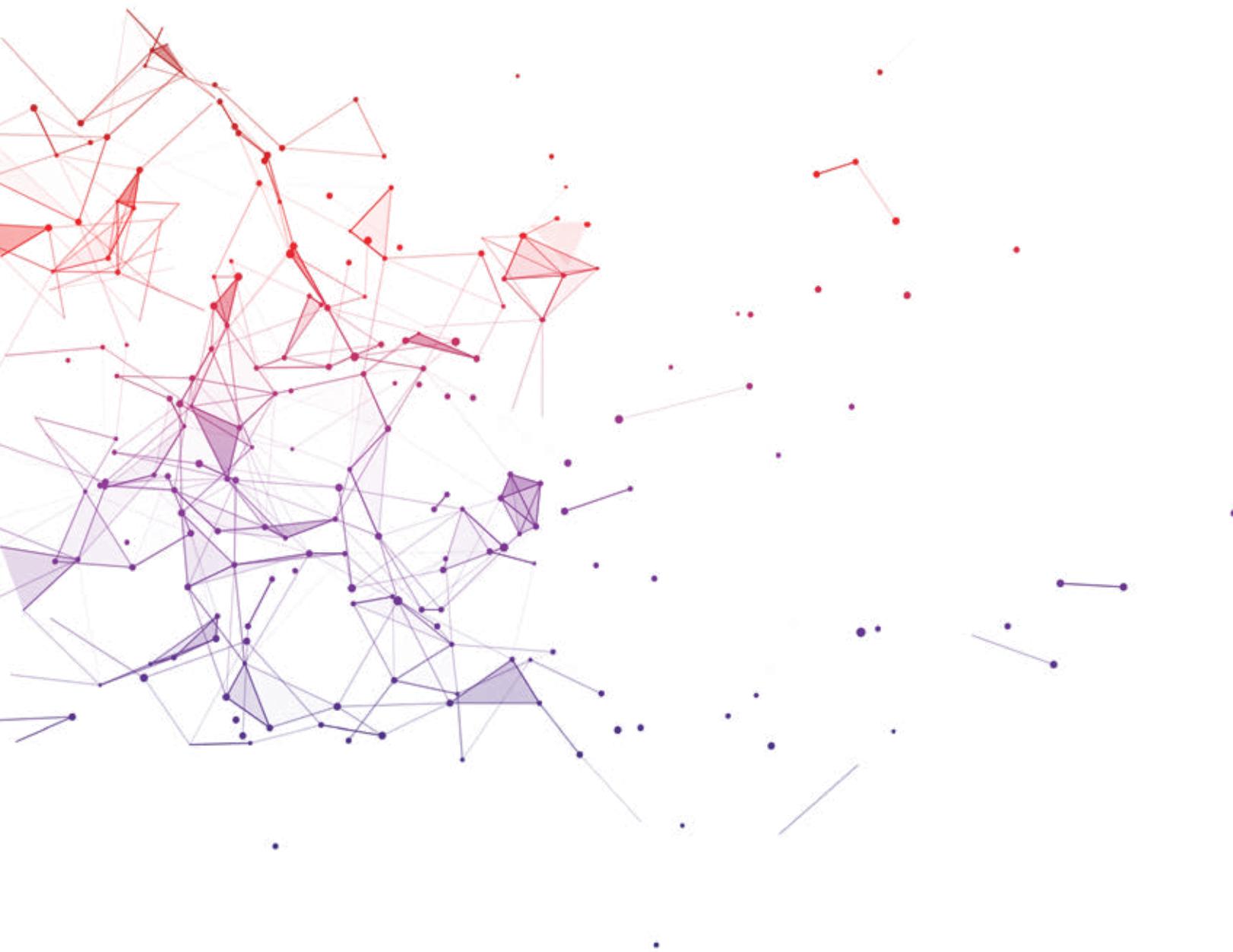


# EXAMINING HUAWEI'S GROWTH & GLOBAL REACH

KEY IMPLICATIONS, ISSUES &  
THE CANADIAN CONNECTION





# FOREWORD

The China Institute at the University of Alberta (CIUA) is pleased to publish this Occasional Paper titled “Examining Huawei’s Growth and Global Reach: Key Implications, Issues and the Canadian Connection.”

