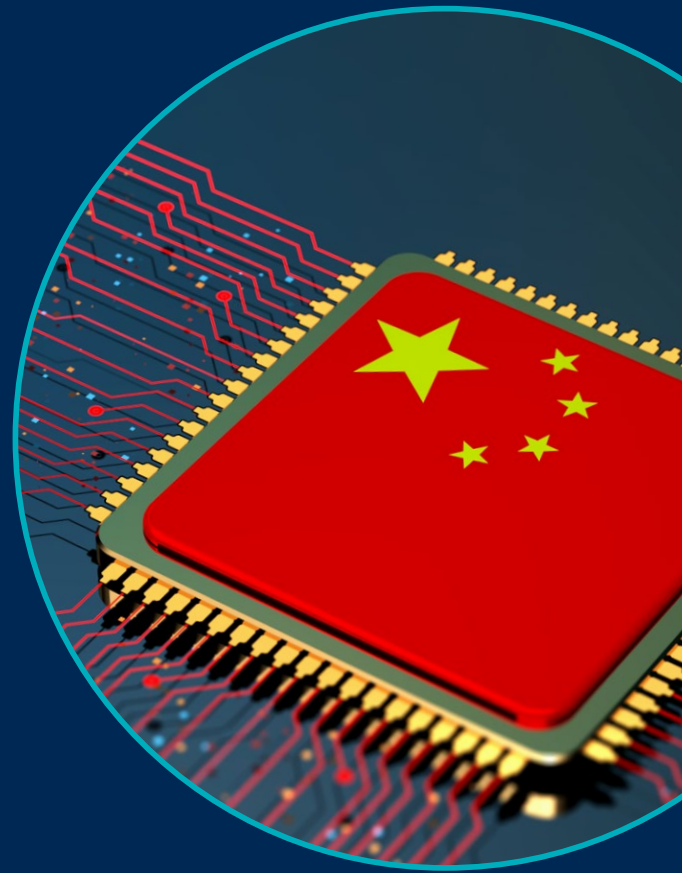


STACKING THE DECK: CHINA'S INFLUENCE IN INTERNATIONAL TECHNOLOGY STANDARDS SETTING



DANIEL R. RUSSEL AND BLAKE H. BERGER

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ABOUT THE AUTHORS

Daniel R. Russel is Vice President for International Security and Diplomacy at the Asia Society Policy Institute. He was a career member of the Senior Foreign Service at the U.S. Department of State, most recently serving as the Assistant Secretary of State for East Asian and Pacific Affairs. He also served at the White House as Special Assistant to the President and National Security Council Senior Director for Asian Affairs, where he helped formulate President Barack Obama's strategic rebalance to the Asia-Pacific region.

Blake H. Berger is Assistant Director at the Asia Society Policy Institute. Prior to joining ASPI, he was a research associate at the Centre on Asia and Globalisation at the Lee Kuan Yew School of Public Policy, National University of Singapore. His research and publications focus on the Association of Southeast Asian Nations (ASEAN), the Belt and Road Initiative, and U.S.-ASEAN policy.

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THE ASIA SOCIETY POLICY INSTITUTE

Web: AsiaSociety.org/Policy-Institute

Twitter: @AsiaPolicy

Facebook: facebook.com/AsiaPolicy

Email: policyinstitute@asiasociety.org

NEW YORK

725 Park Avenue, New York, NY 10021

+1 212 288 6400

WASHINGTON, D.C.

1779 Massachusetts Avenue NW, Suite 805

Washington, D.C. 20036

+1 202 833 2742

ABBREVIATIONS

3GPP	3rd Generation Partnership Project
ANSI	American National Standards Institute
BRI	Belt and Road Initiative
BRICS	Brazil, Russia, India, China, and South Africa
CCP	Chinese Communist Party
CAIH	China – ASEAN Information Harbor
CAC	Cyberspace Administration of China
DSR	Digital Silk Road
EU	European Union
FDI	Foreign Direct Investment
GGE	Group of Governmental Experts
ICSP	Interagency Committee on Standards Policy
ICT	Information and Communications Technology
IDDS	Innovation-Driven Development Strategy
IoT	Internet of things
IDFC	International Develop Finance Corporation
IEC	International Electrotechnical Commission
IETF	Internet Engineering Task Force
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
ITU	International Telecommunications Union
ITU-T	International Telecommunications Union, Telecommunication Standardization Sector
JTC 1	Joint Technical Commission
MOU	Memorandum of Understanding
MoST	Ministry of Science and Technology
NDRC	National Development and Reform Commission
IDDS	National Innovation-Driven Development Strategy
NIST	National Institute of Standards and Technology
R&D	Research and Development
STEM	Science, Technology, Engineering, and Math
SCO	Shanghai Cooperative Organization
SAC	Standards Administration of China
SDO	Standards Development Organizations
SOE	State-Owned Enterprises
TBT	Technical Barriers to Trade
WAPI	WLAN Authentication and Privacy Infrastructure
WIC	World Internet Conference
WTO	World Trade Organization

FOREWORD

China's rise is impacting the global order across numerous domains as its growing capabilities, interests, and ambitions put pressure on the U.S.-centric postwar system. One area of disruption is tech governance, where Beijing's declared goal of becoming a "cyber great power" manifests itself in policies aimed at rivaling or surpassing the West in the competition to develop next-generation technology and to promote its global adoption.

An underappreciated aspect of this effort has been the deliberate strategy to increase China's influence within international standards development organizations (SDOs). Through various tactics, Beijing has significantly enhanced its ability to gain approval of its own proposals and to resist those that it does not favor. Just as the Chinese government has made a deliberate effort to boost its presence in leadership positions throughout the United Nations system, Beijing has lobbied hard for key roles in multilateral SDOs. And while the Belt and Road Initiative has been the focus of much research, including the Asia Society Policy Institute's "Navigating the Belt and Road" series, far less attention has been given to its technological artery, the Digital Silk Road (DSR), which supports the export of Chinese telecommunications and other high-tech systems.

What ASPI Vice President Danny Russel and Assistant Director Blake Berger have accomplished in this report is to connect the dots and show how state-directed activism in SDOs, combined with the promotion of Chinese tech systems through the DSR, serve to stack the digital deck in China's favor. This report further explains how these strategies not only serve China's commercial interests, but also bolster its push for "cyber sovereignty" instead of the free flow of ideas, information, and data. State control of the internet and the Chinese approach to data governance restrict access to information and curtail free speech and other universal rights. Embedding Chinese technology standards in overseas infrastructure projects – often with "data harmonization" agreements – creates a path dependency that locks other countries into using Chinese vendors and standards. DSR initiatives such as "Smart Cities" may include artificial intelligence powered digital censorship and surveillance tools which authoritarian regimes can use for repression and to quell dissent. Meanwhile, Smart Cities systems also provide access to immense quantities of data that are useful to both Chinese companies and government agencies.

Most importantly, this report goes on to explore the strategic and practical implications of China's "stacking the deck" strategy to offer actionable policy recommendations for governments, including the U.S., for protecting a merit-based international standardization system and an open internet.

This report, therefore, reflects the Asia Society Policy Institute's role as a pragmatic "Do Tank" as well as a "Think Tank," and continues the institute's efforts to shed objective light on the immense impact of China's international policies and initiatives.

I would like to thank Facebook for its support of this important project.

The Honorable Kevin Rudd AC

President, Asia Society

President, Asia Society Policy Institute

26th Prime Minister of Australia

CHAPTER 1: Introduction

President Xi Jinping has led a foundational shift in the Chinese system's engagement with the international community, moving away from Deng Xiaoping's "hide and bide" approach toward one that places China prominently on the world stage. Xi and the Chinese Communist Party (CCP) he leads assert that "time and momentum are on China's side"¹ and that "the East is rising, while the West is declining."² Xi has repeatedly called for his nation to "lead the reform of the global governance system"³ and argued that the system should adapt to reflect changing dynamics, chiefly a rising China.⁴ These calls for reform do not take place in a vacuum. They have grown in tandem with factors such as China's rapid technological advancement, its stated ambition to become a "cyber great power," and its increasing influence within multilateral and multistakeholder technology standards setting bodies, and alongside the pursuit and expansion of the Belt and Road Initiative (BRI) and Digital Silk Road (DSR).

While the Chinese Party-State's overt ambition to attain technological dominance strikes many in the West as an unsettling new challenge, Xi's push for indigenous technology to "catch up and surpass" the West, as well as his emphasis on the need to unify politics and technology, have a historical lineage. The CCP has long viewed technological progress not only in terms of strengthening the country's economy and military, but as a political goal. In seeking to become a "cyber great power" by 2049 (the centennial of the People's Republic), the CCP aims to prove that the Party's stewardship has enabled China at last to assume its rightful place as a great power.⁵

Technology is framed as a critical pillar in China's political, economic, and military ascendancy. But leaders are also intensely aware of the vulnerabilities and risks to CCP control posed by technology that empowers individual citizens. For Beijing, preserving Party control and ensuring that domestic security and stability remain paramount, and technology and its tools for social control are foundational to both goals. Beijing has continually emphasized the risks inherent in the free flow of information, the internet, and foreign control and ownership of advanced technology, while simultaneously stressing the importance of developing indigenous technology to the state's security and economic well-being. Illustrative of these two underlying

Unease is evident in capitals and boardrooms at the prospect of having to "play by Chinese rules," in the operation of the internet.

trends, in his first major address on being a "cyber great power" in 2014, Xi remarked that "to build China into a cyber great power, China must have its own technology, and it must have strong technology,"⁶ and that "without cybersecurity, there will be no national security."⁷ This ambition to become a "cyber great power" and to ensure cybersecurity is not, as Xi expressed, solely "a game of technology, but also a game of ideas and discourse power."⁸

The push to reform global governance is directly related to Beijing's aim of increasing its influence commensurate with its growing power and status. "Discourse power," frequently invoked by Chinese leaders, is about shaping global values and governance and the People's Republic of China's (PRC's) ability to control the agenda of international institutions. The "China model" has been framed as alternative to Western and democratic principles that the CCP rejects.⁹ Beijing seeks to ensure that China's norms and standards are reflected in the future order under the banner of a "community of common destiny for mankind."¹⁰

Chinese authorities are using increased influence within international institutions to push the principle of noninterference. Beijing asserts that a country's collective interests outweigh the rights of the individual, and that it is exclusively the state that must determine the collective national interests. In other words, state sovereignty is sacrosanct: no universal right can supersede it or nonstate actor challenge it. This push has profound implications for the future of data governance, the freedom of the internet, and human rights in general.

In its messaging to external audiences, Beijing frames its engagement in international standards setting as a mutually beneficial “win-win” to promote a common future in cyberspace. However, in the Party-State's internal messaging, standards development is framed as a zero-sum contest and an instrument of national power needed to dominate future technology.¹¹ Indeed, technical standards not only matter in terms of global production today, but also will shape the contours of next-generation technology, ranging from 5G to artificial intelligence (AI) and the internet of things (IoT). Standards setting will help determine commercial winners and losers on a global scale.

