

Winning the 5G Race with China: A U.S.-Japan Strategy to Trip the Competition, Run Faster, and Put the Fix In

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EXECUTIVE SUMMARY

This article argues that China's 5G wireless information and communications technology (ICT) poses serious risks to privacy and national security and describes a potential U.S.-Japan strategy for countering these threats.

MAIN ARGUMENT

Chinese leaders have promoted 5G ICT as a component of both the Belt and Road Initiative and Military-Civil Fusion—efforts intended to extend China's influence around the world for national, commercial, and military advantage. Under Chinese law, 5G ICT firms like Huawei and ZTE are required to grant Chinese authorities access to any data that touches their systems. In response, the U.S. and Japan should consider working to counter the advantages of Chinese firms by cutting off their access to key markets, technology inputs, talent, and capital (“tripping the competition”); build up free-world alternatives (“running faster”); and restructure the global playing field to protect privacy, economic competition, and national security (“putting the fix in”).

POLICY IMPLICATIONS

- To reduce Chinese firms' market access, the U.S. and Japan have focused on expelling untrustworthy Chinese 5G technology from their ICT markets, tightening foreign investment review processes, enhancing visa screening and working with universities to counter Chinese intellectual property theft and talent recruitment, and ensuring that Chinese 5G firms are unable to draw on allied capital markets to fund their expansion.
- To provide alternatives to Chinese 5G ICT, Washington and Tokyo are actively investing in secure and resilient 5G technologies and using these as a bridge to 6G solutions, while leveraging export promotion and development finance tools to help these technologies spread in third-country markets.
- To balance privacy, economic competition, and national security, the U.S. and Japan can promote Open Radio Access Network (O-RAN) and virtualized core technology solutions to restructure wireless markets, while also working with partners to advocate for data privacy norms embodied in international standard-setting institutions.

The rapid proliferation of inexpensive Chinese information and communications technology (ICT), combined with Beijing's efforts to shape global IT norms in an authoritarian direction, has been among the most pressing technology concerns confronting the free world. This is particularly true for 5G wireless technologies that endanger users' personal data. As Laura Rosenberger, senior director for China on the National Security Council (NSC), wrote in mid-2020, "The installation of Chinese 5G equipment around the world will enable the collection of huge tranches of data by Chinese telecommunications companies...[that] could be shared with Chinese state or Communist Party institutions."¹ If left uncontested, Huawei, ZTE, and other Chinese ICT firms, with their legal requirements to grant data access to Chinese authorities, protected market at home, and key roles in China's drive toward Military-Civil Fusion (*junmin ronghe*), pose real and growing threats to data privacy, economic competitiveness, and national security.² As the world's two richest and most technologically advanced allied liberal democracies, the United States and Japan share a common interest in countering these risks. Both President Joe Biden and Prime Minister Yoshihide Suga have stated their commitment to global information technology norms and standards that favor privacy and national security, and their administrations are looking to promote alternatives to Chinese ICT firms that center on clean and reliable communications network architectures. What strategic options are Washington and Tokyo likely to consider in responding to the China 5G challenge?

The People's Republic of China (PRC), with its state-directed decision-making process, has several advantages over the United States and Japan in terms of development speed and investment scale for strategic technologies. For one, it can directly support national champion firms, such as Huawei and ZTE, and use them to support its overall economic, technological, and national security policy goals by leveraging strategic plans such as the Made in China 2025 program, the China Standards 2035 program, and the Belt and Road Initiative. Such an approach differs substantially from the more market-driven approaches of the United States and Japan, which are oriented toward private-sector gains, not government power, and are constrained by legal systems intended to protect user privacy, even if imperfectly. By contrast,

¹ Laura Rosenberger, "Making Cyberspace Safe for Democracy," *Foreign Affairs*, May/June 2020.

² National People's Congress of the People's Republic of China (PRC), "Wangluo anquan fa (cao'an) quanwen" [Cybersecurity Law of the People's Republic of China (Draft)—Full Text], 6, 2015 ~ https://web.archive.org/web/20161029174914/http://www.npc.gov.cn/npc/xinwen/lfgz/flca/2015-07/06/content_1940614.htm.

China is actively directing its state and nominally private-sector firms toward the “China dream” of “national rejuvenation” under Chinese Communist Party (CCP) general-secretary and president Xi Jinping. The vision aims first to restore China to preeminence in the Indo-Pacific region and then to remake the world order in ways that favor the Chinese party-state.

Indeed, as Kurt Campbell and Rush Doshi have argued, Beijing is taking advantage of the Covid-19 pandemic to “reshape global order,” with ICT being one of the most notable areas of China’s advance.³ Beijing appears, as Campbell and Mira Rapp-Hooper argued in early 2020, to have decided that it is “done biding its time” and is now moving rapidly to take the world in a direction more favorable to CCP interests.⁴ To that end, as part of its strategy for economic recovery from the pandemic, Beijing has been accelerating its focus on digitization, with the National People’s Congress promulgating a \$2 trillion “new infrastructure” strategy in May 2020.⁵ The strategy lists seven digital industries for investment, including 5G mobile network technologies. According to the *Global Times*, China could invest almost \$173 billion in 5G infrastructure by 2025.⁶

Given that Chinese leaders view information as a key domain of political struggle and armed conflict, aim to use Military-Civil Fusion to leverage the commercial sector for military gains, and attempt to “pick foreign flowers to make honey in China” (i.e., exploit overseas knowledge to benefit China’s military), liberal democratic countries should be concerned about the spread of Chinese ICT firms’ technologies and business relationships.⁷ Chinese leaders regard Military-Civil Fusion as the PRC’s “path to victory in a global confrontation of systems.”⁸ As a recent study of efforts by the People’s Liberation Army (PLA) to exploit its research ties to New Zealand noted, “many foreign universities, research institutes, and corporations who partner

³ Kurt M. Campbell and Rush Doshi, “The Coronavirus Could Reshape World Order,” *Foreign Affairs*, March 18, 2020. Subsequently, Kurt Campbell and Rush Doshi joined the Biden administration’s NSC as the Indo-Pacific coordinator and China director, respectively.

⁴ Kurt M. Campbell and Mira Rapp-Hooper, “China Is Done Biding Its Time,” *Foreign Affairs*, July 15, 2020. Mira Rapp-Hooper has since become China director for the Department of State’s Policy Planning Staff.

⁵ “China Bets on \$2T High-Tech Infrastructure Plan to Spark Economy,” *Nikkei Asia*, June 1, 2020 ≈ <https://asia.nikkei.com/Business/China-tech/China-bets-on-2tn-high-tech-infrastructure-plan-to-spark-economy>.

⁶ Wang Cong and Huang Ge, “Seven ‘New Infrastructure’ to Lift Economy,” *Global Times*, March 10, 2020 ≈ <https://www.globaltimes.cn/content/1182077.shtml>.

⁷ Alex Joske, “Picking Flowers, Making Honey: The Chinese Military’s Collaboration with Foreign Universities,” Australian Strategic Policy Institute, October 30, 2018.

⁸ Alex Stone and Peter Wood, *China’s Military-Civil Fusion Strategy: A View from Chinese Strategists* (Montgomery: China Aerospace Studies Institute, 2020).

with Chinese entities have been unwittingly drawn in to the PLA's technology transfer project.⁹ A report from the Center for Security and Emerging Technology on U.S. universities' and other institutions' often unsuspecting links to the PLA presents a similar finding.¹⁰

If Huawei and ZTE come to dominate global telecommunications, they could provide privileged access to the Chinese party-state and the PLA to surveil foreign audiences in unprecedented ways that would be difficult to detect and prevent. Shanthi Kalathil, an expert on human rights and technology, presciently warned nearly two decades ago that the internet and advanced communications technologies are “not necessarily a threat to authoritarian regimes.”¹¹ China's 5G authoritarian technology exports are grounded in its protected domestic market, where Huawei has pioneered the use of artificial intelligence (AI) for facial recognition and mass domestic surveillance in support of China's genocide and crimes against humanity in Xinjiang, a phenomenon Kalathil has characterized as “managing internally, projecting externally.”¹² Tarun Chhabra, now senior director for technology and national security on the NSC, has previously argued that progressives should embrace competition with China, specifically noting the value of industrial promotion policies aimed at investing to counter Huawei's advantages in 5G technology.¹³

While China's government and nominally private-sector firms have laid out ambitious development plans premised on substantial investments in R&D, some observers have cautioned against “exaggerating China's technological prowess.” They point to the many vulnerabilities that Huawei and other Chinese firms face, including heavy dependence on imported semiconductors.¹⁴ Such observers caution that China faces numerous obstacles to achieving its technology goals and warn that treating Chinese policy ambitions as if they are facts within reach could fuel a greater level

⁹ Anne-Marie Brady, Jichang Lulu, and Sam Pheloung, “Holding a Pen in One Hand, Gripping a Gun in the Other: China's Exploitation of Civilian Channels for Military Purposes in New Zealand,” Wilson Center, July 2020, 2.

¹⁰ Ryan Fedasiuk and Emily Weinstein, “Universities and the Chinese Defense Technology Workforce,” Center for Security and Emerging Technology, Georgetown University, December 2020.

¹¹ Shanthi Kalathil and Taylor C. Boas, *Open Networks, Closed Regimes: The Impact of the Internet on Authoritarian Rule* (Washington, D.C.: Carnegie Endowment for International Peace, 2002). Shanthi Kalathil is currently senior coordinator for democracy and human rights on the NSC.