This is the first publication by the China Institute on the subject of Huawei, but is one of several publications focused on the topic of Chinese science and technology.

Huawei, the largest privately held company in the People’s Republic of China (PRC), epitomizes the global prowess and growth of the Chinese telecommunications industry. The company is active in almost every country around the globe and its relatively inexpensive and increasingly high quality equipment is used in many of the world’s communications networks. Huawei has also experienced rapid growth in the consumer electronics industry by producing popular smartphones, laptops, and tablets.

Huawei has become an international political saga, as well as a technology story. The arrest of Huawei CFO Meng Wenzhou by the Government of Canada in Vancouver, at the request of the U.S. government, triggered the most serious diplomatic crisis between Canada and China in a generation. This crisis was further complicated by the subsequent arrest of two Canadians in China – an act deemed by Ottawa as retaliation for the arrest of Ms. Meng.

This development came as various Western states, including Canada, debated whether to exclude Chinese firms from participating in the development of their respective 5G networks. Huawei is currently caught in the

crossfire between its role as China’s most prominent global technology company and Western concerns regarding the security implications of Huawei’s equipment in national telecommunications systems. The Huawei story is, in turn, a subset of a broader Western policy debate over how China’s rising technological prowess should be managed.

This paper will highlight Huawei’s current business operations, discuss how it is perceived around the world, shed light on the company’s controversies, and examine the company’s role in Canada. We refrain from making policy recommendations, instead aiming to promote understanding and provide a balanced view of the ongoing global Huawei saga.

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# EXECUTIVE SUMMARY

Meng Wanzhou, the Chief Financial Officer of Huawei, was arrested in Vancouver in December 2018, triggering a diplomatic crisis between Canada and China. Ms. Meng's arrest was made at the request of U.S. authorities and she is currently enveloped in a complex extradition proceeding. In what was widely considered a retaliatory measure, two Canadians were subsequently detained in China. Concurrently, both the U.S and Canada are considering measures which would limit the use of Huawei technology and equipment in their respective 5G telecommunications networks. Critics claim that Huawei's allegedly close relationship with the Chinese state gives rise to national security concerns. Further, they argue that the Canadian government should adopt a more cautious approach to relations with China in general. In contrast, Chinese officials suggest that the national security concerns have been overblown and that American restrictions on Huawei products are unduly punitive.

Huawei, a multinational technology company based in Shenzhen, China, has experienced meteoric rise, in terms of both financial success and global reach, since its founding in 1987. Although Huawei began as a domestic Chinese reseller of foreign-made telephone switches, it invested heavily in internal R&D and quickly shifted to producing independently designed equipment. Huawei's revenue steadily increased throughout the 1990s, eventually leading to expansion into the international market. Today, Huawei is a powerful and internationally recognized brand with global reach. Huawei's primary revenue-driving business units are its consumer division (smartphones, laptops, wearable technology) and carrier division (telecommunications network equipment and services, including 5G technology).

The Huawei case is broadly indicative of the cooling broader bilateral relations between Western countries and China. Since the 2016 U.S. Presidential election, the Trump Administration has been outspoken in its criticism, warning allies of the potential dangers of procurement from Huawei, as well as the implications of a Huawei-developed 5G network. A number of U.S. allies, including New Zealand and Australia (both members of the Five Eyes intelligence alliance), have raised similar concerns and blocked Huawei involvement in future 5G network development. However, developing countries, who tend to view Huawei as a cost-effective provider of quality telecommunications products, do not always share these concerns.