Traditionally, the international technical standards development landscape has been primarily industry-led and dominated by multistakeholder standards development organizations (SDOs). In these bodies, private sector actors, engineers, and experts negotiate, propose, debate, and approve the *best* technical standards to address common problems and issues surrounding interoperability. While the process is not completely apolitical, considering the stakes involved, the technical standardization process has been traditionally focused on technical, rather than commercial or political, arguments in debating the merits of a standard. However, China's increasing engagement in standards development, particularly given its top-down, state-centric approach to standardization, is changing the status quo.¹²



Chinese President Xi Jinping gives a speech at a press conference after the Belt and Road Forum at the China National Convention Center at the Yanqi Lake venue on April 27, 2019 in Beijing, China, Wang Zhao - Pool/Getty Images

The Xi administration has employed a dual-track approach to setting both *de jure* and *de facto* technology standards. In the *de jure* track, Beijing has sought to influence both the multilateral (governmental) and the mixed multistakeholder technical SDOs. This approach includes placing Chinese nationals in senior leadership positions within the SDOs; increasing the representation of Chinese tech companies within these bodies; assuming leadership positions in secretariats, working groups, and technical subcommittees; and pushing Chinese companies to vote for Chinese proposals. In the *de facto* track outside of the SDOs, Chinese companies, with guidance from the Party-State, are creating standards on the ground utilizing the BRI and DSR. By exporting its technologies, signing memoranda of understanding (MOUs) for the harmonization of standards, and developing other standards harmonization mechanisms, Beijing is propagating its own technology standards in project host states.

The United States, European Union (EU), Japan, and others have raised concerns that the adoption of Chinese standards enables unfettered data mining, compromises national and personal security, and promotes Beijing's international agenda. Unease is evident in capitals and boardrooms at the prospect of having to "play by Chinese rules," not only in terms of the future design of wireless networks, but also the operation of the internet.¹³ A further concern is the risk of a bifurcated international information and communications technology (ICT) environment.

Is the international community's apprehension over the prospect of China becoming a "cyber great power" with substantial influence in SDOs warranted? Does Beijing's insistence that its increasing participation in SDOs only benefits the international community have merit? Do the activities of Chinese actors necessarily undermine the existing approach to standards setting, which focuses on transparency, consensus, and openness? Will the systems that are gradually being disseminated through the BRI and DSR ultimately lock recipient states into exclusive use of Chinese-sourced technology and products?

This report examines the mechanisms and strategies the Chinese government has employed to gain influence within the digital rulemaking space as well as ways that Beijing has used its influence – and its "Belt and Road" corridors – to promulgate its digital norms and standards. Chapter 7 lists responsible measures that the U.S. and other governments might take to ensure that the international digital standards "deck" is not stacked against their companies, interest, and values.

CHAPTER 2: “Catch Up and Surpass” and China’s Domestic and International Standardization Push

Xi’s call for China to become a “cyber great power” and the importance of technology to national rejuvenation have a historical lineage that can be traced back to the birth of the CCP. Party leaders blamed the country’s stagnation on its inability to keep pace with international technological advancements.¹⁴ Mao admired the Soviet Union’s technological prowess and adopted Khrushchev’s slogan “catch up and surpass the United States.”¹⁵ For Mao, a devout Marxist, politics and technology were closely intertwined. He saw achievement in science and technology as foundational to China’s economic, ideological, and geopolitical power. “There is no question that politics and the economy must be unified, and that politics and technology must be unified. It has always, and will always, be so,” he wrote in 1958.¹⁶

Over the decades, CCP policies have oscillated between greater state control and more market-oriented and reformist approaches. However, a consistent theme has been the importance of technology in the drive to catch up with the international community.¹⁷ Deng Xiaoping helped place the country on its current technological trajectory by focusing on economic opening and market reform.¹⁸ The government began to ramp up investment in science and technology, sent delegations overseas to bring back new technology and ideas, and encouraged foreign companies to establish a presence in China so they could share their know-how. The enactment of the 1983 Key Technologies Program not only encouraged research in ICT and automation, but helped foster an environment in which the private sector would start to play a larger role in the domestic economy.¹⁹ It is no coincidence that both Lenovo and Huawei were established shortly after the unveiling of the policy. Deng was also critical in restarting the national standardization effort by creating new government agencies and rejoining the International Organization for Standardization (ISO) in 1978.²⁰

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The pursuit of advanced technologies to “catch up and surpass” persisted in subsequent decades, although China continued to lag behind the United States, Japan, Europe, and others. China’s lack of competitiveness in core technologies and its limited indigenous innovation hampered its transition beyond the export-oriented “global factory” economic model. This was as much a national security problem as an economic one in the eyes of the CCP. In 2007, State Councilor Liu Yandong articulated the concern among party elites that “the majority of the [Chinese] market is controlled by foreign companies, most core technology relies on imports, so the situation is extremely grave as we are further pressured by developed countries who use blockades and technology controls – if we are not able to solve these problems we will forever be under the control of others.”²¹

After China’s accession to the World Trade Organization (WTO) in 2001, one of the first hurdles it encountered was clearing regulatory and technical standards in conformity with the Technical Barriers to

Trade (TBT) agreement it had signed. This served as a wake-up call that prompted the Ministry of Science and Technology to initiate studies on standards development, producing a broad preliminary outline for a national standards strategy.²² Several priorities emerged: using standardization to promote indigenous innovation; adopting international standards and inserting indigenous innovations into them; using foreign direct investment (FDI) to promote Chinese standards; and having the country play a larger role in international SDOs and transition from being a standards taker to a standards setter.²³

Implementation of some aspects of this strategy proved difficult. Chinese companies continued to pay huge royalty fees to foreign corporations that owned the patents. Notable failures to introduce a domestic standard internationally include the attempts to advance the China Blue High-Definition Disk as an alternative to DVD and WLAN Authentication and Privacy Infrastructure as an alternative to Wi-Fi.²⁴ In the telecommunications field, Chinese companies were standards followers in the waves of 2G, 3G, and 4G technology, imposing significant costs on these industries. As recently as 2014, Chinese companies paid roughly \$8 billion in royalties to Qualcomm alone.²⁵ Beijing clearly took to heart the important relationship between standards setting and competitiveness, as well as the value of first-mover advantage in setting next-generation technology standards.

Standardization was evident as a priority from the beginning of the Xi Jinping administration. In laying out his goal of national rejuvenation at the 2012 Party Congress that elevated him to power, Xi explicitly tied China's rise to securing a place at the forefront of technological revolutions and warning against the risks of a lagging tech sector.²⁶ In a 2013 speech, he said, "In core technology fields where it would be impossible for us to catch up by 2050, we must research asymmetrical steps to catch up and overtake. Internationally, if you don't have the advantage of core technologies, you don't have the political momentum."²⁷ Beijing then unveiled a range of policy initiatives and domestic reforms to boost indigenous technology and competitiveness, to enhance security and state control over technology, and to facilitate the transition from being a "standards taker" to a "standards maker."

Since then, standardization has emerged and remained a top priority for both industry and government. A saying reportedly popular in innovation-focused circles in China is that "third-tier companies make products, second-tier companies make technology, and first-tier companies make standards."²⁸ Premier Li Keqiang declared that "standardization is a reflection of a country's core competitiveness and overall strength."²⁹ In 2017, a revision to China's Standardization Law marked a shift from a centralized system to a hybrid model that preserves state control while encouraging market-driven standardization. In addition to simplifying the standards development process and involving private sector actors, the law sought to harmonize domestic standards and improve government coordination in standardization.³⁰ These moves helped reduce redundant or conflicting standards, promote domestic adoption, and increase the effectiveness of research and development (R&D) spending.

Championing Chinese standards in global technology is an outgrowth of the CCP's strategy to maximize its influence over the future global economy. The drive to control the agenda within the United Nations (UN) and SDOs is one aspect of a comprehensive push to strengthen the country's global rulemaking power and to shield it from unwelcome constraints or intrusions. From Beijing's perspective, the time has come to advance norms, rules, laws, and standards that promote and protect China's interests and security. This determination to cement China's place in the international order and reform it is evident in Beijing's and the country's efforts to advocate for its conception of cyber sovereignty in the UN as well as promotion and diffusion of indigenous standards through SDOs and via the DSR.

TIMELINE OF RELEVANT OFFICIAL CONCEPTS, NATIONAL POLICIES, AND BRI-RELATED POLICIES

2013

- > Special Project Action Plan for Internet of Things Development

2015

- > Plan to Deepen Reform of Standardization Work
- > "Digital Silk Road"
- > Action Plan to Connect "One Belt, One Road" through Standardization (2015-2017)
- > National Standardization System Construction and Development Plan (2016-2020)

2017

- > First Belt and Road Forum:
 - First 12 Bilateral Technical Standards Recognition Agreements
- > Standardization Law of People's Republic of China

2019

- Second Belt and Road Forum:
- > National Standard Information Platform for the Belt and Road
 - > Standardization CN-EN Bilingual Intelligent Translation Cloud Platform

2021

- > Second China-ASEAN International Standardization Forum:
 - China-ASEAN Standard Cloud Platform
 - International Standardization Training Center
- > National Standardization Development Program

2014

- > "Cyber Great Power"
- > "Cyber Sovereignty"

2016

- > National Innovation-Driven Development Strategy
- > Cybersecurity Law

2018

- > China Standards 2035
- > Action Plan on Belt and Road Standard Connectivity (2018-2020)

2020

- > Main Points of National Standardization Work

- OFFICIAL CONCEPTS
- NATIONAL POLICIES
- BRI-RELATED POLICIES

CHAPTER 3: Transforming Global Governance and Exporting the China Model

The CCP has not been shy about the ambition to have China play a central role in global affairs and to actively lead the reform of the international system. The Party's approach to this goal appears to be a mix of grand strategy and opportunism. Xi Jinping describes a new era in which China is "moving closer to center stage and making greater contributions to mankind," playing a leading role in reforming the international order by "contributing Chinese wisdom and strength to global governance."³¹ At the same time, the vacuum created by the United States' withdrawal from multilateral engagement under President Donald Trump provided Beijing with an opportunity to take an even larger role in shaping the international system.

Unsurprisingly, as China rises, it is attempting to reform global governance in ways that create a more favorable environment – an environment that shields Beijing from criticism and legitimizes its political system. This approach includes Beijing's efforts to bolster its "discourse power" in international organizations – code for both pushing Chinese talking points and discouraging criticism. In normative terms,

Beijing has sought to recast the definition of important principles such as human rights and has championed new principles such as cyber sovereignty within the UN system and other forums.

Whatever its merits, the cyber sovereignty concept provides cover for tightening controls over information in the quest to maintain domestic control and regime security.

Xi's stated ambition is to make his nation not just a great power, but a "cyber great power" as well. Beijing has embedded its preferred principles in the BRI and DSR, which, in turn, have facilitated their uptake. Through

these and more conventional diplomatic means, the PRC is proselytizing Chinese-style cybersecurity and its system of data management laws. These efforts have significant implications for the future of data governance, the internet, and the free flow of information.