¹² Shanthi Kalathil, “Beyond the Great Firewall: How China Became an Information Power,” Center for International Media Assistance, March 2017.

¹³ Tarun Chhabra, Scott Moore, and Dominic Tierney, “The Left Should Play the China Card,” *Foreign Affairs*, February 13, 2020.

¹⁴ Peter Cowhey and Susan Shirk, “The Danger of Exaggerating China's Technical Prowess,” *Wall Street Journal*, January 8, 2021.

of U.S.-China rivalry than is warranted by the PRC's actual capabilities.¹⁵ Yet, while the limitations China faces in climbing the complexity ladder on 5G and related advanced technologies like semiconductors are real, they are not necessarily insurmountable. For this reason, many observers regard it as crucial to restrict Chinese ICT firms' access to U.S., Japanese, and other countries' markets and critical technologies now while it is still possible to do so.¹⁶ It may also be important to cut off these firms' ability attract talent and financing in order to buy time for the United States and its allies and partners to build alternative sources of 5G technologies. Former president of the National Foreign Trade Council William Reinsch has argued that the Biden administration appears primed to increase the United States' focus on competing effectively with China, including by augmenting U.S. industry: "When you're in a race, there's only two ways to win. One is to trip the other guy, and the other is to run faster...[and] to Biden's credit, he's really focused on running faster."¹⁷

Given that the costs of "losing" are so great for American and Japanese individuals and firms and the broader national security, and taking a cue from Reinsch's metaphor, we argue that there are actually three ways to "win this race." To do so, the United States will need to pursue all of them together with Japan, which can bring economic, technological, and soft power to bolster U.S. efforts. Winning the 5G race requires three things. The first element is "tripping the competition" by continuing to ban Chinese ICT from U.S. and Japanese markets and closing off access to critical inputs and talent in these areas. The second is "running faster" by producing more competitive, affordable, and attractive 5G, and ultimately 6G, ICT products (while also continuing to compete on legacy 3G and 4G wireless equipment). The third element is "putting the fix in" by restructuring the international market for 5G through an approach based around an Open Radio Access Network (O-RAN) and embedding norms and standards that favor privacy, a fair economic playing field, and national security in international organizations. These measures will ensure that Chinese firms,

¹⁵ Paul Triolo, "China Is Not a Technology Superpower. Stop Treating It Like One," SupChina, October 1, 2019 ~ <https://supchina.com/2019/10/01/china-is-not-a-technology-superpower-stop-treating-it-like-one>.

¹⁶ Scott W. Harold and Justin Hodiak, "China's Semiconductor Industry: Autonomy through Design?" Institut Montaigne, September 25, 2020 ~ <https://www.institutmontaigne.org/en/blog/chinas-semiconductor-industry-autonomy-through-design>; and Scott W. Harold and Justin Hodiak, "Can China Become the World's Leader in Semiconductors?" *Diplomat*, September 25, 2020 ~ <https://thediplomat.com/2020/09/can-china-become-the-world-leader-in-semiconductors>.

¹⁷ Jonathan Martin and Ana Swanson, "Biden Picks Rhode Island Governor for Commerce Secretary," *New York Times*, January 7, 2021.

with their requirement to pass any data that touches their systems to Chinese authorities if requested, cannot compete.

This article is organized as follows:

- ≈ pp. 81–83 examine what the ICT race is and why it is important.
- ≈ pp. 83–91 address measures to prevent China from dominating 5G.
- ≈ pp. 91–95 look at building 5G alternatives to better compete with China.
- ≈ pp. 95–102 detail the need to restructure markets and entice partners to adopt similar practices and strategies that enforce international norms of privacy, economic fairness, and national security.
- ≈ pp. 102–3 conclude with an argument for the United States and Japan to stay focused on the long game and prove themselves capable of rising to the China challenge.

WHAT THE 5G RACE IS ABOUT AND WHY IT MATTERS

ICT has long been a focal point for national competition and market access protection owing to security concerns. This is especially true for China, a country that seeks “information security” (*xinxi anquan*).¹⁸ China, for example, refused to agree to liberalize its telecommunications sector during its negotiations on accession to the World Trade Organization in 2001, fearing that the national security implications of doing so could undermine the regime or weaken its economic competitiveness. Consequently, China rebuffed U.S. and other member states’ requests to negotiate the opening up of their own domestic ICT markets.¹⁹ Owing to the importance of ICT to both economic and national security, and the intensifying competition in this arena, many observers have characterized the competition over markets for advanced wireless communications technologies as a “race to 5G.”²⁰ Some observers, however, have taken issue with the metaphor of a race, noting that numerous developing countries around the world are still using or deploying 2G, 3G, and 4G systems; others note that the very definition of

¹⁸ Amy Chang, *Warring State: China’s Cybersecurity Strategy* (Washington, D.C.: Center for a New American Security, 2014).

¹⁹ Scott W. Harold, “Freeing Trade: Negotiating Domestic and International Obstacles on China’s Long March to the GATT/WTO, 1971–2001” (PhD diss., Department of Political Science, Columbia University, 2007).

²⁰ Stu Woo, “In the Race to Dominate 5G, China Sprints Ahead,” *Wall Street Journal*, September 7, 2019.

5G requires disaggregation.²¹ The race metaphor can also induce a sense of urgency on the part of some national decision-makers, who may feel pressured to buy Chinese ICT products even if they represent a security risk simply to avoid falling behind. It can create a false impression that there is a finish line and that such competition is merely a game.

Recognizing these points, together with the notion that there is not one single race but in fact many races that can be disaggregated across component technology type, country, or other metrics of assessment and fields of competition, it may be more useful to focus less on “winning” a single race and more on avoiding self-destructive steps. At the same time, the United States and Japan may find it advantageous to encourage PRC leaders’ predilection toward centralization and indigenization, as these are likely to reduce (if not totally cripple) the competitiveness of China’s ICT firms. In sum, we employ the terminology with caveats here because of its emphasis on competition and urgency, while acknowledging that policymakers should be alert to those aspects of the competition that might be obscured by the metaphor of a race.

Broadly speaking, 5G technologies can be broken down in several ways. One is to think about them in terms of three basic categories: (1) core servers and other related hardware that compute and process information, (2) radio access network (RAN) infrastructure (i.e., cell towers) that distribute the information, and (3) handsets and other mobile devices that receive, process, and demand information for users. Other ways to conceptualize these technologies are in terms of objects versus utilities, hardware versus software, or devices versus applications. These different “layers” where economic transformation can be driven and profitability can occur have powered past generations of ICT development, with the fifth generation expected to have broad socioeconomic impact through the connection of larger numbers of devices that enable AI, autonomous vehicles, real-time remote operations of physical systems, and the expansion of the Internet of Things. According to one recent report, Chinese firms Huawei and ZTE have been the first and third most aggressive in striving to patent 5G technologies, aiming to corner key technologies so as to dominate future ICT markets.²²

²¹ See, for example, James Lewis, “Can Telephones Race? 5G and the Evolution of Telecom,” Center for Strategic and International Studies, June 20, 2020; and Kevin Werbach, “The ‘Race to 5G’ Is a Myth,” CNN, February 3, 2020 ~ <https://www.cnn.com/2020/02/03/perspectives/5g-disruption/index.html>.

²² Jed John Ikoba, “Huawei Has Filed the Most 5G Patents Globally as of February 2020—Report,” GizmoChina, June 2, 2020 ~ <https://www.gizmochina.com/2020/06/02/huawei-has-the-most-5g-standard-essential-patents-globally>.

In terms of 5G market segments, Huawei and ZTE are active in the core network and RAN spaces, while Huawei and Xiaomi are the PRC's leading ITC firms producing smartphones. One of the core vulnerabilities of Chinese 5G providers is that the devices they produce remain overwhelmingly dependent on semiconductors that, even if some are designed indigenously, are nonetheless sourced from foundries located abroad. China has invested billions in attempting to develop a domestic semiconductor industry but to date has only been able to incrementally develop chipsets. Despite this limitation, the PRC's approach has been exceedingly market distorting, focused not only on investing in R&D but also on trying to undercut foreign competitors through intellectual property (IP) theft and proliferate Chinese technology standards through multilateral institutions.²³

If imitation is the sincerest form of flattery, U.S. and Japanese officials may conclude it is time to use China's own strategy against its national champion firms. Indeed, James Mulvenon has recently argued along similar lines, noting that "the best defense is a good offense...[but that] no team can win on offensive prowess alone. It needs defense, too."²⁴ We agree, and suggest that the United States is unlikely to succeed by playing offense and defense alone but rather should proceed in tandem with Japan and other like-minded allies and partners. This coalition can work not only to counter Chinese ICT firms ("defense," or what we have termed "tripping the competition") and build up alternatives ("offense," or "running faster") but also to change the rules of the game by addressing international norms embedded in key multilateral institutions ("putting in the fix").

TRIPPING CHINA'S NATIONAL CHAMPION ICT FIRMS

Chinese leaders have long recognized ICT as offering some of the most critical tools. In 2019, Julian Gewirtz, now China director on the NSC, described "China's long march to technological supremacy," a march in which Chinese leaders have demonstrated "persistence and ingenuity."²⁵ As a result of this decades-long effort to "catch up and surpass," by some estimates

²³ James Lewis, "Learning the Superior Techniques of the Barbarians," Center for Strategic and International Studies, 2019.