Because of recent controversies surrounding Huawei and the detention of Canadian citizens in China, Huawei has become the subject of significant news coverage and public attention. This media frenzy risks confusion and, in some cases misinformation, regarding Huawei. This paper does not attempt to generate policy recommendations, but rather to provide context and perspective to the issue at hand. Aimed at both the policy community and the general public, this paper seeks to present an overview that charts the path of Huawei from its inception onwards, providing context to inform future discussion and research. The China Institute looks forward to informed and meaningful dialogue on the future of Canada-China relations, including the role that Huawei may or may not play in the development of Canada's telecommunications infrastructure.



# INTRODUCTION

On December 1, 2018, Huawei's Chief Financial Officer Meng Wanzhou was detained by Canadian authorities at the Vancouver International Airport at the request of the U.S. government, triggering a diplomatic crisis between Beijing and Ottawa. Chinese officials have condemned the arrest as arbitrary and called on Canada to release Ms. Meng. The Canadian side affirmed its commitment to the 'rule of law', and noted that the decision to extradite Ms. Meng to the U.S. will be determined by the Canadian legal system. The crisis was further complicated by the subsequent detention of Michael Kovrig and Michael Spavor, two Canadian citizens living in China, broadly considered to be a retaliatory measure. This paper will examine the company at the centre of this controversy.

As this crisis continues to unfold, and in light of the recent influx of public attention directed at Huawei from the West, understanding Huawei has become increasingly important. The aim of this paper is not to judge Huawei's merits, weigh the risks that it may present to Western security, nor to make policy recommendations. It will instead (1) provide an overview of the company's origins, history and growth; (2) highlight Huawei's current business operations; (3) discuss how the company is perceived around the world; (4) shed light on the company's complex set of controversies; and (5) examine the company's complicated (and sometimes controversial) connection to Canada.

This paper examines how Huawei grew from a small Chinese reseller of telephone switches to the world's largest telecommunications equipment provider. The company's

emergence on the global stage has generated mixed reactions that parallel, to some extent, emerging global geopolitical considerations. Concerned about potential risk, a number of countries, including the U.S., Australia, and New Zealand, have curtailed Huawei's operations within their borders, espousing the view that Huawei is a threat to national security and/or working in tandem with the Chinese state - an accusation the company consistently denies. Despite U.S. pressures, countries within the EU have adopted its own approach to Huawei that posits the need to regulate the company in a manner that advances European interests while addressing potential security concerns. In contrast, many developing countries have welcomed Huawei as a provider of affordable equipment as they work to modernize their telecommunications networks.

Huawei is also playing an increasingly important role in Canada despite being a relatively new entrant to the domestic telecommunications landscape. The company supplies equipment and technology for Canadian cellular networks, and provides many top post-secondary institutions with much-needed research funding. Similar to other Western countries, this connection has raised national security concerns and has prompted debate over whether Huawei should be permitted to take part in Canada's 5G network development. The U.S. has pressed Canada significantly on this issue, and regardless of its decision, Canada will undoubtedly face ongoing political and economic ramifications from both Washington and Beijing.

# HUAWEI ORIGINS, HISTORY & GROWTH

Shortly after China began the process of reform and opening up in 1978, the country set out to expand and modernize its telecommunications network. China's reform leaders, after years of disruption, were finally able to "actively promote market forces, allowing the sector to make a mighty contribution to the country's drive towards industrial modernization."<sup>1</sup> The Ministry of Post & Telecommunications (MPT), which controlled China's domestic telecommunications sector, encouraged the importation of foreign technologies, joint ventures with foreign partners, and independent research and development (R&D).<sup>2</sup> This policy directive allowed Chinese companies to both collaborate with and compete against foreign firms, which set the stage for widespread development within the sector.