In terms of human rights, for example, the PRC has worked through international and regional organizations to advance an authoritarian-friendly alternative definition. Beijing has advocated for the concept of "particularity" of human rights, arguing that human rights can only be advanced within the specific context of each state's national conditions.³² This major caveat to universal human rights was adopted as part of the "Beijing Declaration" at the 2017 South-South Human Rights Forum. This qualified definition allows states to balance human rights against other needs and priorities, while also providing an alibi for illiberal governments to violate human rights on the grounds of "national security, public order, public health, public safety, public morals and the general welfare of the people."³³

At the UN, the PRC has advanced this reinterpretation of human rights with "Chinese characteristics." In 2017 and 2018, Chinese diplomats presented two resolutions in the Human Rights Council that advanced this alternative framing. The resolutions, which passed, hold that human rights must be balanced with the state's economic development; that a country's human rights issues need to be viewed in the context of its history, cultural, and religious backgrounds; and that nations seeking to address human rights problems in *other* states should do so through "mutually beneficial cooperation."³⁴ In this reframed definition of human rights, the state serves as the arbiter of both the nation's collective interests and the individual's rights.

Under this definition, a totalitarian government could assert absolute rights over its internal affairs and claim to be safeguarding human rights so long as its domestic economy grows.³⁵

This absolutist interpretation of state sovereignty and noninterference has also emerged in the digital space. Beijing is advocating for its conception of cyber sovereignty within the UN and multilateral organizations such as the World Internet Conference (WIC), the Shanghai Cooperative Organization (SCO), and the BRICS (Brazil, Russia, India, China, and South Africa) grouping. At the second WIC in 2015, Xi described cyber sovereignty as “respecting each country’s right to choose its own internet development path, its own internet management model, and its own public policies on the internet.”³⁶

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The promotion of the cyber sovereignty concept serves PRC priorities such as security, stability, and promotion of indigenous innovation. But advancing this construct undercuts the principles of an open global internet and the free flow of data – the universalist approach championed by the United States and other likeminded states. The PRC’s position is built around three key assertions:

First, Beijing contends that cyberspace is fully under the jurisdiction of national governments and that the state is entitled to implement laws as it sees fit, thus rejecting any right of free internet expression or access to information.

Second, that while technical organizations and multistakeholder institutions have a role in cyberspace governance, nonstate actors are subordinate to the nation-state and final authority rests solely with national governments. In formulating governance rules, this principle subordinates and weakens the role of multistakeholder bodies in favor of intergovernmental ones directly controlled by the state.

Third, that the principle of sovereign equality applies to cyberspace and that no state should have more power than – or any power over – another state in this space.³⁷

Whatever its merits, the cyber sovereignty concept provides cover for tightening controls over information in the quest to maintain domestic control and regime security. International advocacy of this concept also aligns with the CCP’s desire for technological autarky at home. Its drive for indigenous innovation seeks not only to protect and nurture domestic industry, but also to reduce dependence on foreign technology and suppliers. In addition to economic incentives and the goal of decreasing vulnerability to foreign leverage, the Chinese government is motivated by perceived major national security risks.

Beijing’s concerns about foreign controlled technology are neither without merit nor unique. China is not the only state that has sought greater regulation and control over the internet on national security grounds. The 2013 Edward Snowden incident only confirmed Beijing’s suspicions and reinforced the perceived risks posed by dependence on U.S. technology. In 2016, Xi warned that for internet technology to be controlled by others “is our greatest hidden danger,” and in 2019, Beijing mandated that all government and public institutions completely replace foreign software and computers with “secure and controllable” technology within three years.³⁸

It is certainly true that many democratic states have crafted policies to control online information domestically. For example, both Germany and Singapore have implemented policies that would impose hefty fines on social media companies for posting content that the government has deemed illegal.³⁹ India, which in the past has shut down mobile networks and blocked access to social media during protests, enacted a new set of policies in 2021 that provide the government with increased capabilities to control content on social media sites and online news platforms.⁴⁰

The Chinese government's push for cyber sovereignty to strengthen the state's control over all internet activity and the flow of information is in a class of its own. The CCP claims the right to control and curate ideas in cyberspace, ensuring that inconvenient information and dissenting views are either blocked or removed from domestic platforms. A 2017 article in the Party's premier journal by the Cyberspace Administration of China (CAC) stated the objective plainly: "the Party's ideas [should] always become the strongest voice in cyberspace" and the Party should use the internet to "steadily control all kinds of major public opinion."⁴¹ Xi Jinping has publicly reiterated the importance of a system for integrated internet management to "oppose and resist various erroneous views."⁴²

This explicit desire to control the internet helps explain why the PRC favors a intergovernmental model of internet governance over the multistakeholder, bottom-up approach led by private sector, technical groups, and civil society organizations. Beijing sees the multistakeholder model as inherently grounded in the political and economic interests of the country that developed the internet – the United States.⁴³ In seeking to undercut that model, Beijing's first internet white paper in 2010 argued that "the UN should be given full scope in international internet administration."⁴⁴ Much as it has done in advancing its concept of

human rights "with Chinese characteristics," Beijing is using its leadership within the UN and bespoke multilateral forums to advocate for cyber sovereignty and its associated norms.

In responding to the U.S. push for an open, secure, and interoperable global ICT structure, Beijing began to undertake a more assertive posture in promoting cyber sovereignty as a foundational norm in global cyberspace governance.⁴⁵ In 2011, Russia joined China in submitting a draft "international code of conduct for information security" to the UN General Assembly. Not only did the code elevate the UN as the primary institution to develop governance norms and rules, it also asserted the sovereign rights of the nation-state in internet governance.⁴⁶ In 2015, the SCO, a Chinese-established regional organization, submitted an updated draft of the code of conduct to the UN General Assembly that states that "authority for Internet-related public issues is the sovereign right of States, which have rights and responsibilities for international Internet-related public policy issues."⁴⁷ The same year, during the second WIC, Xi criticized the existing structure of internet governance, which he said did not "reflect the desires and interests of a majority of countries" and instead should be grounded in a multilateral approach.⁴⁸ The BRICS Xiamen Declaration in 2017 again emphasized that "all states should participate on an equal footing in the evolution and functioning of the Internet and its governance."⁴⁹

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The UN Group of Governmental Experts (GGE) on the Developments in the Field of Information and

Telecommunications is the expert body examining the applicability of international law to nation-state actions in cyberspace. Chinese representatives, with a group of authoritarian regimes, sought to steer the GGE toward the protection and expansion of state cyber sovereignty. Their approach collided with a U.S.-led effort to incorporate a reference to Article 51 of the UN Charter, which would allow states to respond in self-defense to a cyberattack. This led to a deadlock resulting in the collapse of the GGE and the establishment by China, Russia, and other states of a parallel body called the Open-Ended Working Group, splitting the process into two competing camps.⁵⁰

In tandem with its multilateral efforts, Beijing has acted to sell or share its digital regulatory technologies and know-how to states seeking to exercise greater sovereign control over the internet. The spread of Chinese digital hardware and technological systems, largely through the DSR, complements Beijing's advocacy of an approach that prioritizes state authority over individual rights and privacy. Beijing is exporting its doctrine, its technology, and its standards.

The combination of access to Chinese digital technology with the doctrine of cyber sovereignty is proving popular, particularly in the Global South. States in Asia, the Middle East, and Africa have developed and implemented their own versions of China's cybersecurity and data management laws – encouraged in some cases by Chinese-led seminars for government officials on cyberspace management. Following one such seminar for North African officials, Egypt unveiled a cybercrime law that drew on China's model.⁵¹ Similar laws and monitoring systems have been adopted in Uganda, Tanzania, Nigeria, Vietnam, and Cambodia.⁵²

Chinese companies assist in training host country officials in digital censorship, surveillance, and propaganda. Companies such as Huawei and ZTE are providing the hardware and software that enable governments to clamp down on dissent and guide public opinion. For example in Uganda, Chinese technicians have helped the government intercept opposition communications and track political opponents through cell phone data.⁵³ Huawei and ZTE have established similar systems across the globe, in countries such as Kazakhstan, Malaysia, Pakistan, United Arab Emirates, and Zambia.⁵⁴ The growing adoption of Chinese systems and its model of cyber governance makes it a competitive alternative to the free and open internet advocated by the United States.

CHAPTER 4: The PRC's Quest for Technological Leadership and Influence of Technical Standards Bodies and Organizations

Standards have long been important to society, and since the Industrial Revolution, they have become essential to manufacturing and trade. Today, in an increasingly connected, globalized, and digitally integrated world, the stakes have never been higher when it comes to who develops technical standards. These technical standards serve as the connective tissue linking technology to markets and help facilitate interoperability and compatibility across products, services, and systems.⁵⁵ Governance and development of technical standards, which are typically the realm of technology experts and private sector engineers, have emerged as another arena of U.S.-China geopolitical and economic competition.

While generating standards is a technical and collaborative process, defining those standards is an increasingly competitive enterprise. Standards setting helps determine which technologies will dominate future markets, and therefore it carries significant advantages for those that set them. Viewed through this lens, the dry and specialized issue of standards takes on political significance. Beijing's ambition to become a "cyber great power" and to "catch up and surpass" the West includes promoting indigenous Chinese technology standards internationally. Officials routinely call for strengthening China's "discourse power," by which they mean the ability to set agendas and gain influence over other countries.

The Chinese government routinely describes standards creation as a tool for boosting its domestic industrial base. But they also view standards setting as both a path to the forefront of future technology and an instrument in international power competition.

The Chinese government routinely describes standards creation as a tool for boosting its domestic industrial base and upgrading production capabilities. But Chinese authorities also view standards setting as both a path to the forefront of future technology and an instrument in international power competition. In a 2016 speech, Xi emphasized the need for China to accelerate the promotion of its "discourse power and rulemak-

ing power in cyberspace and make unremitting efforts towards the goal of building a cyber great power."⁵⁶ A 2020 article by the Party School of the CCP stated explicitly that "in the internet era, whoever has the discourse power and rulemaking power has the power to lead the future order."⁵⁷ The quest to achieve global technological leadership and transition from being a standards taker to a standards maker is both commercially driven and ideological – conferring prestige and reflecting China's new status as a great power.

In seeking to export Chinese domestic technical standards worldwide, Beijing has adopted a coordinated and comprehensive approach, working through both multilateral and multistakeholder bodies as well as through initiatives such as the BRI and DSR. In the multilateral and multistakeholder SDOs, the PRC has sought to increase its influence over the setting of de jure standards by increasing the number of Chinese nationals and representatives at the senior leadership level and within SDO secretariats, working groups, and technical committees. Securing leadership positions within these bodies is vitally important since these are the venues where standards get developed and debated. At a broader level, Beijing's efforts

reflect a well-known understanding of bureaucratic processes that “those who set the agenda and control the flow of paper in these international organizations stand a far greater chance of influencing ultimate outcomes in their favor.”⁵⁸ As part of Beijing's efforts to advocate for and promote Chinese standards, Chinese technology companies have been known to “flood the zone” with proposals to these SDOs and vote as a bloc when Chinese standards are discussed and put up for a vote.