²⁴ James Mulvenon, "A World Divided: The Conflict with Chinese Techno-Nationalism Isn't Coming—It's Already Here," War on the Rocks, January 28, 2021 ~ <https://warontherocks.com/2021/01/a-world-divided-the-conflict-with-chinese-techno-nationalism-isnt-coming-its-already-here>.

²⁵ Julian Baird Gewirtz, "China's Long March to Technological Supremacy," *Foreign Affairs*, August 27, 2019.

Huawei and ZTE controlled roughly 41% of the global telecommunications infrastructure as of late 2020.²⁶ It is important to note that Chinese firms have acquired this substantial market share in part through widespread IP theft that helped enable the production of fairly high-quality products that, if not always at the cutting edge, are close enough to be competitive. In addition, the price of Chinese ICT technologies is very attractive due to unfair economic practices such as the heavy subsidization of ICT firms' costs of production together with concessionary loans from Chinese banks to foreign customers, making such loans up to 70% cheaper than their alternatives.²⁷ Chinese tech is rarely the best, and certainly not reliable in terms of protecting data privacy. Yet for many customers worldwide the quality-price ratio is good enough to make Huawei or ZTE competitive, especially for customers that are relatively ignorant of or indifferent to security vulnerabilities.

The first step toward preventing China from dominating 5G, then, has been to slow or even roll back the gains of these firms as much as possible while creating time for providers from the United States, Japan, and Europe to roll out alternative technology offerings and, if necessary, undergo consolidation or bring in additional investors to shore up their fiscal positions.²⁸ The United States and Japan have four tools for doing so: (1) expelling Chinese ICT firms from U.S. and Japanese markets, (2) constraining these firms' access to necessary technology components, (3) restricting their access to talent, and (4) ensuring that they cannot take advantage of U.S. or Japanese capital markets to raise financing.

As Campbell and Doshi argued on the eve of taking up their new positions in the Biden administration, competition with China in the Indo-Pacific centers on shoring up regional order and restoring balance and legitimacy. A key economic component of this process will involve building shared and trusted "supply chains, standards, investment regimes, and trade agreements" with allies and partners, even as the United States works to re-shore sensitive industries and pursue a "managed decoupling" from China.²⁹ Over the past few years, the United States has increasingly moved

²⁶ Matt Kapko, "Huawei Dominates Nokia, Ericsson, Dell'Oro Says," SDX Central, December 3, 2020 ~ <https://www.sdxcentral.com/articles/news/huawei-dominates-nokia-ericsson-delloro-says/2020/12>.

²⁷ Melanie Hart and Jordan Link, "There Is a Solution to the Huawei Challenge," Center for American Progress, October 14, 2020 ~ <https://www.americanprogress.org/issues/security/reports/2020/10/14/491476/solution-huawei-challenge>.

²⁸ Barry Collins, "Microsoft in the Frame (Again) to Buy Nokia, Analysts Forecast," *Forbes*, October 5, 2020 ~ <https://www.forbes.com/sites/barrycollins/2020/10/05/microsoft-in-the-frame-to-buy-nokia-again/?sh=31e782c77228>.

²⁹ Kurt M. Campbell and Rush Doshi, "How America Can Shore Up Asian Order," *Foreign Affairs*, January 12, 2021.

to restrict PRC firms' ability to invest in and acquire technology firms whose products carry national security implications, culminating in the passage of the 2018 Foreign Investment Risk Review Modernization Act to enhance the effectiveness of the Committee on Foreign Investment in the United States (CFIUS).³⁰ Indeed, the most notable instances of U.S. efforts to block investments by foreign actors in recent years have all involved China. These include CFIUS support for the 2016 cancellation of the German firm Aixtron's sale to China's Fujian Grand Chip Investment Fund, the 2017 move by then president Donald Trump to prevent China's Canyon Bridge Capital Partners' acquisition of Lattice Semiconductor, and Trump's 2018 blocking of the sale of chipmaker Qualcomm to Singapore's Broadcom over concerns about the latter's connections to Huawei.³¹

At the same time, the United States has moved to exclude Chinese technology firms that pose threats to personal privacy and national security from its market and hamper their ability to import critical inputs. On May 16, 2019, the Commerce Department added Huawei to the Entity List (its trade blacklist). On June 30, 2020, the Federal Communications Commission (FCC) blocked telecommunications providers from drawing on federal subsidies from its \$8.3 billion Universal Service Fund to purchase Huawei or ZTE hardware, designating the firms as "national security risks to America's telecommunications infrastructure and our 5G future."³² In December 2020, the United States placed China's Semiconductor Manufacturing International Corporation (SMIC) on the Entity List.³³ Since the start of the Biden administration, Secretary of Commerce Gina Raimondo has confirmed that she sees "no reason" to lift the ban on Huawei and has vowed to use the Entity List "to its full effect" against Chinese

³⁰ "CFIUS Reform under FIRRMA," Congressional Research Service, February 21, 2020.

³¹ Kate O'Keeffe, "Trump Orders Broadcom to Cease Attempt to Buy Qualcomm," *Wall Street Journal*, March 13, 2018.

³² Makena Kelly, "FCC Designates Huawei, ZTE as Threats to National Security," *Verge*, June 30, 2020 ~ <https://www.theverge.com/2020/6/30/21308477/fcc-huawei-zte-ban-universal-service-fund-national-security-threat-risk>.

³³ Jeanne Whalen and Ellen Nakashima, "U.S. Bans Technology Exports to Chinese Semiconductor and Drone Companies, Calling Them Security Threats," *Washington Post*, December 18, 2020 ~ <https://www.washingtonpost.com/technology/2020/12/18/china-smic-entity-list-ban/>; and U.S. Bureau of Industry and Security, Commerce, "Addition of Entities to the Entity List, Revision on Entry on the Entity List, and Removal of Entities from the Entity List," Federal Register, December 22, 2020 ~ <https://www.federalregister.gov/documents/2020/12/22/2020-28031/addition-of-entities-to-the-entity-list-revision-of-entry-on-the-entity-list-and-removal-of-entities>.

telecommunications companies.³⁴ On March 12, 2021, the FCC designated Huawei and ZTE as entities that “pose an unacceptable risk to the national security of the United States or the security and safety of United States persons.”³⁵

These U.S. actions have shown that PRC ICT firms are vulnerable, despite attempts by their CEOs and Chinese leaders to suggest otherwise, claiming that “no force can stop China’s progress” and that U.S. sanctions “cannot crush us.”³⁶ In 2019, for example, Huawei felt compelled to give out over a quarter of a billion dollars in employee bonuses to its 194,000 staff to alleviate concerns that employees might abandon the firm if they concluded that its future was in doubt. In 2020, Huawei was forced to cancel its Kirin chipset due to U.S. restrictions on semiconductor exports to China.³⁷ CEO Ren Zhengfei eventually admitted that his firm was facing an unprecedented challenge and would need to “fight its way out” from under U.S. sanctions, an unusual remark from a purportedly commercially oriented firm.³⁸ Reflecting this approach, China has reportedly pressured Western firms to lobby their own governments against restrictions, while Huawei appears to have launched a social media disinformation campaign against efforts to restrict its participation in key 5G markets.³⁹ Nonetheless, in November 2020, Huawei divested itself of its budget cellphone handset subsidiary Honor in an attempt to raise capital and reduce the demand for chips placed on its dwindling

³⁴ Eric Martin, “Biden Commerce Pick Sees ‘No Reason’ to Lift Huawei Curbs,” Bloomberg, February 3, 2021 ~ <https://www.bloomberg.com/news/articles/2021-02-04/biden-commerce-pick-sees-no-reason-to-pull-huawei-from-blacklist>; and “U.S. Commerce Head to Use Tool to Limit Tech Exports to China Firms ‘to Full Effect,’” Reuters, March 4, 2021 ~ <https://www.reuters.com/article/us-usa-china-trade-commerce/u-s-commerce-head-to-use-tool-to-limit-tech-exports-to-china-firms-to-full-effect-idUSKBN2AW22R>.

³⁵ Federal Communications Commission (FCC), “Public Safety and Homeland Security Bureau Announces Publication of the List of Equipment and Services Covered by Section 2 of the Secure Networks Act,” Public Notice, DA 21-309, March 12, 2021 ~ <https://docs.fcc.gov/public/attachments/DA-21-309A1.pdf>.

³⁶ Helen Regan and James Griffiths, “No Force Can Stop China’s Progress, Says Xi in National Day Speech,” CNN, October 1, 2019 ~ <https://www.cnn.com/2019/09/30/asia/china-oct-1-national-day-intl-hnk/index.html>; and “The U.S. Cannot Crush Us, Says Huawei Founder,” BBC, February 18, 2019 ~ <https://www.bbc.com/news/business-47274679>.

³⁷ “Huawei to Stop Making Flagship Chipsets as U.S. Pressure Bites, Chinese Media Say,” Reuters, August 8, 2020; and “Huawei to Give Staff \$286 Million Bonus for Helping It Ride Out U.S. Curbs,” Reuters, November 12, 2019.

³⁸ Lily Kuo, “‘There Will Be Conflict’: U.S. Has Underestimated Huawei, Says Founder,” *Guardian*, May 20, 2019; and Dan Strumpf, “Huawei Founder Ren Zhengfei Takes Off the Gloves in Fight with U.S.,” *Wall Street Journal*, June 6, 2020.