Against this backdrop, Ren Zhengfei, an ex-PLA-Military Engineer from Guizhou Province, established Huawei Technologies Co., Ltd. in 1987 with a mere CNY21,000.<sup>3</sup> Shenzhen government regulations required private technology companies to have at least "CNY20,000 as registered capital and at least five shareholders" to obtain a local business license. Ren, with only CNY3,000 to his name, pooled capital with a group of initial investors to meet this threshold.<sup>4</sup>

The Shenzhen-based company initially acted as a Chinese sales agent for foreign-made telecommunications equipment, such as private branch exchange (PBX) telephone switches, before developing its own switching technology and beginning to invest heavily in R&D.<sup>5</sup> This shifted Huawei away from foreign reliance and diverged from the conventional industry strategy of pursuing international joint-ventures (IJVs) with foreign firms, which Ren saw as "unwisely handing an advantage to the larger international partner."<sup>6</sup>

The first Huawei-branded product was the BH01, a 24-interface switch that was assembled using outsourced parts. In 1990, Huawei initiated an independent R&D process and launched its first independently designed product, the BH03 switch, which achieved accreditation from the Ministry of Posts and Telecommunications (MPT). In 1992, Huawei stepped into "central office switch" development and launched its JK1000 model the following year. Meanwhile, it began promoting digital solutions in rural China. Rural digital solutions contributed significantly to Huawei's growth in the 1990s.<sup>7</sup> By the end of 1993, Huawei's C&C08 digital telephone switch had become its first major breakthrough, positioning the company "perfectly to ride the wave of China's telecoms-infrastructure boom of the 1990s."<sup>8</sup>

Huawei experienced meteoric growth within the domestic Chinese market, largely thanks to revenue from provinces often overlooked by its competitors. Huawei's sales force initially targeted the remote and rural areas of China, as larger competitors were entrenched in Chinese cities and lacked a rural presence. Huawei, for example, had over 200 employees stationed in Heilongjiang Province in the early 1990s, whereas foreign rival Ericsson had only a handful.<sup>9</sup> Huawei's sales grew from near zero to CNY0.8 billion in 1994 and CNY1.5 billion by 1995, mainly derived from rural markets in China.<sup>10</sup> One commenter even observed that this approach paralleled the "well-known Maoist strategy of first focusing on seizing the countryside, then encircling and conquering cities."<sup>11</sup>

Huawei's international expansion followed a similar path by focusing on emerging and developing markets such as Russia, India, Africa, Southeast Asia, and Latin America. These countries and regions were largely ignored

by existing American and European players.<sup>12</sup> In 1996, Huawei launched its C&C08 switch in Hong Kong, the first step of an international expansion into the global telecommunications market.<sup>13</sup> Huawei soon entered the Russian market and by 2001, its total revenue derived from international sources exceeded US\$100 million.<sup>14</sup> In 1997, Huawei invested over US\$30 million to establish a joint venture with a local company in Brazil, marking the firm's first step into the South American market.<sup>15</sup> Huawei entered the African telecommunications field in 1998, first establishing operations in Kenya and eventually expanding to roughly 40 other African countries.<sup>16,17</sup> In 1999, an R&D centre was established in Bengaluru (formerly Bangalore), India. In 2015, Huawei invested an additional US\$170 million into its Indian R&D hub.<sup>18</sup> In 2001, Huawei established a branch in Bangkok, Thailand. This growth continued throughout the Southeast Asian telecommunications sector.

After gaining significant success in these markets, Huawei began to expand into Europe, Japan and North America. In 2004, Huawei won its first significant contract in Europe, valued at over US\$25 million, with Dutch operator, Telfort.<sup>19</sup> In 2005, Huawei was selected as a preferred 21Century Network (21CN) supplier by British Telecom (BT) to provide multi-service network access (MSAN) components and optical transmission equipment. In 2006,

Huawei became a supplier for Vodafone, another British multinational telecommunications conglomerate.<sup>20</sup> The deal with BT spring-boarded Huawei into the European market. By 2007, the company “was able to secure contracts with all major network operators in Europe” and by 2015, was said to provide around 50% of all European 4G telecommunications equipment.<sup>21</sup>

Interestingly, Huawei (as we know it) almost ceased to exist during this period of rapid international expansion. The company, having endured business troubles, was contemplating entering the growing Chinese real estate sector and shifting away from telecommunications. Motorola nearly purchased Huawei's hardware systems for US\$10 billion during a period of negotiations from 2002-2003.<sup>22</sup> Both sides, having signed a letter of intent and submitted the requisite paperwork, were awaiting final approval before it was quashed by Motorola's incoming Chairman, who “balked at signing off on the deal, as the board fretted over what it saw as a high price for an unknown foreign quantity, with the bulk payable upfront in cash.”<sup>23</sup> If this deal had not been rejected, there “would have been yet another real estate developer in China, but the world would have missed a telecom giant, and the global telecom industry would have taken a different course.”<sup>24</sup>