In tandem with Chinese efforts to influence standards development in both multilateral and multistakeholder SDOs, Beijing is utilizing overseas infrastructure projects to set de facto standards on the ground. By exporting technologies such as Smart Cities, Safe Cities, and Smart Ports, signing MOUs for the harmonization of standards, and developing standards harmonization mechanisms, Beijing is diffusing its domestic technology standards in BRI and DSR project host states (discussed in detail in chapter 5).

The SDO landscape comprises an array of organizations with differing governance models, sizes, remits, and focuses, and with no real centralized coordination mechanism. Formal (de jure) standards are developed, set, and administered by both multilateral and multistakeholder SDOs.⁵⁹ Multilateral SDOs are the organizations made up of government representatives. The UN's International Telecommunications Union (ITU) plays a central role and has emerged as a chief focus of Beijing's efforts. Multistakeholder bodies, which are open to nongovernmental participants, can be divided into industry and technical associations, such as the Internet Engineering Task Force (IETF) and the Institute of Electrical and Electronics Engineers (IEEE), or those that bring together national standards bodies, including the ISO and 3rd Generation Partnership Project (3GPP).

While the standards developed in SDOs through negotiations are considered voluntary and companies are not legally obligated to incorporate them into their products and technologies, they are enormously significant and shape the trajectory of nascent technology.

While the standards developed in SDOs through negotiations are considered voluntary and companies are not legally obligated to incorporate them into their products and technologies, they are enormously significant and shape the trajectory of nascent technology. Once a standard is debated and agreed upon, products that do not conform to the standard may lose market share. Despite their voluntary nature, standards developed by SDOs can be enforceable under international trade law.⁶¹ For example, the WTO's TBT agreement effectively mandates that WTO member states utilize internationally accepted standards as the basis for their own technical regulations.⁶²

The PRC's inability to translate domestic standards into international ones, even after its entry into the WTO, undercut its competitiveness – constraining its attempts to surpass the West and adversely impacting Chinese companies' bottom line. Missing out on setting standards for 2G, 3G, and 4G technologies, for example, cost Chinese companies tens of billions of dollars in royalty fees to the firms that owned the patents and developed the standards. Chinese companies that manufactured products based on domestic and not international standards risked being isolated in overseas markets.

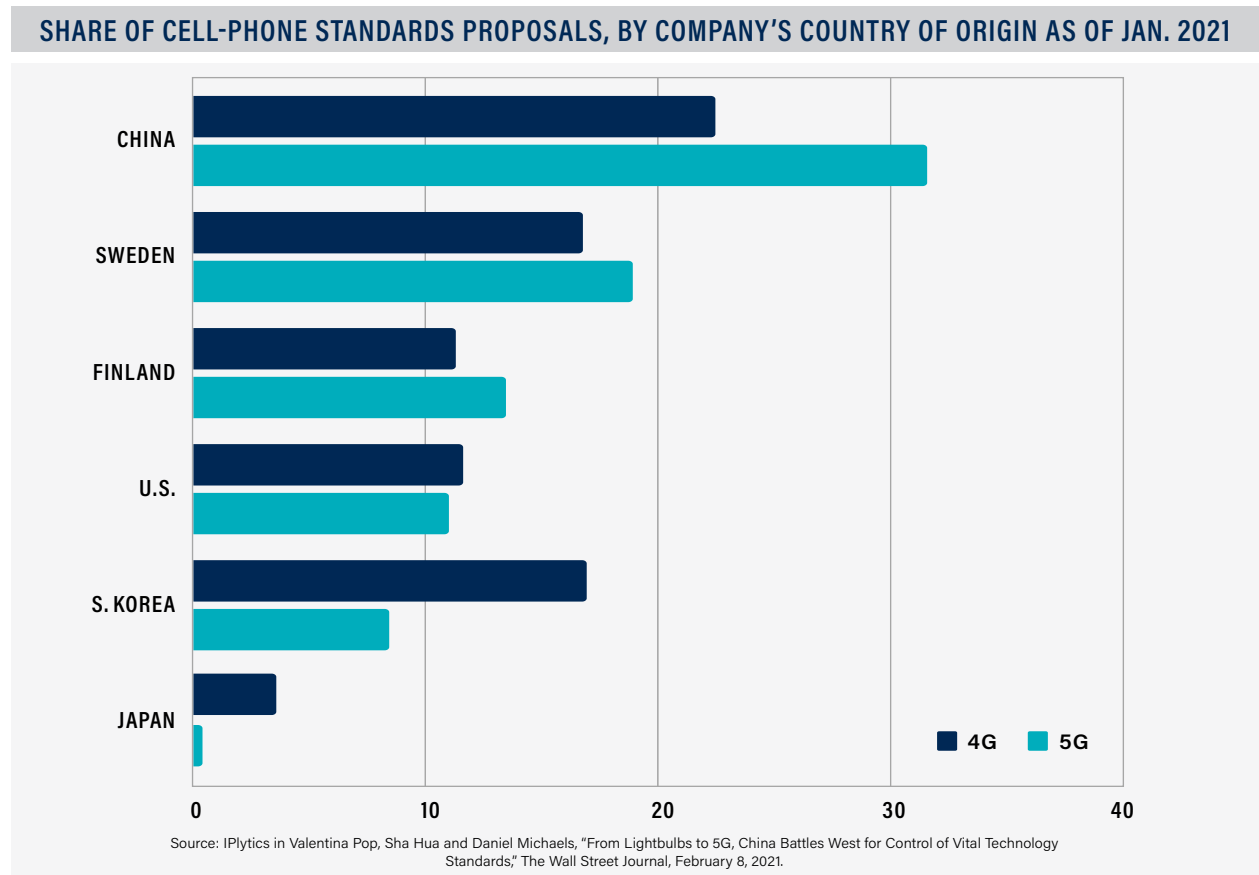
Chinese firms have benefited from increased synchronization with international standards through an enhanced ability to export products and compete in overseas markets.⁶³ But beyond the benefits of

MAJOR INTERNATIONAL STANDARDS BODIES ⁶⁰				
ORGANIZATION	INTERNET GOVERN. TASKS	TYPE	MEMBERSHIP	LEADERSHIP AND REPRESENTATION
International Organization for Standardization (ISO)	Proprietary industrial and commercial communication standards derived through a consensus-driven process	Multistakeholder; independent, nongovernmental international organization	165 members National standards bodies are considered the organization most representative of standardization in each country U.S. is represented by American National Standards Institute (ANSI); China is represented by Standardization Administration of China (SAC) Private sector organizations are also present	China (SAC): 68 secretariats and 3 twinned secretariats U.S. (ANSI): 98 secretariats
International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) Joint Technical Committee (JTC 1)	See ISO internet governance tasks	Multistakeholder; consensus-based, voluntary international standards group	35 participating members and 65 observing members	China (SAC): Participating Member U.S. (ANSI): Secretariat and Participating Member
International Electrotechnical Commission (IEC)	Electrotechnology standards derived through a consensus-based process	Nonprofit, "quasi-governmental" organization	62 full and 24 associate members National committees appoint experts and delegates from industry, commerce, government, test and research labs, academia, and consumer groups	China: 12 Technical Committee/Sub Committee secretariats U.S.: 27 Technical Committee/Sub Committee secretariats
3rd Generation Partnership Project (3GPP)	Primary focus on network communications for fixed line and mobile networks that allow entities to claim intellectual property rights in standards-setting bodies	A consortium of standards associations	7 organizational partners from Japan, U.S., China, European Union, India, South Korea, and Japan U.S. is represented by the Alliance for Telecoms Industry Solutions (ATIS); China is represented by the China Communications Standards Association (CCSA) 24 market representation partners that are invited by organizational partners 773 individual members	China: 139 individual members U.S.: 61 individual members
International Telecommunications Union (ITU)	Communication standards "recommendations"	Multilateral and multistakeholder; specialized agency of the UN	193 UN member states; 900+ companies, research institutes, and international and regional organizations National representatives are core members U.S. is represented by the Federal Communications Commission (FCC), International Communications and Information Policy (CIP), International Telecommunications Settlements Section, and National Telecommunications and Information Administration (NTIA) China is represented by the Ministry of Industry and Information Technology (MIIT)	Secretary-General: Houlin Zhao, China Director of Telecommunication Development Bureau (BDT): Doreen Bogdan Martin, U.S. China: 34 sector members (including 4 platinum members and 3 gold members); 28 academic members U.S.: 63 sector members (including 8 platinum members and 12 gold members); 10 academic members
International Telecommunications Union, Telecommunication Standardization Sector (ITU-T)	Voluntary, influential recommendations	A division of the ITU	193 UN member states, 266 sector members, and 6 associates	China: 26 sector members U.S.: 31 sector members

adoption, moving on to become a standard setter can provide a firm with first-mover advantage in developing products and technologies that conform to the new standard. Such companies can collect royalties from foreign firms that adopt the standard in their product, services, or systems. Beijing is well aware of these benefits. At the rollout of the China Standards 2035 initiative in 2018, the Standards Administration of China (SAC) underscored the urgency of developing new technological standards, stating that it's a "good opportunity to realize the transcendence of China's industry and standards" as "international technology research and development and patent layout have not yet been completed, and global technical standards are still being formed."⁶⁴

In addition to the economic and commercial benefits, being a standard setter serves Beijing's "great cyber power" aspirations. The chair of one of China's leading AI voice recognition companies spelled this out bluntly: "If we can't have discourse power in the field of artificial intelligence, we can't leap into the high-end of the global value chain in the future, and we can't have global influence."⁶⁵ Thus, the push to set standards is about capturing markets, assisting Chinese firms "going out," moving up the global supply chain, as well as shaping the international system in line with China's interests and ambitions.

Making up for lost time, the Chinese state and companies began racing to develop both technology and standards, investing heavily in R&D. By 2018, China was spending more on R&D than Japan, South Korea, Germany, and France combined.⁶⁶ Huawei alone has dedicated roughly \$60 billion in the last decade to R&D on technology linked to 5G telecommunications standards.⁶⁷ During the same period, in collab-



oration with industry and the education sector, the government began to develop a range of educational programs to produce international standards experts.

Beijing's strategy for using multilateral and multistakeholder SDOs has been outlined in numerous policy documents and guidelines. These include the National Development and Reform Commission's 2013 Special Project Action Plan for Internet of Things Development, the 2015 State Council's Plan to Deepen Reform of Standardization Work and National Standardization System Construction and Development Plan (2016–2020), the 2016 National Innovation-Driven Development Strategy, the 2017 Standardization Law of the PRC, the 2020 Main Points of Standardization Work, and the 2021 National Standardization Development Program strategy.

The push to set standards is about capturing markets, assisting Chinese firms “going out,” moving up the global supply chain, as well as shaping the international system in line with China’s interests and ambitions.