³⁹ Richard Milne, “Why Ericsson Took On Its Own Government to Defend Rival Huawei,” *Financial Times*, January 27, 2021; and Adam Satariano, “Inside a Pro-Huawei Influence Campaign,” *New York Times*, January 29, 2021.

stockpiles of semiconductors.⁴⁰ Following its own “near death” experience under U.S. sanctions, ZTE has invested even more heavily in 5G technology as a pathway back to viability.⁴¹ As a final example of U.S. pressure on China’s leading ICT firms, in early 2021 the United States moved to blacklist Chinese handset maker Xiaomi by designating it as a military-linked firm and forcing U.S. companies and individuals to divest any ownership stakes they may hold in the company.⁴²

In tandem with these moves by the Departments of Commerce and Defense to exclude Chinese ICT firms domestically, the Department of State launched the Clean Networks Initiative in 2020 and has been urging U.S. allies and partners to remove Huawei and other Chinese ICT firms from their 5G networks.⁴³ Key officials tasked with reviewing national security technology policy in the Biden administration have signaled in their past writings that they would favor continuing and improving the implementation of such competitive policies.⁴⁴ In addition to expulsion from key markets, U.S. policy has sought to sever the ability of Huawei, ZTE, and other suspect Chinese firms from procuring key hardware components required to produce advanced ICT products—most notably in the field of semiconductors, where China imports over \$300 billion in chips annually.⁴⁵ The United States also has imposed restrictions on exports of fundamental equipment and tools that include U.S. IP. For example, Washington pressured the Dutch firm ASML to cancel the export of extreme ultraviolet lithographic technology used for advanced chip manufacturing. Such sanctions and technology cutoffs constitute effective cost-imposing strategies.

Japan has also taken steps to ban Huawei and ZTE from government contracts. While not making specific reference to any Chinese firms, then prime minister Shinzo Abe stated that it is “extremely important to make sure

⁴⁰ Dan Strumpf, “Huawei Sells Off Honor Phone Business as U.S. Sanctions Bite,” *Wall Street Journal*, November 17, 2020; and Ken Wieland, “Huawei Sells Honor for \$15.1B—Report,” Light Reading, November 10, 2020 \approx [https://www.lightreading.com/asia/huawei-sells-honor-for-\\$151b---report/d/d-id/765323](https://www.lightreading.com/asia/huawei-sells-honor-for-$151b---report/d/d-id/765323).

⁴¹ Li Tao and Bien Perez, “ZTE Steps Up 5G Investments as It Seeks Comeback after Near-Death Experience,” *South China Morning Post*, March 27, 2019.

⁴² Jodi Xu Klein and Robert Delaney, “U.S. Adds Nine Chinese Firms, Including Xiaomi, to Military Blacklist,” *South China Morning Post*, January 15, 2021.

⁴³ U.S. Department of State, “The Clean Networks Initiative” \approx <https://2017-2021.state.gov/the-clean-network/index.html>.

⁴⁴ Nick Wadhams and Jenny Leonard, “Biden Builds Out China Team with Staff Who Reflect Tougher Tone,” Bloomberg, Quint, February 17, 2021 \approx <https://www.bloombergquint.com/global-economics/biden-builds-out-china-team-with-staff-who-reflect-tougher-tone>.

⁴⁵ Eamon Barrett, “China Will Spend \$300 Billion on Semiconductor Imports as U.S. Squeezes Chip Supply,” *Fortune*, August 27, 2020 \approx <https://fortune.com/2020/08/27/china-semiconductor-chip-imports-us-ban-huawei>.

we would not procure equipment with functions of malicious intention.”⁴⁶ Following the 5G spectrum allocation, the Japanese government also imposed conditions that had the de facto effect of eliminating Chinese firms from competing for contracts with Japanese mobile telephony providers. One of the conditions that the Japanese Ministry of Internal Affairs and Communications stipulated in its 5G spectrum allocation guidelines was that qualifying firms were required to commit to “appropriate cybersecurity measures, including mitigating risks associated with the supply chain.”⁴⁷ Since mobile operators must follow the ministry’s guidelines to obtain 5G spectrum, the practical effect on Japanese mobile phone companies was to exclude Chinese ICT firms from their networks. In addition, on April 1, 2020, the Japanese government launched the Economics Section in its National Security Secretariat. Shigeru Kitamura, the secretary-general of the National Security Secretariat, reportedly took the initiative to launch the section so as to impede China’s quest for technological supremacy and to accelerate Japanese coordination with the United States to counter Beijing’s advances.⁴⁸ The Economics Section aims to strengthen economic regulations related to national security to prevent 5G IP theft and protect 5G networks from Huawei’s participation.⁴⁹

Beyond cutting off access to U.S. and Japanese markets and technology inputs, the United States and Japan have sought to convince third-party suppliers of chips and other components not to simply step in and provide market substitutes. Following the imposition of an initial round of U.S. export controls, Huawei attempted to procure chips from the Franco-Italian STMicroelectronics while also exploring sourcing from South Korea’s Samsung and SK Hynix and Taiwan’s TSMC, MediaTek, Novatek, and Realtek, among other firms.⁵⁰ In May and again in August 2020, the U.S. Department of

⁴⁶ Simon Denyer, “Japan Effectively Bans China’s Huawei and ZTE from Government Contracts, Joining U.S.,” *Washington Post*, December 10, 2018.

⁴⁷ Ministry of Internal Affairs and Communications (Japan) “Dai-go sedai ido tsushin shisutemu (5G) no donyu no tame no tokutei kichiyoku no kaisetsu keikaku no nintei (gaiyo)” [Authorization of the Plan to Establish Specified Base Stations for the Introduction of 5G (Overview)], April 2019 ~ https://www.soumu.go.jp/main_content/000613734.pdf.

⁴⁸ “Abe seiken-ko: NSS keizaihan ga raigetsu hossoku haikai ni aru no wa chugoku no taito, beikoku to renkeishi taiko e” [Abe’s Policy Calculus: NSS Economic Section to Launch Next Month with China’s Rise in the Background and an Eye on Cooperation with the U.S. to Counter It], *Sankei Shimbun*, March 17, 2020 ~ <https://www.sankei.com/premium/news/200317/prm2003170005-n1.html>.

⁴⁹ Brad Glosserman, “NSC Challenge Prepares Japan for New Global Realities,” *Japan Times*, April 1, 2020 ~ <https://www.japantimes.co.jp/opinion/2020/04/01/commentary/japan-commentary/nsc-change-prepares-japan-new-global-realities>.

⁵⁰ Mike Dano, “Huawei Using STMicroelectronics to Parry U.S. Attack—Report,” *Light Reading*, April 28, 2020 ~ <https://www.lightreading.com/5g/huawei-using-stmicroelectronics-to-parry-us-attack-andndash-report-/d/d-id/759253>.

Commerce issued regulations restricting and ultimately banning the Taiwan firms from exporting chips to China that contain U.S. IP. In September 2020, South Korean firms also halted sales of memory chips to Huawei.⁵¹ Were the United States and Japan to block exports of leading-edge technologies only to see rival firms from allied and partner nations swoop in to collect lucrative contracts, this would render the allies' efforts counterproductive. They must, therefore, pursue a continuous, coordinated, and sustained diplomatic approach to export controls on advanced ICT components if they are to prove successful.⁵² This may include allowing firms to continue exporting less-advanced hardware (since many firms are heavily dependent on the massive Chinese market), while also offering some concessions to support firms that previously had been heavily reliant on sales of advanced software or equipment to Chinese firms. This approach is also likely to require diplomatic assistance to help companies that China may seek to penalize for compliance with U.S. and Japanese restrictions on exports and market access. Although it is unclear exactly how much the U.S. effort to encourage export cutoffs for semiconductors has harmed Huawei to date, it is worth noting that Wuhan Hongxing Semiconductor Manufacturing Corporation collapsed in late February 2021, further complicating China's overall efforts to develop an indigenous source of advanced semiconductors.⁵³

The third component of the "tripping" leg of the strategy centers on complicating Chinese firms' ability to attract and exploit talent and human capital from the United States, Japan, and elsewhere. Some prominent voices have called for a complete cutoff of PRC students' access to science, technology, engineering, and math (STEM) programs at U.S. universities.⁵⁴ Analysts have noted, however, that the majority of those who come from China to pursue advanced STEM education are law-abiding, remain in the United States after completing their degrees, and contribute to the viability of U.S. institutions of

⁵¹ Grady McGregor, "This Chipmaker Was a Winner in the U.S. Crackdown on Huawei. Now, It's a Victim," *Fortune*, August 20, 2020 ~ <https://fortune.com/2020/08/20/us-huawei-ban-restrictions-chipmaker-mediatek>; and Cho Mu-hyun, "Samsung and SK Hynix to Halt Memory Supply to Huawei," *ZDNet*, September 9, 2020 ~ <https://www.zdnet.com/article/samsung-and-sk-hynix-to-halt-memory-supply-to-huawei>.

⁵² Martijn Rasser, "Rethinking Export Controls: Unintended Consequences and the New Technological Landscape," Center for a New American Security, December 8, 2020.