# CURRENT BUSINESS OPERATIONS

Huawei has since expanded to operate in 170 countries/regions and employs 188,000 people globally.<sup>25</sup> According to the company, roughly half of the world's population uses a telecommunications network supported by some type of Huawei equipment or technology.<sup>26</sup> With a reported US\$107.1 billion in revenue in 2018, up 19.5 % year on year,

Huawei ranks as one of the world's largest information and communication technology (ICT) providers.<sup>27</sup> Huawei's revenue growth over time is illustrated in **Figure 1**, and **Figure 2** outlines the company's 2018 revenue, divided by region.<sup>28 29</sup>

## Huawei's Revenue 2007-2018

(In Billion Yuan)



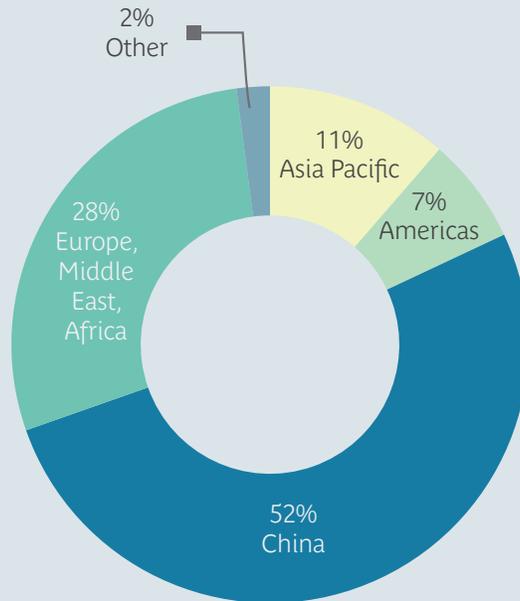
FIGURE 1  
Source: Huawei

FIGURE 2

Source: Huawei

## Breakdown of 2018's Revenue

(By Region)