As early as 2013, the PRC began expanding the number of Chinese representatives holding leadership positions in SDOs. The Special Project Action Plan for Internet of Things Development⁶⁸ explicitly targets influence in SDOs to lead in the development of IoT standards. The plan not only outlines the role that Chinese ministries and departments should have in promoting China's standardization work, but specifically calls for China to lead and influence multilateral and multistakeholder SDOs. China should “become a standards-issuing country... win leadership positions on important international committees like ISO/ International Electrotechnical Commission (IEC) and ITU, and submit and respond to international proposals and motions, in order to increase China's international influence and competitiveness.”⁶⁹

The 2015 Plan to Deepen Reform of Standardization Work encourages organizations, technology alliances, and companies to “actively participate... and assume leadership positions in the international

standards organizations.”⁷⁰ It also calls for integrating Chinese standards into engineering contracts, equipment and infrastructure exports, and overseas construction projects – explicitly using the BRI for standards dissemination. The plan directs Chinese firms to lead and participate in the formulation of 50 percent of international standards within SDOs, increase the number of mutual recognition agreements with major trading partners, and help China become an internationally recognized standards power.⁷¹

The State Council's 2015 five-year National Standardization System Construction and Development Plan urges “Chinese experts and institutions to assume positions in international standardization technical institutions and undertake the work of the secretariat” to promote Chinese standards and support Chinese businesses.⁷²

The 2017 Standardization Law expands this guidance to educational and scientific institutions and promises that “commendations and rewards shall be given to those who made remarkable contributions to standardizing work.”⁷³ The incentive structure includes annual stipends of roughly \$155,000 for Chinese firms engaged in developing standards at international SDOs.⁷⁴ Additionally, Chinese representatives who secure SDO leadership positions are reportedly provided bonuses.⁷⁵

The Main Points of Standardization Work, issued in 2020, seeks to shape the governance structures

of SDOs.⁷⁶ It directs the Chinese national committees in the ISO and IEC to play a coordinating role, and to “accelerate the conversion of China’s advantageous technical standards into international standards and continue to promote the release of Chinese versions of ISO and IEC standards.”⁷⁷ Chinese ministries and firms should vigorously “put forward more international standard proposals” and “improve China’s ability to assume responsibility for the technical bodies of the international standards organizations and the secretariat.”⁷⁸ The plan also outlines a range of measures including facilitating civil-military fusion in standards, fostering a next generation of “standardization talents,” strengthening information gathering and analysis, and promoting Chinese standards in BRI host countries and through other cooperation mechanisms.

In October 2021, China created the National Standardization Development Program, announcing the establishment of a government mechanism to “guide” work on international standardization and to use the BRI to promote Chinese standards.⁷⁹ The program will include the creation of standards research, innovation, and certification centers to accelerate the nation’s ability to develop and export tech standards. Although this document points to increased involvement of industry in standardization work – acknowledging the reality that the pace and breadth of technological innovation exceeds the ability of bureaucrats to set standards – it also reinforces the dominant role played by the CCP and its political priorities in standardization strategies.

The intergovernmental “one-country, one-vote” model accords with China’s top-down, state-dominated approach. It reinforces the primacy of the nation-state and circumscribes the power of the private sector.

The standards development process of other industrialized countries also involves coordination among experts and stakeholders to develop standards domestically which can then be taken abroad. But while Western governments may play a role in developing and promoting their own country’s standards, the process is primarily industry-led. This contrasts with the dominant role of the Chinese Party-State in directing a top-down approach to standards setting and dissemination.

Beijing’s approach can be problematic to the extent that it turns a technical process into a geopolitical competition. But the international community certainly has an interest in, and benefits from, Chinese participation in standards setting processes, which helps China align its products and technology with those of other countries. Participation in these forums promotes transparency and incentivizes the use of international standards as the basis for national standards or, at a minimum, encourages closer alignment between the two. Narrowing that gap has benefited foreign businesses by lowering technical barriers to market access and reducing costs and time in getting a product to the Chinese market. It has also helped expand the lucrative licensing of western intellectual property for use in China.⁸⁰

Historically, SDOs have been dominated by western nations that led in the post-war development of both technology and tech standards. But as the PRC’s own technological output and interests have grown, the Chinese government has worked to install handpicked nationals in leadership positions and in the secretariats across the range of international SDOs. It has shown a pronounced preference for multi-lateral institutions – particularly the UN’s ITU – over multistakeholder bodies.⁸¹ The intergovernmental “one-country, one-vote” model accords with China’s top-down, state-dominated approach. It reinforces the primacy of the nation-state and circumscribes the power of the private sector. Moreover, Beijing can better

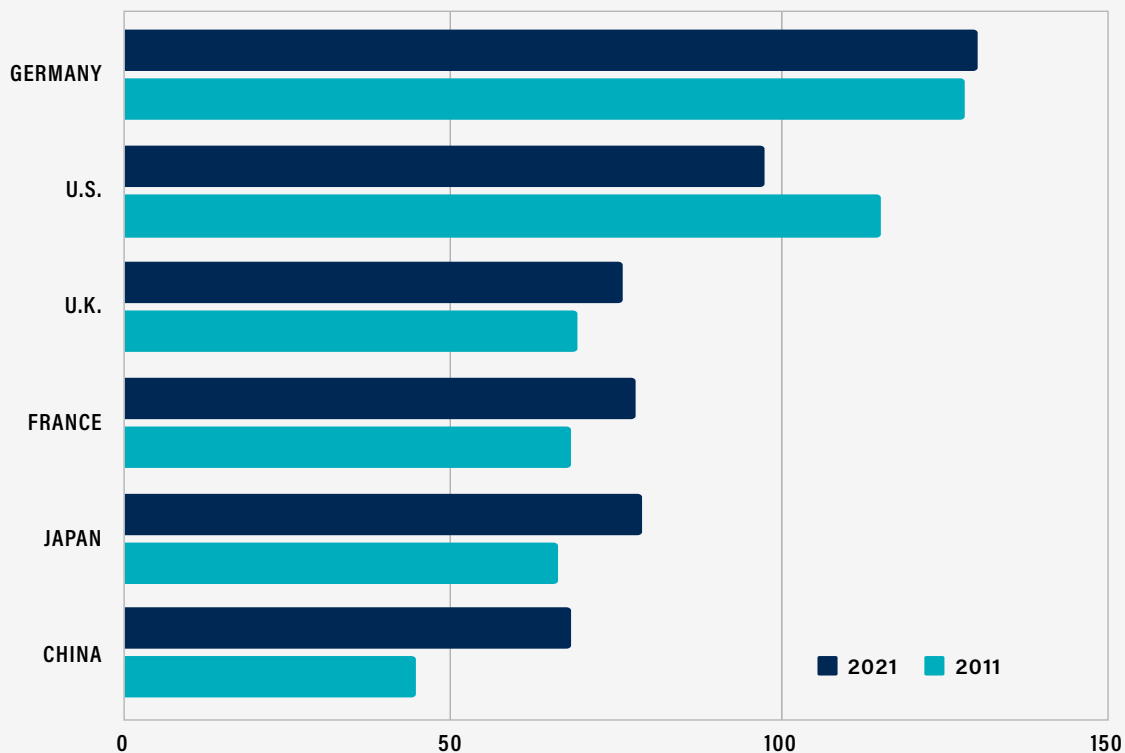
use its considerable diplomatic leverage to rally other states to support its positions in intergovernmental multilateral forums.⁸²

At the ITU, the current Secretary-General is Zhao Houlin, an engineer formerly with China's Ministry of Posts and Telecommunications.⁸³ Zhao has been an advocate for Huawei and a leading proponent of the BRI – signing an agreement with China in 2017 to promote ICT development in BRI project host countries and calling on nations to “join forces with China” and hop on the BRI “express train.”⁸⁴ During Zhao's tenure, China has placed its nationals in one-fifth of the institution's leadership positions, including a senior Huawei official who chairs the body focused on next-generation networking standards.⁸⁵

In critical multistakeholder SDOs such as the ISO and IEC, the number of Chinese nationals in secretariat and leadership positions has surged in the past decade.⁸⁶ The ISO's president from 2015 to 2018 was the vice chair of a leading Chinese state-owned enterprise, and the current president of the IEC is the chair of one of the country's largest electricity state-owned enterprises. In the body that develops 5G technical specifications, the 3GPP, Chinese representatives hold roughly a quarter of the chair or vice chair positions, and China now has twice as many voting members in the organization as the United States.⁸⁷

Chinese firms have also ramped up their participation in SDOs with financial support and other incentives from the government. Huawei alone has sent nearly twice as many representatives to 3GPP

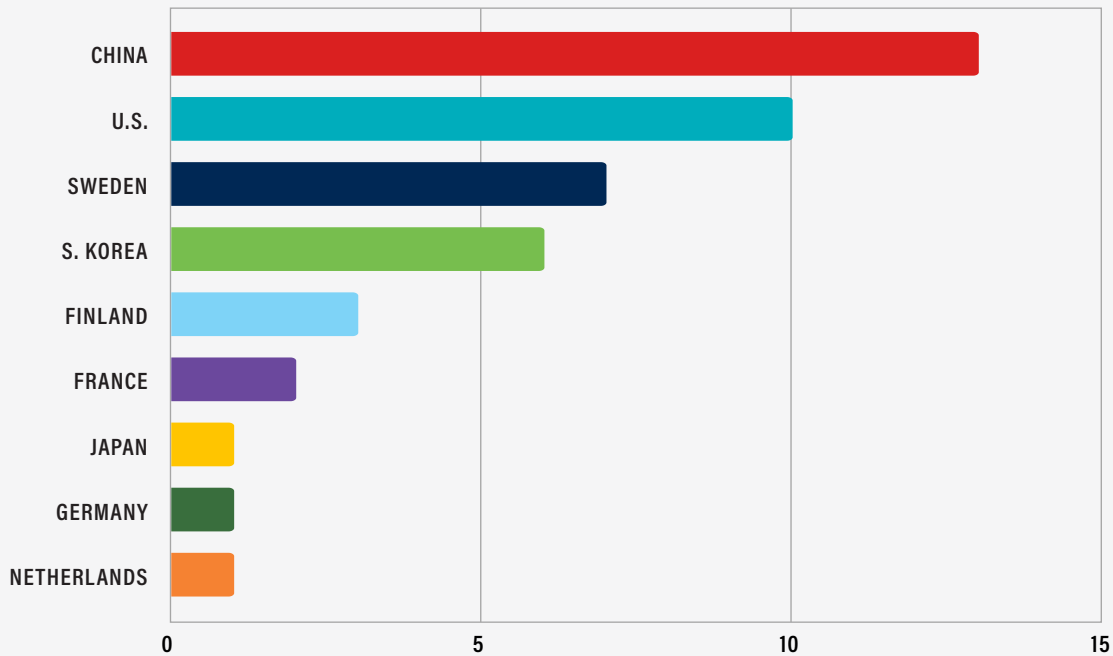
SECRETARIAT POSITIONS ON INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO) TECHNICAL COMMITTEES AND SUBCOMMITTEES AS OF NOV. 2021