⁵³ Iain Morris, "Huawei Is Proving as Hard to Stop as a Movie Villain," *Light Reading*, February 18, 2021 ~ <https://www.lightreading.com/5g/huawei-is-proving-as-hard-to-stop-as-movie-supervillain/a/d-id/767491>; and Ching-Tse Cheng, "China Gives Up Ambitious \$20 Billion Semiconductor Investment Project," *Taiwan News*, February 28, 2021 ~ <https://www.taiwannews.com.tw/en/news/4138523>.

⁵⁴ Elizabeth Redden, "Proposed Legislation Would Bar Chinese STEM Graduate Students," *Inside Higher Ed*, May 28, 2020 ~ <https://www.insidehighered.com/quicktakes/2020/05/28/proposed-legislation-would-bar-chinese-stem-graduate-students>.

higher education as well as U.S. economic and technological advancement, with large numbers becoming life-long U.S. citizens. Rather than banning PRC students from studying in STEM programs in U.S. universities, what is needed is greater investment in U.S. higher education, better monitoring by schools of foreign students' and scholars' activities on campus, and a better-resourced relationship between federal law enforcement and universities to understand and respond to potential threats. If done with the proper screening, reporting requirements, and incentive structures, the United States can turn its normative soft power appeal into a continued drain on Chinese talent that would be more likely to help its own companies and hamper Chinese ICT firms' efforts to climb the technology ladder.⁵⁵

Like the United States, Japan is also moving to review and tighten its visa policies to counter the threat of IP loss to Chinese firms such as Huawei and ZTE. In June 2020 the Abe administration released a draft integrated innovation strategy that warned that “leaks of technological information and talent have already occurred as a result of active information collection” by foreign actors such as China.⁵⁶ However, even as they tighten visa screening, the United States and Japan are likely to take steps to signal that Chinese students are still welcome as long as they undertake the course subjects they came to study and abide by relevant laws and regulations. It will likely prove important for the allies to encourage other like-minded countries to adopt a similar approach to protecting institutional research and knowledge so that the problem does not migrate to more vulnerable targets elsewhere with fewer resources to check espionage and IP theft.

A final component of the “tripping” strategy involves ensuring that Chinese ICT firms and their subsidiaries are not able to raise capital in the U.S. or Japanese financial markets. Though Huawei is officially an entirely privately held company, ZTE, Xiaomi, and other telecommunications firms raise funds on Chinese and foreign stock exchanges. Indeed, China's three largest state-run mobile service providers—China Unicom, China Telecom, and China Mobile—were all listed on the New York Stock Exchange until January 11, 2021, when they were banned by the Department of the Treasury's Office of Foreign Asset Control.⁵⁷ Many analysts expect that decision to be upheld, especially in light of Treasury Secretary Janet Yellen's comments

⁵⁵ Ryan Fedasiuk, “If You Want to Keep Talent Out of China, Invest at Home,” *Foreign Policy*, September 17, 2020 ~ <https://foreignpolicy.com/2020/09/17/china-thousand-talents-plan-invest-us-xenophobia>.

⁵⁶ “Japan to Beef Up Screenings of Foreign Students, Researchers,” *Jiji Press*, June 27, 2020.

⁵⁷ Alan Rappeport, “After Pressure, New York Stock Exchange Will Delist 3 Chinese Firms,” *New York Times*, January 6, 2021.

during her confirmation hearings that the Biden administration plans to “take on China’s abusive, unfair and illegal practices” by “work[ing] with allies” and employing “the full array of our tools.”⁵⁸

In May 2020 the Japanese government revised its foreign investment regulations, imposing stricter scrutiny on foreign nationals’ stock purchases of companies deemed vital for national security. Despite opposition from financial institutions, the government lowered the threshold for requiring buyers and sellers to notify it prior to a transaction, reducing the requirement from 10% to just 1% for companies manufacturing dual-use technology or critical infrastructure, including telecommunications.⁵⁹

As comprehensive as an approach based on market closure and the cutting off of tech inputs, talent, and finance is, the United States and Japan likely cannot overcome the China 5G challenge with this strategy alone. Rather, they will also need to promote alternative ICT solutions. For this reason, Washington and Tokyo have been forced to consider helping support competitive alternatives to Chinese 5G providers while also investing in R&D to develop technological solutions that go beyond 5G.⁶⁰

RUNNING FASTER: BUILDING TRUSTED 5G ALTERNATIVES TO COMPETE

Competing effectively with China on 5G will require more than just hindering the advance of Chinese ICT firms, though this is a critical component of opening up space for U.S., Japanese, and other trusted vendors to compete in third-country markets. Companies like U.S.-based Infinera, which makes packet optical transmission equipment and competes directly with Huawei, appear to be benefiting already. CEO Tom Fallon stated in mid-2020 that “in the medium term, I think there’s going to be significant opportunity for true replacement of Huawei networks,” a view that some other 5G market analysts appear to share.⁶¹ Indeed, Huawei and ZTE have

⁵⁸ Linda Hardesty, “Delisting of China Telcos from NYSE Likely to Stand, Say Wiley Rein Lawyers,” *Fierce Wireless*, January 12, 2021 [~ https://www.fiercewireless.com/regulatory/delisting-china-telcos-from-nyse-likely-to-stand-say-wiley-rein-lawyers](https://www.fiercewireless.com/regulatory/delisting-china-telcos-from-nyse-likely-to-stand-say-wiley-rein-lawyers); and Jeff Cox, “Five Takeaways from Janet Yellen’s Treasury Confirmation Hearing,” *CNBC*, January 19, 2021 [~ https://www.cnbc.com/2021/01/19/five-key-takeaways-from-janet-yellens-treasury-confirmation-hearing.html](https://www.cnbc.com/2021/01/19/five-key-takeaways-from-janet-yellens-treasury-confirmation-hearing.html).

⁵⁹ Kohda Satoru, “Following the U.S. Lead: Japan Revises Its Foreign Investment Rules,” *Nippon.com*, May 29, 2020 [~ https://www.nippon.com/en/in-depth/d00565](https://www.nippon.com/en/in-depth/d00565).

⁶⁰ Roberto Saracco, “What about 7G?” *IEEE, IEEE Future Directions*, March 23, 2019 [~ https://cmte.ieee.org/futuredirections/2019/03/23/what-about-7g](https://cmte.ieee.org/futuredirections/2019/03/23/what-about-7g).

⁶¹ Mike Dano, “It Looks Like Trump Is Beating Huawei,” *Light Reading*, August 6, 2020 [~ https://www.lightreading.com/security/it-looks-like-trump-is-beating-huawei/a/d-id/763019](https://www.lightreading.com/security/it-looks-like-trump-is-beating-huawei/a/d-id/763019).

also lost market share in cellular equipment to Ericsson and Nokia since the U.S. campaign to stigmatize the firms entered into force, and Nokia picked up a \$700 million contract from British Telecom after the United Kingdom moved to divest itself from Huawei equipment.⁶²

An effective, competitive strategy, however, will also require U.S.-Japan cooperation on technology and innovation.⁶³ In recent years, both states have begun exploring ways to enhance cooperation on 5G even as they shift more attention to the development of 6G ICT and promote vendor diversity. In September 2020, at the U.S.-Japan Policy Cooperation Dialogue on the Internet Economy, Washington and Tokyo agreed not only to “continue coordination in international fora on 5G network security and the development of principles for open and interoperable networks” but also to “enhance cooperation on Beyond 5G (6G) technologies including research, development, and international standards.” Their joint statement referred to the importance of promoting vendor diversity in the 5G network, highlighting “the value of transparent, open, and interoperable 5G network architecture to support security and vendor diversity.”⁶⁴ Compared to the 2019 dialogue, which focused on promoting reliable 5G networks, the 2020 joint statement placed greater emphasis on enhancing bilateral coordination on 6G technology development. Accelerating 6G development could be a game-changing move for the United States and Japan, as well as the global 5G marketplace. To cooperate effectively in this area, the two states face the challenge of reconciling definitions and component technologies of 6G at the same time that they promote reliable 5G networks as a bridge to the 6G future.

For its part, the Japanese government is proactively promoting the development of 6G as a strategy for responding to the current oligopolistic 5G market structure. In its June 2020 document “Beyond 5G Promotion Strategy,” Tokyo expressed its intent to support R&D and standardization for 6G technologies that it expects will launch around the 2030s.⁶⁵ The government’s goal is to roll out initial advanced 6G technology at the World

⁶² Stu Woo and Dan Strumpf, “Huawei Loses Cellular-Gear Market Shares Outside China,” *Wall Street Journal*, March 7, 2020 ~ https://www.wsj.com/articles/huawei-loses-cellular-gear-market-share-outside-china-11615118400?mod=hp_lead_pos5.

⁶³ For another pair of authors who make this argument, see James L. Schoff and Akei Ito, “Competing with China on Technology and Innovation,” Carnegie Endowment for International Peace, October 10, 2019.

⁶⁴ “Joint Press Statement on the 11th U.S.-Japan Policy Cooperation Dialogue on the Internet Economy,” Ministry of Internal Affairs and Communications (Japan), Press Release, September 25, 2020 ~ https://www.soumu.go.jp/main_content/000708222.pdf.

⁶⁵ Ministry of Internal Affairs and Communications of Japan, “Beyond 5G Promoting Strategy (Overview),” June 2020 ~ https://www.soumu.go.jp/main_sosiki/joho_tsusin/eng/presentation/pdf/200414_B5G_ENG_v01.pdf.