* Includes twinned secretariats

ISO and NIST in US-China Business Council, “China in International Standards Setting: USCBC Recommendations for Constructive Participation,” February 2020. International Organization for Standardization. <https://www.iso.org/home.html>

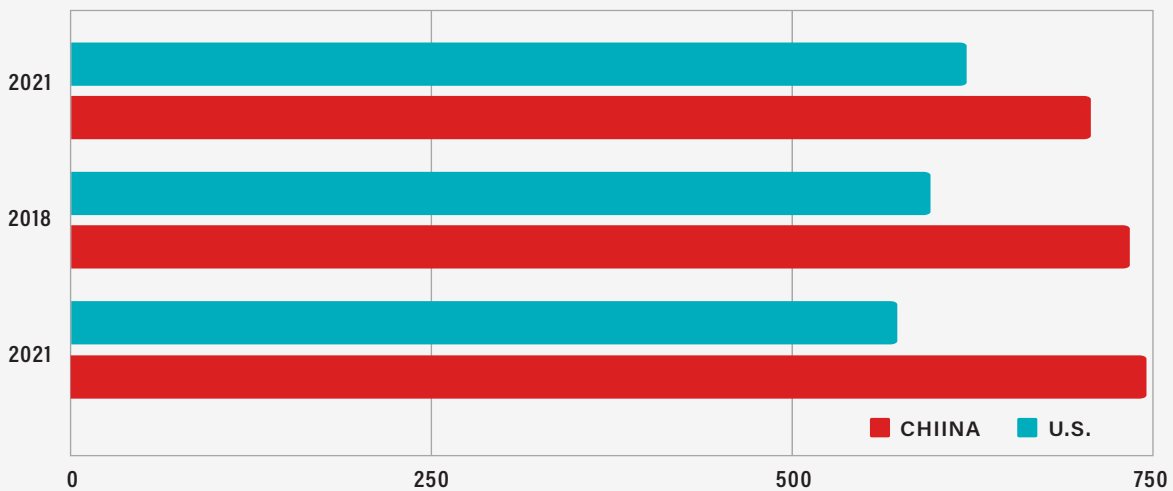
LEADERSHIP POSITIONS IN THIRD GENERATION PARTNERSHIP PROJECT (3GPP) SUBGROUPS AS OF SEP. 2020



Source: 3GPP in Julia Voo, "Shaping Global Technology Governance: Why the U.S. Must Adopt a Proactive Approach to Technical Standards for Long Term Security," Working Paper for the Penn Project on the Future of U.S.-China Relations, October 2020.

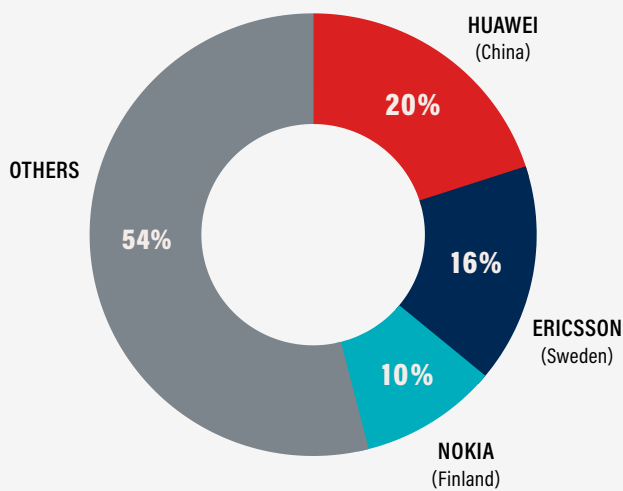
meetings as has Qualcomm, and 50 percent more than either Ericsson or Samsung.⁸⁸ A similar trend is visible in other groups such as the ISO/IEC Joint Technical Commission (JTC 1), where Chinese participation has outstripped that of the United States. Chinese experts reportedly participated in 99 percent of the organization's committees and subcommittees, leading to a significant increase in adoption of Chinese proposals.⁸⁹

COMPARISON OF U.S. AND CHINA'S PARTICIPATION IN ISO/IEC JTC 1 (2012-2021)



Source: Julia Voo, "Shaping Global Technology Governance: Why the U.S. Must Adopt a Proactive Approach to Technical Standards for Long Term Security," Working Paper for the Penn Project on the Future of U.S.-China Relations, October 2020. Authors have provided updated figures for 2021.

SHARE OF 5G-RELATED PROPOSALS SUBMITTED TO THIRD GENERATION PARTNERSHIP PROJECT (3GPP) AS OF AUG. 2020

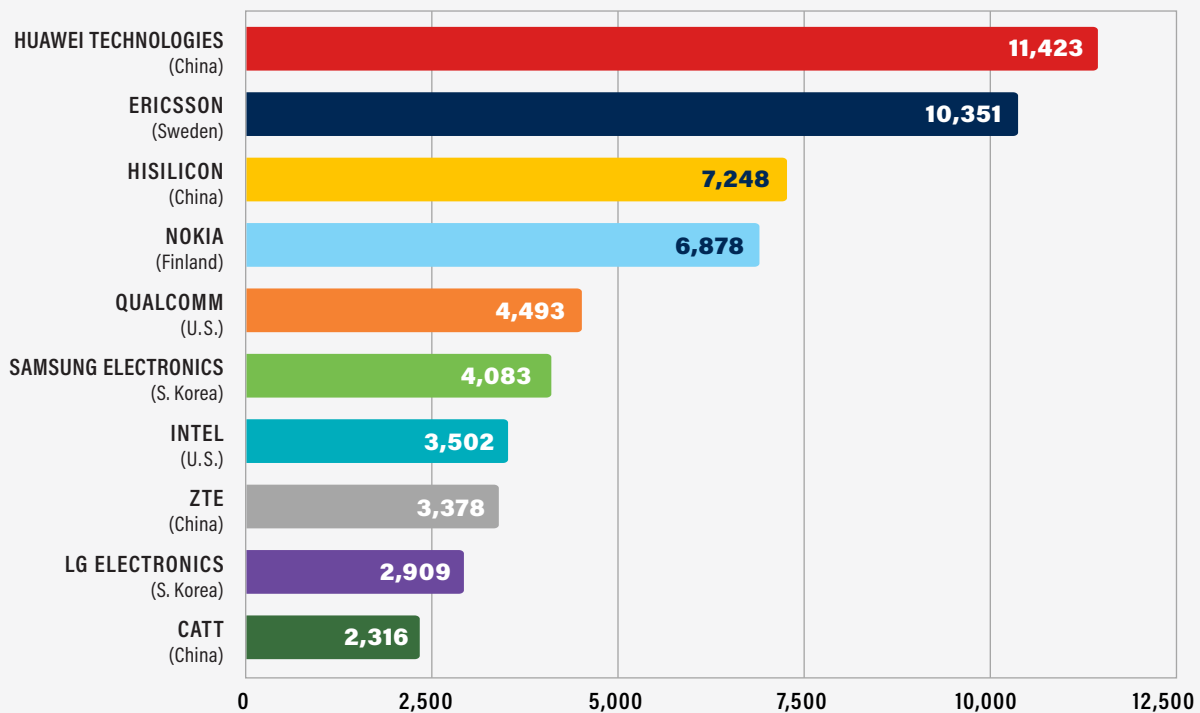


Source: Cyber Creative Institute in Hideaki Ryugen and Hiroyuki Akiyama, "China leads the way on global standards for 5G and beyond," Financial Times, August 4, 2020.

Not only do Chinese firms “flood” committees with a huge volume of standards proposals, they also typically vote as a single bloc – unlike the experts and engineers from other countries who vote according to their own or their company’s best judgment. A telling incident occurred in 2016 when a Chinese company backed Qualcomm’s proposed standard instead of Huawei’s. The company was publicly denounced as a “traitor” to China and its founder ultimately was forced to apologize, saying that “Chinese companies should be united and never be played off against one another by outsiders.”⁹⁰

Overall, the flood of proposals at SDOs combined with coordinated voting has produced a strikingly high rate of success in the number of Chinese submissions and approvals.⁹¹ These tactics, along with deliberate efforts to bolster leadership, representation, and participation across multilateral and multistakeholder SDOs, strengthen the PRC’s ability to set de jure technical standards for next-generation technology.

NUMBER OF 5G STANDARDS PROPOSED AS OF DEC. 2018



Source: IPlytics in Dan Strumpf, "Where China Dominates in 5G Technology," The Wall Street Journal, February 26, 2019.

CHAPTER 5: Chinese Influence, the Digital Silk Road, and the Diffusion of Chinese Technical Standards

The Digital Silk Road, which serves as the “software” to the BRI’s infrastructure “hardware,” was first announced in 2015. It is helping drive the globalization of Chinese ICT and fintech companies and to lay the foundation for a massive digital economy that places China at the center. The Digital Silk Road is growing as a core component of the BRI strategy, with over 130 projects under its label.⁹² These projects range from data centers and smart cities in Kenya and fiber-optic cables in Pakistan to 5G testing sites in Thailand and e-commerce platforms in Malaysia. They serve to expand digital networks in BRI countries and to connect those networks more closely to China.

While building internet infrastructure, promoting e-commerce, and improving digital connectivity, the DSR initiative is also spreading de facto Chinese technology standards. This is taking place primarily through two of its main features: first, the export and adoption of Chinese technologies and systems, including Smart Cities, Smart Ports, and Safe Cities networks; and second, through technical standards harmonization requirements, including MOUs.

De facto standards, as opposed to de jure or formal standards, emerge as a result of widespread adoption, rather than regulatory or industry decisions. The high penetration of many Chinese tech companies in emerging economies, frequently with financial support from the Chinese state, often yields a first-mover advantage. Where Chinese companies such as Huawei and ZTE hold a dominant market position, Chinese systems and standards will predominate. De facto standards have a certain stickiness to them because of the cost of transitioning to a system that utilizes different, sometimes incompatible standards. Thus, embedded in the export of digital networks and systems are implicit decisions about technology standards that tend to lock in Chinese vendors, whether the customers know it or not.

The PRC can point to the extensive adoption of Chinese technologies as indicators of the high quality of their standards – bolstering their case in international standards deliberations and strengthening the global marketability of their products.

At the first Belt and Road Forum in 2017, Xi Jinping listed a variety of new technologies and called for accelerated development of big data, cloud computing, and smart cities “to turn them into a digital silk road of the 21st century.”⁹³ A key feature of the DSR is the provision of stacked or bundled technologies – integrated package deals that combine multiple technologies. The Smart Cities initiative mentioned by Xi will be discussed later. But, as noted earlier, the widespread adoption of technology packages tends to create a future advantage for the companies that produce them due to the “path dependency” – a lock-in effect that makes it difficult and expensive to switch to an alternative standard, even if it is superior. At the same time, the PRC can point to the extensive adoption of Chinese technologies as indicators of the high quality of their standards – bolstering their case in international standards deliberations and strengthening the global marketability of their products.⁹⁴

Along with the export and adoption of Chinese technologies, Beijing is using bilateral agreements and MOUs to proliferate its standards. At the 2017 Belt and Road Forum, China announced a dozen technical standards recognition agreements with countries including Cambodia, Malaysia, and Greece.⁹⁵ By the end of 2019, it had 90 such agreements with 52 countries.⁹⁶ Admittedly, these agreements generally lack specifics and are nonbinding; many chiefly establish an exchange between the two countries' standardization bodies to promote cooperation. But they demonstrate a clear effort to lay the foundation for wider adoption of Chinese standards, including through new mechanisms and more focused agreements.⁹⁷ The 2021 China-ASEAN International Standardization Forum pushed for standards compatibility with China, unveiled a new China-ASEAN Standard Cloud Platform" and launched the International Standardization Training Center in Nanning, China.⁹⁸ The PRC has also created a state-owned enterprise with an expansive project portfolio in ASEAN countries, including Smart Harbors, big data information platforms, and cloud communications. The company, China-ASEAN Information Harbor, pledged to boost its standards development activities in the region.⁹⁹

As early as 2015, Beijing began to incorporate technology standards promotion into BRI- and DSR-related policies and guidelines. The State Council's 2015 Plan to Deepen Reform of Standardization Work directs Chinese companies to help Chinese standards "go out" by integrating them into foreign projects and equipment and infrastructure exports.¹⁰⁰ Two action plans – one in 2015 to "Connect One Belt, One Road Through Standardization" and another in 2018 on "Belt and Road Standard Connectivity" – demonstrate Beijing's utilization of the DSR to promote overseas adoption of Chinese standards.^{101, 102} The plans include specific actionable guidance for Chinese firms. The 2015 plan commissions a comparative analysis of standards across BRI countries, calls for 500 priority Chinese standards to be translated into foreign languages as part of an official Standards Foreign Language Action Plan and advocates for standardization centers in BRI host countries.

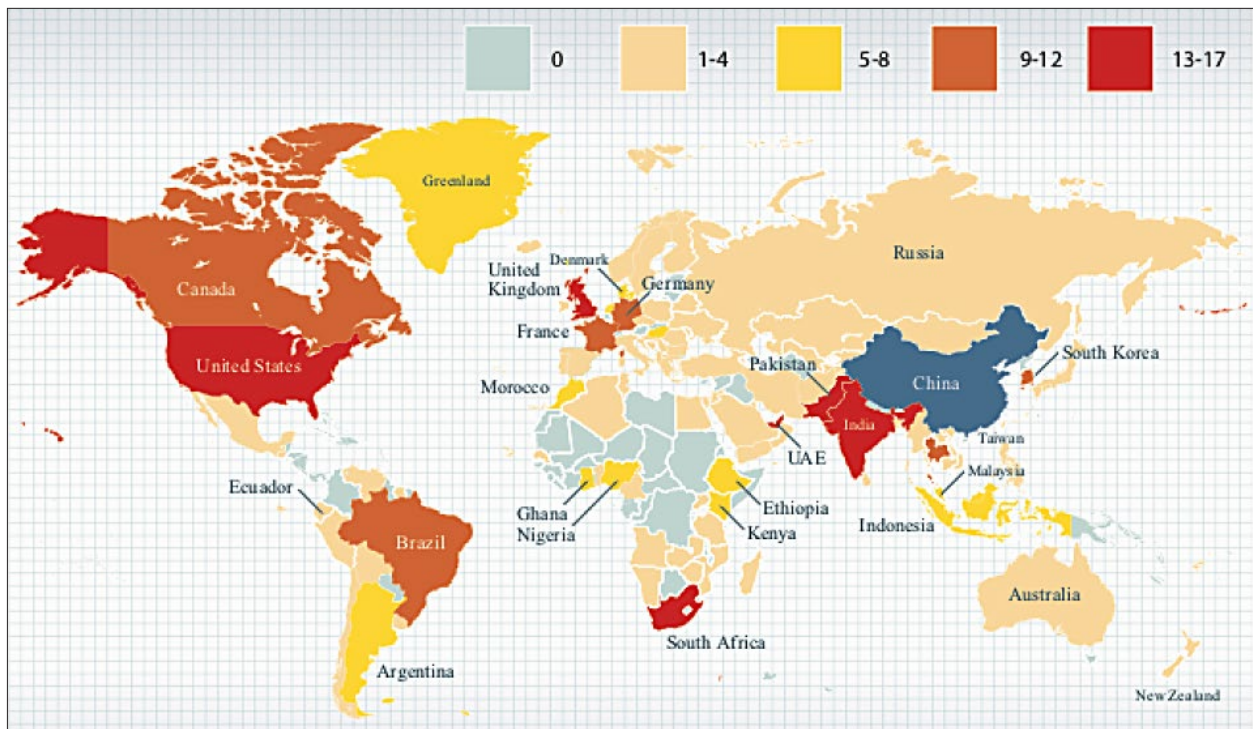
As a deliverable of the Second Belt and Road Forum in 2019, Chinese agencies announced the creation of two new mechanisms, the BRI National Standard Information Platform and the Standardization CN-EN Bilingual Intelligent Translation Cloud Platform. The Information Platform, in partnership with five SDOs, including the ISO, IEC, and ITU, will provide updates on standards development, country standardization overviews, and classification and translation capabilities. The Translation Cloud platform is designed to facilitate the use of Chinese standards by non-Mandarin speakers.¹⁰³

The most recent in a series of reinforcing documents on the promotion of Chinese standards along the BRI – and beyond – is the State Council's October 2021 National Standardization Development Program. This document includes an explicit reminder that the Party is in charge of the country's standardization work.¹⁰⁴ While the CCP may well direct these initiatives, and the state provides financial support, Chinese technology companies are clearly at the forefront of overseas implementation as they expand into overseas markets, export emerging technologies whose standards largely remain up for grabs, and participate in international standards setting.^{105, 106}

An important vehicle for Chinese companies to export and lock in their technology is the range of Smart Cities (and Smart Ports) projects. These can include energy smart grids, cloud computing networks and data centers, AI-driven surveillance and facial recognition technology, municipal services such as traffic control and emergency call centers, and other integrated platforms and features.¹⁰⁷

OVERVIEW OF IDENTIFIED CHINESE SMART CITIES TECHNOLOGY EXPORTS ¹⁰⁸			
TECHNOLOGY CATEGORY	PRODUCT TYPE	CHINESE COMPANIES INVOLVED	PRESENT IN CASE STUDY
Surveillance	IP cameras, CCTV, DVR, NVR, video management systems, police body cameras, traffic surveillance systems, facial recognition, IR cameras, license plate recognition	Huawei, Hikvision, Dahua, Shenzhen ZNV, Megvii, Kedacom, Cloudwalk, Uniview, E-Hualu, Yitu	Malaysia, Ecuador, Kenya, Germany, United Kingdom
Network Infrastructure	Backbone networks, Wi-Fi, high-speed networks, 3G, 4G, and 5G infrastructure, LTE networks	Huawei, ZTE, H3C	Malaysia, Ecuador, Kenya, Germany, United Kingdom
Big Data	Cloud networks, data centers, servers	Huawei, Alibaba, Tencent, Sugon, Inspur, Sangfor, iSoftStone, ChinaSoft	Malaysia, Germany
Fintech	Mobile payment applications, automated payment systems	Huawei, Ping'an, Panda Electronics	Malaysia, Kenya
Energy	Smart grid, smart meters, advanced metering infrastructure (AMI)	Huawei, ZTE, CEIEC Electric	
Integrated Platforms	Emergency response systems, "safe city" solutions, unified urban operation platforms, command centers, dispatching systems, call centers	Huawei, ZTE, Dahua, Alibaba, Kedacom, Shenzhen ZNV	Malaysia, Ecuador, Kenya, Germany
Municipal Services	Smart parking, traffic management and control systems, bus system, smart streetlamps, smart waste management	Huawei, Hikvision, Dahua, Kedacom, Gosuncn, E-Hualu, Panda Electronics, Founder International, Carsmart, TelChina, Shenzhen ZNV, iSoftStone	Malaysia, Kenya, Germany, United Kingdom

GLOBALLY IDENTIFIED CHINESE SMART CITIES PROJECTS¹¹¹



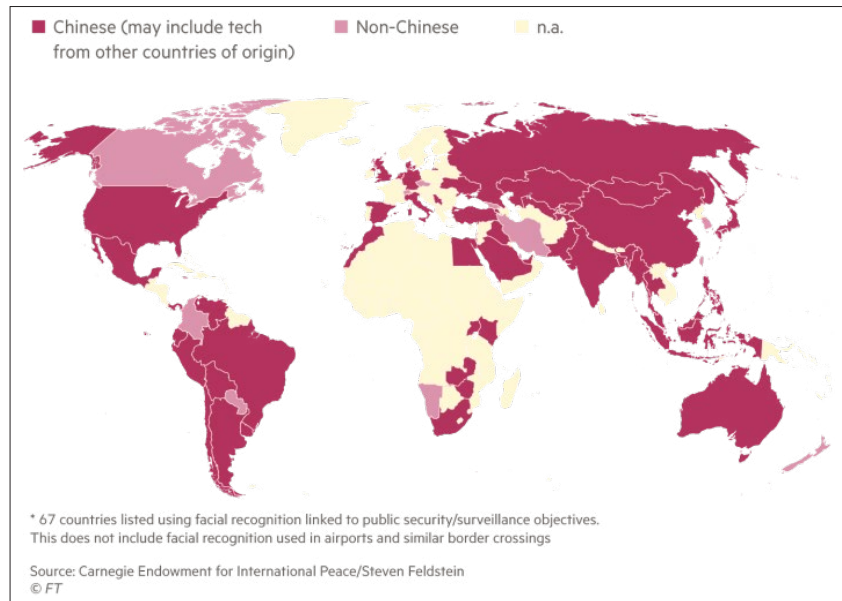
The Chinese government began domestic Smart Cities pilot projects in 2012. At least 300 pilot projects have been certified and an industry group estimated that there are roughly 500 more in China. A recent report indicates that 106 countries are hosting some form of Smart Cities projects and associated Chinese technologies.¹⁰⁹ Two of the largest companies in this space, Huawei and ZTE, alone have developed over 200 and 170 Smart Cities projects worldwide, respectively.¹¹⁰

Beyond Smart Cities per se, Chinese firms are actively exporting their component technologies. Huawei has developed roughly 70 percent of Africa's 4G networks.¹¹² Alibaba has opened up data centers in over 22 countries, Huawei is developing cloud data centers in Pakistan and Kenya, and both China Unicom and China Mobile are constructing a range of terrestrial and submarine telecommunication networks in Africa, Europe, the Middle East, and South Asia.¹¹³

The PRC is also exporting next-generation surveillance, monitoring, and censorship technology, ostensibly for public security.¹¹⁴ Huawei installed over 1,000 cameras in Belgrade, Serbia, and is developing a \$126 million project involving facial recognition surveillance in Uganda.¹¹⁵ In Venezuela, ZTE is developing a national ID system, payment system, and national database to strengthen the government's ability to track individuals.¹¹⁶

Since 2014, almost all of the standards submissions at the ITU for facial recognition technology have come from Chinese companies; over half the submission have been approved.¹¹⁷ A new consortium of Chinese companies, universities, and experts is leading the development of standards for Smart Cities' technologies in the ISO/IEC through a working group whose five officers are all from China.¹¹⁸

THE GLOBAL SPREAD OF CHINESE FACIAL RECOGNITION TECHNOLOGIES



CHAPTER 6: China's Advantages

External Advantage

The PRC's far-reaching international standards promotion strategy, coupled with its vigorous advocacy of cyber sovereignty, facilitates China's emergence as a "cyber great power." The common thread throughout its activities in this space is enhanced control – control over norms, information, data, next-generation technology, and over standards. That enhanced control, in turn, contributes to both China's national security and to greater technological, economic, and geopolitical influence.