Expo 2025 in Osaka. To achieve that goal, the Ministry of Internal Affairs and Communications launched a “Beyond 5G Promotion Consortium” on December 18, 2020, to boost public-private cooperation in R&D for 6G by supporting demonstration projects and holding international conferences to share best practices. It also developed a “Beyond 5G New Business Strategy Center” to accelerate the acquisition of IP and spread global standards for 6G among industry, academia, and governments.

In December 2020 the Japanese government allocated 50 billion yen (approximately \$483 million) for 6G R&D. Of that amount, 30 billion yen will be allocated to establish a new fund through the National Institute of Information and Communications Technology (NICT) focused on supporting 6G R&D by private companies and universities, while the remaining 20 billion yen will be used to build cutting-edge test facilities that companies can use for 6G R&D. During a visit to the NICT on December 23, 2020, Prime Minister Suga pledged support for the practical use and overseas expansion of 6G technology.⁶⁶ Indeed, in the last year alone, Japan has established an overall 6G technology development strategy, a strategic institutional body for industry-academia-government collaboration, and a funding system for 6G R&D.

The U.S. government has also signaled interest in 6G technologies and openness to international cooperation. On March 23, 2020, Congress passed the Secure 5G and Beyond Act, which requires the president to develop a strategy that “shall (1) ensure the security of 5G wireless communications systems and infrastructure within the United States; (2) assist mutual defense treaty allies, strategic partners, and other countries in maximizing the security of 5G systems and infrastructure; and (3) protect the competitiveness of U.S. companies, privacy of U.S. consumers, and integrity of standards-setting bodies.”⁶⁷ Furthermore, in January 2021, the FY 2021 National Defense Authorization Act went into effect. Section 9202 provides funding for the Department of the Treasury to establish a “public wireless supply chain innovation fund” and allocates funds for a “multilateral telecommunications security fund.”⁶⁸

⁶⁶ “‘6G’ ‘ryoshiango’ ato-oshi Suga shusho” [“6G” and “Quantum Cryptography” Boosted by Prime Minister Suga Yoshihide], *Jiji Press*, December 23, 2020 ~ <https://www.jiji.com/jc/article?k=2020122300778&g=pol>.

⁶⁷ U.S. Congress, Senate, *Secure 5G and Beyond Act of 2020*, S. 893, 116th Cong. (March 23, 2020) ~ <https://www.congress.gov/bill/116th-congress/senate-bill/893>.

⁶⁸ “William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021,” HR 6395, 116th Cong. (January 1, 2021) ~ <https://www.govinfo.gov/content/pkg/BILLS-116hr6395enr/pdf/BILLS-116hr6395enr.pdf>.

Incentivizing the development of trustworthy 5G devices and equipment will not be enough to meet the 5G challenge from China if they are not promoted effectively in foreign markets. To help trusted ICT spread, the United States and Japan will likely need to join other like-minded partners—foremost among them the European Union, India, South Korea, Taiwan, and the UK—to craft strategies to support and promote trusted 5G technologies. Already some of the key pieces were put in place by the Trump administration, and, as of this writing, such programs either have been retained or are under review by the Biden administration. These include the following:

- In partnership with its counterparts from Japan and Australia, the State Department launched the Blue Dot Network on development finance. It also developed the Clean Networks Initiative and Digital Connectivity and Cybersecurity Partnership, which focus on financing and providing advisory assistance related to information architectures.
- The U.S. International Development Finance Corporation established the 2018 Better Utilization of International Lending for Development (BUILD) Act to provide alternatives to China’s subsidized infrastructure exports.
- The U.S. Export-Import Bank established a new program initiative on “China and Transformational Exports” to help the United States compete with the PRC across eleven key strategic technologies and services, among them 5G wireless communications equipment.⁶⁹

Embodying the U.S.-Japan partnership to counter China’s advances in 5G, the Japanese Ministry of Economy, Trade and Industry and Ministry of Finance and the U.S. Department of the Treasury signed the “Memorandum of Cooperation on Strengthening Energy and Infrastructure Finance and Market Building Cooperation” in February 2020. In that document, the two sides confirmed their intent to “further promote cooperation in energy and infrastructure finance and market building in the Indo-Pacific region.”⁷⁰

⁶⁹ U.S. Department of State, *A Free and Open Indo-Pacific: Advancing a Shared Vision* (Washington, D.C., November 2019) ≈ <https://www.state.gov/a-free-and-open-indo-pacific-advancing-a-shared-vision>; and “Overview: Program on China and Transformational Exports,” U.S. Export-Import Bank, Fact Sheet, June 11, 2020 ≈ <https://www.exim.gov/who-we-serve/external-engagement/china-and-transformational-exports-program/fact-sheet>.

⁷⁰ “Memorandum of Cooperation on Strengthening Energy and Infrastructure Finance and Market Building Cooperation Concluded between Japan and the United States,” Ministry of Economy, Trade and Industry (Japan), Press Release, February 4, 2020 ≈ https://www.meti.go.jp/english/press/2020/0204_003.html.

In addition, Japan has taken the lead on strengthening infrastructure financing for members of the Association of Southeast Asian Nations (ASEAN). In April 2020 the Japanese minister of economy, trade and industry, Hiroshi Kajiyama, and the Vietnamese minister of industry and trade, Tran Tuan Anh (representing the 2020 ASEAN chair), issued a joint statement on initiatives to promote economic resilience. Noting that Japan is ASEAN's second-largest external source of FDI and fourth-largest trading partner, both ministers affirmed the goal of "aiming to build resilient supply chains that will enable businesses to achieve a better balance between both risk management and cost competitiveness" and promised that "ASEAN and Japan will promote upgrading and diversification of production bases using digital technology."⁷¹ Combined with steps to expel and stigmatize untrusted Chinese technology firms, such moves to develop reliable and competitive technology alternatives will significantly advance an allied 5G ICT competition strategy. A final step, however, involves shaping international norms that support privacy, promote a fair economic playing field, and preserve national security.

PUTTING THE FIX IN ACROSS MARKETS AND INSTITUTIONS

To counter the threats posed by China's 5G ICT firms, it is crucial that the United States and Japan remove Chinese 5G technologies from their domestic networks and restrict PRC firms' access to critical inputs while building and promoting trusted alternatives. However, even these steps are insufficient to constitute a complete strategy. The final leg of a competitive response involves steps that restructure markets, entice partners to adopt similar practices, and enforce international norms that protect user data while preserving national security from threats posed by firms that ultimately answer to the Chinese authorities.

Chinese ICT firms have benefited significantly from the vendor lock-in that occurs after countries adopt their proprietary, vendor-specific (or "black box") products, making it costly and difficult to seek alternatives. Japan has taken the lead globally on promoting vendor diversity by advocating for an open standards approach to ICT, often referred to as the Open Radio Access Network, and for more virtualized network technology.⁷² O-RAN allows for

⁷¹ "ASEAN-Japan Economic Ministers' Joint Statement on Initiatives on Economic Resilience Formulated," Ministry of Economy, Trade and Industry (Japan), Press Release, April 22, 2020 ~ https://www.meti.go.jp/english/press/2020/0422_001.html.

⁷² "Japan Pushes the O-RAN Alliance," Akihabara News, December 21, 2020 ~ <http://akihabarnews.com/japan-pushes-the-o-ran-alliance>.

a wide variety of companies' software to participate in 5G networks with the promise of reducing overall investment and operating costs. This is largely achieved by deploying common, vendor-neutral ("white box") equipment or proprietary hardware with open-standard interfaces, allowing for a more diverse ecosystem of 5G technology vendors. In addition, advances in computing capabilities in recent years have enabled more network functions to be performed "virtually" through software deployed on general-purpose systems. This broader trend of virtualization also contributes to reducing vendor lock-in. O-RAN in conjunction with virtualized network technologies empowers 5G consumers by providing them with the ability to revisit their choice of providers after an initial investment—an approach that would undermine the current models actively exploited by PRC wireless equipment vendors.

The black-box approach to 5G technology favored by Huawei and ZTE could be undermined if the allies successfully promote O-RAN organizations such as the O-RAN Alliance. That group, formally incorporated in 2018, is a "worldwide community of mobile network operators, vendors, and research and academic institutions" whose mission is "to re-shape the RAN industry towards more intelligent, open, virtualised and fully interoperable mobile networks [that] will enable a more competitive and vibrant RAN supplier ecosystem with faster innovation to improve user experience."⁷³ U.S. firms AT&T, Bell, Dish Network, U.S. Cellular, and Verizon all participate in the organization, and as of late 2020, with the addition of Rakuten Mobile, all four of Japan's major mobile telecommunications providers (Rakuten plus NTT DoCoMo, KDDI, and SoftBank) have joined as well.⁷⁴ Rakuten, which operates virtualized 4G nationwide in Japan, has taken steps to build a fully virtualized 5G network. It has also started to develop O-RAN 5G radio equipment with Japan's NEC and construct 5G virtualized RAN software with U.S. mobile network builder AltioStar Networks.⁷⁵ Moreover, Rakuten is promoting O-RAN overseas. In September 2020, Rakuten Mobile and Telefónica, a Spanish mobile operator, announced that they had signed a memorandum of understanding on jointly developing O-RAN architecture,

⁷³ "About O-RAN Alliance," O-RAN Alliance ~ <https://www.o-ran.org/about>.

⁷⁴ "Membership," O-RAN Alliance ~ <https://www.o-ran.org/membership>. It is worth noting that China's telecommunications service providers—China Mobile, China Telecom, and China Unicom—are also part of the O-RAN Alliance, though its original equipment manufacturers, such as Huawei and ZTE, are not.

⁷⁵ "Rakuten Mobile and NEC Begin Production of Open RAN 5G Radio Equipment," NEC, March 24, 2020 ~ https://www.nec.com/en/press/202003/global_20200324_02.html; and "Rakuten Mobile and AltioStar to Launch World's First Cloud-Native, Container-Based 5G Radio Access Network Solution," AltioStar, February 27, 2020 ~ https://www.altioStar.com/5g_cloud_native.

and in November 2020, Rakuten CEO Mikitani Hiroshi unveiled his firm's updated business plan for 5G, which focuses on further overseas expansion of virtual network technology.⁷⁶

NEC's O-RAN technology is drawing attention from the UK, which has been interested in software-defined open architecture for 5G networks since concerns were first raised about Huawei. Since moving to eliminate Huawei's 5G equipment in its networks, the UK has been seeking cooperation with firms from Japan and elsewhere, and the Boris Johnson administration has reportedly explored using NEC and Fujitsu as alternative suppliers to Huawei.⁷⁷ On November 30, 2020, the UK government and NEC announced that they had launched the "NeutrORAN" project, which will introduce innovations to deploy 5G O-RAN within the UK in 2021.⁷⁸ The government's embrace of NEC in its 5G O-RAN trial project will support competition across RAN suppliers, where Huawei, Ericsson, and Nokia currently dominate.⁷⁹ NEC will also build a Global O-RAN Center of Excellence in the UK.

Pursuing O-RAN and virtualized technologies could also deliver benefits for U.S. and Japanese 5G network supply-chain firms. In the words of James Lewis, the five biggest companies that sell telecom network technologies—Ericsson, Huawei, Nokia, ZTE, and Samsung—"sit atop multinational supply chains for critical components that are largely American and Japanese."⁸⁰ Like its Japanese counterpart, the U.S. government is paying growing attention to the importance of the O-RAN initiative. At the Prague 5G Security Conference in September 2020, FCC chairman Ajit Pai emphasized the importance of "close collaboration with international partners and industry to advance 5G security and promote 5G vendor diversity."⁸¹ More recently, in November 2020, the U.S. House of Representatives unanimously passed the Utilizing Strategic Allied (USA) Telecommunications Act, appropriating \$750 million for accelerating 5G O-RAN development and deployment over

⁷⁶ "Rakuten Mobile and Telefónica Sign MOU to Cooperate on OpenRAN," Rakuten Mobile, September 16, 2020 ~ https://corp.mobile.rakuten.co.jp/english/news/press/2020/0916_01.

⁷⁷ "UK Asks Japan for Help with 5G as Alternative to Huawei," *Nikkei Asia*, July 18, 2020 ~ <https://asia.nikkei.com/Business/Telecommunication/UK-asks-Japan-for-help-with-5G-as-alternative-to-Huawei>.

⁷⁸ "NEC Participates in the UK Government-Led 5G Open RAN Trial Program with NeutrORAN Testbed," NEC, November 30, 2020 ~ https://www.nec.com/en/press/202011/global_20201130_02.html.

⁷⁹ Yuka Koshino, "How Japan Can Help the U.K. Meet Its China Challenge," *Japan Times*, January 21, 2021.

⁸⁰ Lewis, "Can Phones Race?"

⁸¹ Ajit Pai, "Remarks by FCC Chairman Ajit Pai to the Prague 5G Security Conference," FCC, September 24, 2020 ~ <https://www.fcc.gov/document/fcc-chairman-ajit-pai-prague-5g-security-conference>.

the next ten years.⁸² The bill then received two readings by the Senate, where sponsors added an additional \$500 million for 5G network security and multilateral adoption of O-RAN-based 5G solutions that do not originate from China.⁸³

Although O-RAN promotes market competition by encouraging multiple vendors to enter the 5G network and reduces capital investment by virtualized technology, the concept is still in its early stages. The market share of base stations that support O-RAN was less than 1% at the end of 2020.⁸⁴ Additionally, there are challenges associated with the scalability of open and virtualized RAN technologies, which to date have been limited to regional and local deployments.⁸⁵ Another complicating factor is that the leading European 5G firms, Nokia and Ericsson, have benefited from the lock-in features of the current oligopolistic market structure and thus may lobby against any shift to a new, open interface approach. Finally, some experts warn that even if Huawei and ZTE were blocked, China could conceivably use the participation of the more than 40 Chinese ICT firms in the O-RAN Alliance as an alternative approach to setting standards and breaching networks.⁸⁶

Still, the “China reckoning” that Kurt Campbell and Ely Ratner wrote about in mid-2018 has hardened attitudes toward the PRC in the United States. This trend has also been occurring abroad, suggesting fertile ground for a competitive strategy toward China if executed skillfully in tandem with allies and partners.⁸⁷ Indeed, in 2019, Campbell and Jake Sullivan, now national security adviser, argued for working with “like-minded nations to define a new set of standards on issues that the World Trade Organization does not currently address, from state-owned enterprises to indigenous innovation policies to digital trade. Ideally, these standards would connect Asia and

⁸² U.S. Congress, “USA Telecommunications Act,” HR 6624, 116th Cong. (April 24, 2020) ~ <https://www.congress.gov/bill/116th-congress/house-bill/6624>.

⁸³ Kelly Hill, “Senate Bill Would Put \$1.25B in Play for 5G O-RAN R&D, Security,” RCR Wireless News, January 15, 2021 ~ <https://www.rcrwireless.com/20200115/5g/senate-bill-would-put-1-25b-in-play-for-5g-o-ran-security-rd>.

⁸⁴ “Huawei Strengthens Leadership in RAN Market,” Telecomlead, December 7, 2020 ~ <https://www.telecomlead.com/telecom-equipment/huawei-strengthens-leadership-in-ran-market-98012>.

⁸⁵ Martijn Rasser and Ainikki Riikonen, “Open Future: The Way Forward on 5G,” Center for a New American Security, July 28, 2020.

⁸⁶ Linda Hardesty, “Irony Alert: What If China Taps Open RAN to Breach Networks?” Fierce Wireless, December 17, 2020 ~ <https://www.fiercewireless.com/tech/irony-alert-what-if-china-taps-open-ran-to-breach-networks>.

⁸⁷ Kurt M. Campbell and Ely Ratner, “The China Reckoning,” *Foreign Affairs*, March/April 2018. Ely Ratner is now special assistant to the secretary of defense on China.

Europe...[in a] rules-setting initiative of market democracies.”⁸⁸ Echoing this proposal, Melanie Hart, now in the State Department and Kelly Magsamen, now serving as chief of staff to Secretary of Defense Lloyd Austin, argued together in 2019 that the United States should lead a “global effort among democratic nations to adopt common governance principles for managing broadcast traffic in the digital era.”⁸⁹

In fact, Washington and Tokyo have already teamed up in their efforts to reach out to third countries to promote reliable 5G networks and norms. In November 2020, for example, at the conclusion of the Japan-U.S.-Brazil Exchange, the three countries released a joint statement that affirmed their commitment to ensure “a secure, trusted, and vibrant communication network ecosystem and to develop a common approach to the deployment of transparent and secure 5G networks.”⁹⁰ Separately, the EU has reportedly expressed hopes that it can build a “tech alliance” on 5G with the United States.⁹¹ Security ties between Japan and Europe represent a case of “allies growing closer” in recent years under the pressure of strategic competition with China, a development that suggests that establishing a trilateral U.S.-Japan-Europe approach to national security technology cooperation could be a logical extension of such trans-Atlantic cooperation.⁹² And at the Quad summit meeting on March 12, 2021, the United States, Japan, Australia, and India agreed to coordinate policies on “critical and emerging technologies,” including those for telecommunications.⁹³

The United States and the UK have recently announced that they would promote Japanese equipment for their 5G networks.⁹⁴ In May 2020 the UK, host country for the 2021 G-7 summit held in June, called for a “D-10” grouping comprising ten democratic countries (the G-7 member states, plus Australia, the South Korea, and India, which the UK invited to attend the summit) to seek alternatives to Huawei for 5G equipment. Such a move could also involve the setting of global norms and standards

⁸⁸ Kurt M. Campbell and Jake Sullivan, “Competition without Catastrophe,” *Foreign Affairs*, September/October 2019.

⁸⁹ Melanie Hart and Kelly Magsamen, “Limit, Leverage, and Compete: A New American Strategy on China,” Center for American Progress, April 3, 2019.

⁹⁰ U.S. Department of State, “Joint Statement on the U.S., Japan, Brazil Exchange,” November 10, 2020 ~ <https://2017-2021.state.gov/joint-statement-on-the-japan-u-s-brazil-exchange/index.html>.

⁹¹ Giannis Seferiadis with Ryhannon Bartlett-Imadegawa, “EU Hopes for ‘Tech Alliance’ with Biden after Trump Huawei 5G Ban,” *Nikkei Asia*, January 12, 2021.

⁹² Jeffrey W. Hornung, “Allies Growing Closer,” RAND Corporation, 2020.

⁹³ White House, “Fact Sheet: Quad Summit,” March 12, 2021 ~ <https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/12/fact-sheet-quad-summit>.