The CCP is significantly enhancing its ability to control information flows in and out of the country and reduce domestic network security vulnerabilities through a collection of new laws and regulations that strengthen the state's oversight in cyberspace.¹¹⁹ Some, like the Personal Information Protection Law, include extraterritorial provisions.¹²⁰ The principle of cyber sovereignty has provided Beijing a tool to fend off international criticism of its restrictions on data flows.

In practice, the cyber sovereignty of emerging economies that are transitioning to a digital-oriented future through Chinese tech infrastructure may be compromised by hidden PRC access to their data.

Developing a technology and designing a standard brings commercial benefits and prestige. It advances the "Dual Circulation" goal of reducing China's external dependencies through indigenous technology. And it also affords a competitive advantage in that the inventor knows the ins and outs of the system's operation. Excluding foreign technology enhances the state's ability to reduce potential vulnerabilities in the domestic network – naturally, a high priority. Moreover, operating as a standards maker, and promoting international adoption of Chinese technology, provides access to a trove of valuable data which can be mined by companies, security services, and other state actors.

Domestic Advantage

Within China, only 24 percent of Chinese national standards in 2019 were adopted from international ones.¹²¹ The predominance of unique standards helps shield less competitive firms from foreign rivals in the domestic market. Recent reforms to domestic standardization processes appear to open up opportunities for foreign companies to participate in standards setting. In practice, however, foreign companies still describe being locked out or denied equal treatment with local firms.¹²² A lack of transparency and prejudicial treatment over standards setting are factors that put foreign companies at a disadvantage.

Multilateral Advantage

Beijing has made significant advances promoting norms with "Chinese characteristics," especially within the UN system. The growing number of Chinese senior officials and secretariat staff in multilateral organizations bolsters Beijing's "discourse power" and ability to legitimize its version of cyber sovereignty as a human right. In practice, the cyber sovereignty of emerging economies that are transitioning to a digital-oriented future through Chinese tech infrastructure may be compromised by hidden PRC access to their data.

In SDOs, Beijing's preference for working through multilateral institutions rather than multistakeholder bodies tends to undercut the role of nongovernmental actors. Industry representatives, technical experts, and civil society groups may lose influence over next-generation technology standards. A predominantly state-centric approach towards technical standards would reduce inclusiveness and transparency, and risks turning a process for facilitating open trade into a geopolitical battleground.¹²³

Path Dependency Advantage

The PRC's push to promote de jure and de facto standards helps Chinese firms transition from licensees to royalty collectors so they can profit from emerging technology markets as well as dominate them. The increasing adoption of technology bundles, such as Smart Cities, Smart Ports, and 5G networks, tend to lock in Chinese technologies and lock out Western competitors. These components of the DSR have non-commercial implications as well. As a unique provider of tools for social and information control that governments can utilize to suppress dissent, Beijing gains influence with ruling elites in authoritarian states. China's plans for international deployment of the digital yuan may not change the primacy of the U.S. dollar, but it will likely enhance China's ability to bypass U.S. sanctions as well tap into a rich vein of foreign financial data.

CHAPTER 7: Recommendations

Recommendation: Government-to-Government and Government-Industry Coordination

It is entirely appropriate for China to play a role in shaping tech governance commensurate with its growing status as a technology leader. And it is neither desirable nor possible to shut the PRC out of the international standardization process. As in other areas of Western competition with China, upping one's own game and aligning the efforts of likeminded countries and stakeholders is far more important than trying to block China. Given the importance of the tech industry in industrialized nations, working jointly to establish a shared baseline of priorities between government and industry is a critical first step.

Recommendation: Prioritizing Key Technologies

For G-7 and other advanced economies, one initial actionable step could be for each government, in consultation with industry, to undertake a study to map and prioritize emerging technologies that are strategically important to national interests. Building on those conclusions to assess which standards will be most relevant – and where they would be adjudicated internationally – would provide the basis for coherent national action plans in SDOs. While commercial interests will dictate some differences between countries, strategic and technological interests will incentivize common cause in multilateral institutions. In the United States, the National Institute of Standards and Technology's (NIST) Interagency Committee on Standards Policy (ICSP) already focuses on developing consistent and effective approaches across federal agency and industry lines. As a recent report by the Day One Project suggested, an expanded, fully funded, and empowered ICSP, working in tandem with the new National Cyber Director, would be an excellent starting point for this venture.¹²⁴

As in other areas of Western competition with China, upping one's own game and aligning the efforts of likeminded countries and stakeholders is far more important than trying to block China.

Recommendation: Support for Stakeholder Participation in SDOs

Governments can also play an important supporting role in strengthening national participation in nongovernmental multistakeholder SDOs. Frequently overlooked is the fact that it is prohibitively expensive for many companies, universities, and organizations to send representation to international standards setting events. A tech industry expert calculates that it costs companies on average \$300,000 per year to fund a single engineer to work full time on technical standards and participate in international meetings.¹²⁵ She suggested that government grants, subsidies, or tax breaks could allow participation of small to medium enterprises and civil society organizations that have been priced out and promote a diversity of voices in these forums. Even modest steps that enable participation in technology alliances can significantly boost know-how, spur innovation, and generate more and better standards submissions. Measures that would facilitate hosting more international standards meetings in the United States would enhance diversity by making it easier for smaller organizations to participate. And a deliberate strategy of facilitating expedited visa issuance would make it easier for qualified foreign participants to contribute.

Recommendation: Communication with Western SDO Personnel

The decentralized SDO landscape makes information sharing a critical component of an effective approach

to standards setting. Communication and coordination should be enhanced between government agencies and industry actors, as well with nationals working in the SDO secretariats or holding positions in committees or working groups. The Information Industry Tech Council has proposed annual convenings of American representatives at standardization bodies to confer with relevant government officials.¹²⁶ This kind of relationship building can be extended in ways that lay the groundwork for a more coordinated approach by stakeholders.

Recommendation: Fostering Standardization Expertise

A very high priority for industry and government should be investments to foster the next generation of standards experts and practitioners. In the United States, President Joe Biden's fiscal year 2022 budget request includes increased funding for R&D and STEM education, as do provisions in other pending legislation.¹²⁷ Increased funding is vital to enable industry and the U.S. government to collaborate on developing standardization training programs to ensure a reliable pipeline and talent pool of standards experts. The American National Standards Institute (ANSI), which has existing educational outreach and programs, could serve as a partner achieving this goal. More broadly, visa policies that would make it easier for foreign

experts to come study and work on standardization – and to retain them – clearly would serve the national interest.

Recommendation: Utilizing Platforms with Likeminded Partners

Beyond national programs, lateral collaboration among likeminded countries is necessary to ensure that standards setting and cyber governance are transparent and inclusive processes. The September 2021 “Quad

America's Build Back Better World (B3W) and new Quad infrastructure partnership announcements have a long way to go before they can provide emerging economies and partners with real alternatives.

Principles on Technology Design, Development, Governance, and Use”¹²⁸ represents a valuable step in promoting coordinated international action. This issue is ripe for a Quad working group and/or collaborative mechanism that likeminded partners such South Korea, New Zealand, Taiwan, and G-7 countries could participate in. There are opportunities to use other multilateral platforms as APEC and the G-20 to encourage the adoption of international standards and push back against national measures that undermine a free and open internet.

Recommendation: Put Alternatives on the Table

As long as the DSR and its bundled technologies are the only available or affordable option for developing countries, unique or proprietary Chinese standards will continue to spread. Far more ambitious programs are needed to generate credible and affordable alternatives to the DSR. America's Build Back Better World (B3W) and new Quad infrastructure partnership announcements signal a growing awareness of this need but have a long way to go before they can provide emerging economies and partners with real alternatives. Technology expert Adam Segal urged the U.S. government to increase funding for the International Develop Finance Corporation (IDFC) to provide loans to enable developing countries to purchase telecommunications equipment from vendors other than Huawei.¹²⁹ Since 5G will act as the backbone for most IoT technologies and platforms, the adoption of Open Radio Access Network (Open RAN) would promote supplier diversity, increased interoperability, healthy competition, and the diffusion of international standards.¹³⁰

Recommendation: Diplomacy with China

At the end of the day, the United States and its partners need to engage with China, bilaterally and multilaterally, in the largely forgotten art of diplomacy and compromise. Outreach to encourage or incentivize Beijing to take a more constructive and unbiased approach in standards setting is worth trying. Negotiations to address nontariff regulatory and other barriers that deploy domestic standards as obstacles to foreign access to the Chinese markets, in contravention of WTO principles, are among the issues that need to be addressed directly with Chinese officials. A report on standards setting by the U.S.-China Business Council ends with the following plea: “As the two largest economies in the world, it is essential that the United States and China continue to work together in setting standards so that the highest- quality technology remains interoperable not just between both countries, but globally.”¹³¹

RECOMMENDATIONS	
TECHNOLOGY CATEGORY	PRODUCT TYPE
Increase Government-to-Government and Government-Industry Coordination	Establish a shared baseline of priorities
Prioritizing Key Technologies	Initiate a study to map and prioritize emerging technologies that are important to national interests
Supporting Stakeholder Participation in SDOs	Strengthen national participation in multistakeholder SDOs Provide government grants, subsidies, or tax breaks to small-to-medium enterprises to bolster participation Increase hosting international standards meeting in the U.S. and implement measures to facilitate foreign participation
Communication with Western SDO Personnel	Establish an annual convening of American representatives to SDOs and relevant U.S. government officials
Fostering Standardization Expertise	Increase funding for R&D and STEM education Develop standardization training programs Implement visa policies to attract and retain foreign standardization experts
Utilizing Platforms with Likeminded Partners	Develop collaborative mechanisms with likeminded partners to ensure standards-setting and cyber governance are transparent and inclusive processes Use multilateral platforms, including APEC and the G-20, to encourage the adoption of international standards and against measures that undermine a free and open internet
Put Alternatives on the Table	Further develop both the B3W and Quad infrastructure partnership Increase U.S. government funding to the IDFC to provide loans to developing countries to purchase technology Promotion the Open RAN model
Diplomacy with China	Engage, bilaterally and multilaterally with China on standards setting

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