⁹⁴ “U.S., Britain to Promote Japanese Equipment for 5G Networks,” *Japan News*, January 11, 2021.

for such technologies.⁹⁵ Former State Department Policy Planning Staff officials Siddarth Mohandas and Edward Fishman have argued that a D-10 should focus on “jointly developing 5G networks that don’t rely on Chinese technology.”⁹⁶ Such a forum would also fit naturally with Biden’s plans to hold a global summit for democracy early in his first term, and could build on the March 2021 Quad dialogue.

As a final step, U.S. and Japanese diplomats are likely to continue to work with allies and partners to promote the adoption of safe and reliable O-RAN standards and virtualized technology, as well as to compete with Chinese ICT. As they do so, they will need to focus on competing for influence in multilateral institutions and groupings, including the International Telecommunications Union (ITU) and the 3rd Generation Partnership Project (3GPP), an international standards development organization that sets specifications for 5G technology.⁹⁷ Japan—with its substantial soft power and normative influence, and lacking some of the diplomatic baggage of the United States following allegations of surveillance of allies—is well-positioned to help promote clean technology norms. In fact, the country has been increasing its efforts to promote ICT norms in recent years. For example, when Japan hosted the G-20 Summit in Osaka in 2019, then prime minister Abe outlined the concept of “data free flow with trust” (DFFT), highlighting the essential role of free data flows in rapidly developing the digitalization of society. Japan also launched the G-20 Osaka Track, a process of promoting international rule-making for the free flow of data and trade-related aspects of electronic commerce at the Leaders’ Special Event on the Digital Economy.⁹⁸ The Suga administration has committed to continuing the Osaka Track and DFFT as solutions to building reliable digital trade.⁹⁹ Japanese ambassador to the United Nations Kimihiro Ishikane is likely to find an ally in his U.S. counterpart Linda Thomas-Greenfield. Ambassador Thomas-Greenfield noted in her confirmation hearing that she intends to use her office to position the

⁹⁵ “UK Seeks Alliance to Avoid Reliance on Chinese Tech: The Times,” Reuters, May 28, 2020.

⁹⁶ Siddarth Mohandas and Edward Fishman, “A Council of Democracies Can Save Multilateralism,” *Foreign Affairs*, August 3, 2020.

⁹⁷ “About 3GPP,” 3GPP ~ <https://www.3gpp.org/about-3gpp>.

⁹⁸ Ministry of Foreign Affairs (Japan), “G20 Osaka Summit (Summary of Outcome)” ~ https://www.mofa.go.jp/policy/economy/g20_summit/osaka19/en/overview.

⁹⁹ “Keynote Speech by Foreign Minister Motegi at the 2nd Tokyo Global Dialogue: Japan’s Foreign Policy toward the Post-COVID-19 World,” Ministry of Foreign Affairs (Japan), February 25, 2021 ~ https://www.mofa.go.jp/fp/pp/page3e_001109.html.

United States to compete with Chinese diplomats for influence in multilateral organizations, including international standards-setting bodies for ICT.¹⁰⁰

By exporting technologies favorable to digital authoritarianism and institutionalizing its own norms and standards in international forums, China is trying to establish itself as “the new Big Brother,” a report from the Foreign Relations Committee Democratic Staff warned in mid-2020.¹⁰¹ China has been actively promoting its own ICT norms, including the idea of cyber sovereignty (*wangluo anquan*), which asserts that each country should have the right to control access to information behind its national boundaries.¹⁰² In the 5G space, Beijing has sought to establish wireless network standards that favor its companies, as reflected in the China Standards 2035 initiative. Indeed, China submitted 830 technical contributions related to wired communications to the ITU in 2019 and has become the fifth-largest contributor to that organization’s budget. It also submitted the largest number of 5G-related proposals to 3GPP in 2019.¹⁰³

Ultimately, if the United States and Japan want to compete effectively with China on 5G, they will need to craft their own national technology strategies and coordinate these by grounding them in a code of shared policies that brings in additional partners to establish broad-based support for ICT norms favoring freedom over authoritarianism.¹⁰⁴ The building blocks for such a coordinated approach are largely already in place via the U.S.-Japan Policy Cooperation Dialogue on the Internet Economy, a forum focused on “promotion of open, interoperable, reliable, and secure fifth generation mobile technologies (5G) networks and services [and] public-private cooperation on the deployment in third countries of digital infrastructure and services.” The dialogue is led

¹⁰⁰ Owen Churchill, “U.S. Ambassador to UN Nominee Linda Thomas-Greenfield Pledges to Counter China’s Authoritarian Agenda,” *South China Morning Post*, January 28, 2021 ~ <https://www.scmp.com/news/china/article/3119530/us-ambassador-un-nominee-linda-thomas-greenfield-pledges-counter-chinas>.

¹⁰¹ Democratic Staff of the Senate Foreign Relations Committee, “The New Big Brother: China and Digital Authoritarianism,” Staff Report, July 21, 2020 ~ <https://www.foreign.senate.gov/imo/media/doc/2020%20SFRC%20Minority%20Staff%20Report%20-%20The%20New%20Big%20Brother%20-%20China%20and%20Digital%20Authoritarianism.pdf>.

¹⁰² Dan Strumpf, “Where China Dominates in 5G Technology,” *Wall Street Journal*, February 26, 2019; and Emily de la Bruyère and Nathan Pizaric, “China’s Next Plan to Dominate Tech Standards,” *Tech Crunch*, April 11, 2020 ~ <https://www.yahoo.com/news/chinas-next-plan-dominate-international-151522824.html?guccounter=1>.

¹⁰³ Hideaki Ryugen and Hiroyuki Akita, “China Leads the Way on Global Standards for 5G and Beyond,” *Financial Times*, August 4, 2020.

¹⁰⁴ See, for example, Martijn Rasser et al., “Common Code: An Alliance Framework for Democratic Technology Policy,” Center for a New American Security, October 21, 2020.

by officials at the director-general level who meet multiple times a year in the working group on the Japan-U.S. Strategic Digital Economy Partnership.¹⁰⁵

Outreach to the private sector on these issues will need to be resourced and sustained, requiring officials with backgrounds in diplomacy, commercial affairs, military issues, development finance, and technology standards to work jointly to articulate values that are common across the liberal international order. Finding commonalities between U.S. law, Japan's proposed DFFT standards, the EU's General Data Protection Regulation, and other frameworks will not be easy.¹⁰⁶ But it will be necessary. Winning the 5G race will require providing the normative, diplomatic, legal, technological, and development finance assistance necessary for firms to compete in third markets against Huawei, ZTE, and essentially the Chinese party-state.

STAYING FOCUSED ON THE 5G LONG GAME

Adam Segal has argued that the most promising strategy that the United States could adopt to compete with China on 5G would be not merely to ban Huawei but also to foster viable alternatives.¹⁰⁷ Kristen Cordell and Kristine Lee have emphasized the importance of “harnessing multilateralism” to craft strong technologies and norms that would work to stigmatize and render less appealing Chinese ICT systems worldwide.¹⁰⁸ And James Schoff and Rika Kamijima-Tsunoda have argued that “the United States and Japan should team up on 5G” as a pathway to developing an allied-centric national security technology policy to compete with China.¹⁰⁹

In this article, we have argued that the approach most likely to succeed in competing with China requires the United States and Japan to cooperate on (1) expelling Chinese 5G firms from U.S. and Japanese markets while restricting their access to imported technology, talent, and financing, (2) building up more viable firms that can compete with Huawei and ZTE worldwide and

¹⁰⁵ Ministry of Economy, Trade and Industry (Japan), “Tenth U.S.-Japan Policy Cooperation Dialogue on the Internet Economy Held,” October 18, 2019 ~ https://www.meti.go.jp/english/press/2019/1018_005.html.

¹⁰⁶ “Data Free Flow with Trust (DFFT): Paths towards Free and Trusted Data Flows,” World Economic Forum, May 2020 ~ http://www3.weforum.org/docs/WEF_Paths_Towards_Free_and_Trusted_Data%20Flows_2020.pdf.

¹⁰⁷ Adam Segal, “The Right Way to Deal with Huawei,” *Foreign Affairs*, July 11, 2019.

¹⁰⁸ Kristen A. Cordell and Kristine Lee, “Harnessing Multilateralism for Digital Development,” Center for a New American Security, January 12, 2021.

¹⁰⁹ James L. Schoff and Rika Kamijima-Tsunoda, “The U.S. and Japan Should Team Up on 5G,” Carnegie Endowment for International Peace, July 23, 2020.

supporting them with relevant policy initiatives, and (3) promoting market restructuring, advancing shared norms on ICT equipment among like-minded states, and embedding such changes in international standards-setting institutions. We describe this approach to winning the 5G race with China as a strategy based on “tripping the competition, running faster, and putting the fix in.”

To be sure, the Biden and Suga administrations confront multiple crises that demand their attention and resources, including the Covid-19 pandemic, domestic political instability in the United States, the ongoing recovery from economic recession, climate change, and the twin challenges of deconstructing systemic racism and defeating domestic terrorism in the United States. The 5G challenge posed by China will also demand the attention of the two administrations because it poses a long-term threat to their citizens’ privacy, overall economic well-being, and national security in a world with an assertive China. If the United States and Japan focus on collaborating to counter China’s national champions, build up their own technology alternatives, and establish ICT norms that favor freedom, they should prove capable of rising to this challenge. 