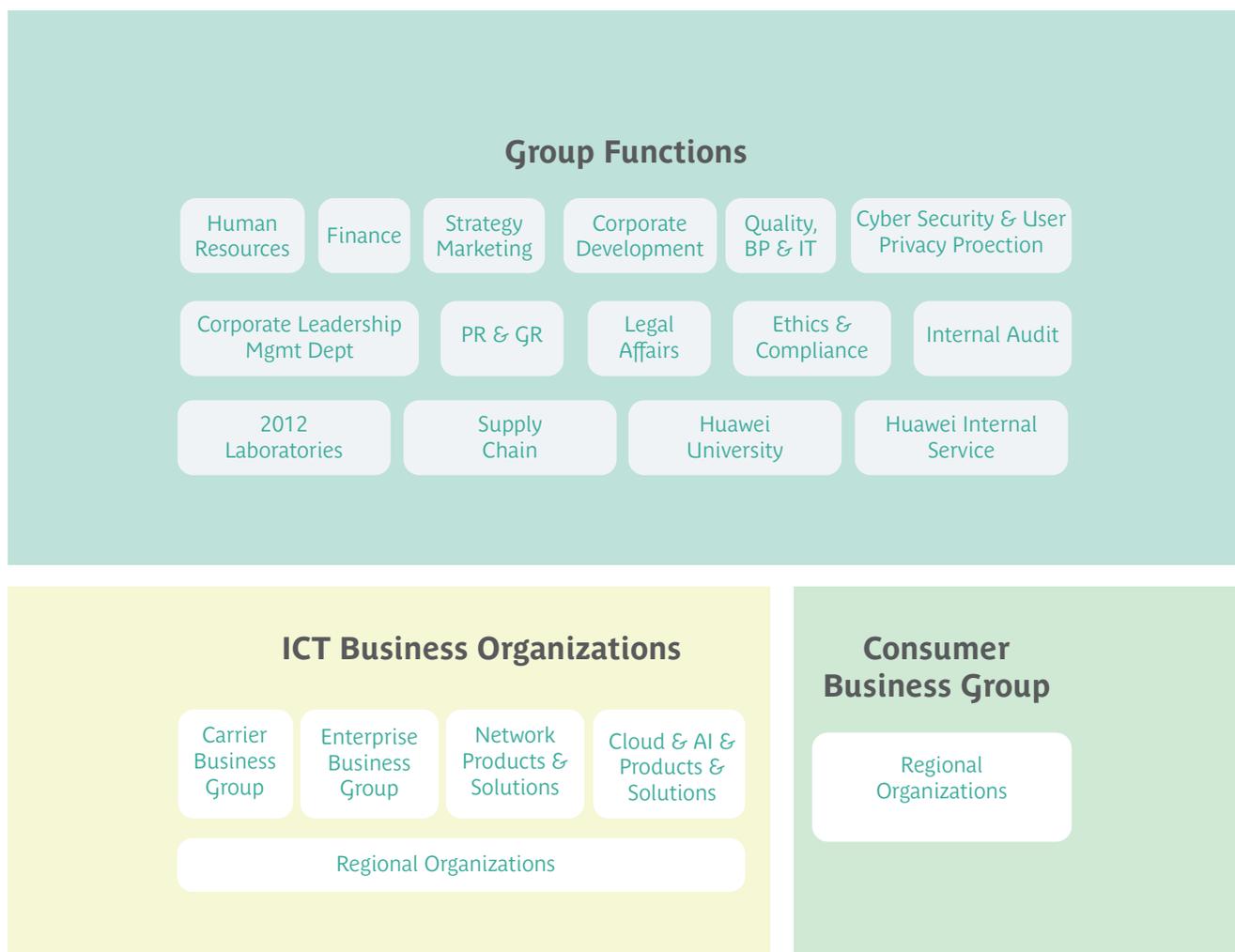


While still headquartered in Shenzhen, the company maintains 16 R&D centres in countries such as Germany, Sweden, the U.S., France, Italy, Russia, India, and Canada, along with around 30 global joint innovation centres. These centres employ over 80,000 people - accounting for 45% of the company's total workforce worldwide.<sup>30</sup> The company's research activities are centred around "fully connected networks, intelligent computing, and innovative devices."<sup>31</sup> Huawei invested CNY101.5 billion in R&D, accounting for 14.1% of total revenue, in 2018.<sup>32</sup> By 2018, Huawei had obtained 87,805 patents, among which 11,125 patents were issued by U.S. patent offices.<sup>33</sup> Huawei is now the world's second largest business solutions provider, ranked second only to Cisco.<sup>34</sup>

Huawei operates across four broad domains: telecom networks, IT, smart devices, and cloud services. Network Products & Solutions and Cloud & AI Products & Services divisions are responsible for "product planning, development, and delivery as well as for building product competitiveness to deliver better user experience and support business success." Huawei's three primary, revenue-driving business groups are: Enterprise, Consumer, and Carrier/Telecommunications.<sup>36</sup> **Figure 3** provides an overview of Huawei's corporate structure.<sup>37</sup>

FIGURE 3

Source: Huawei



Huawei's Enterprise Business group provides corporate products and solutions across a variety of public and private domains, which includes cloud computing, big data, security, campus networks, data centres and information and technology innovation. The Enterprise Business group accounted for 10.3% of Huawei's total revenue in 2018.<sup>38</sup>

Huawei's Consumer Technology group manufactures and develops smartphones, PCs, tablets, wearable technology, and mobile services. Huawei first established its mobile handset department in the early 2000s and released its

first Android Smartphone in 2009. It has grown rapidly to pass Apple Inc. over the second fiscal quarter (April to June) of 2018 as the world's second-largest smartphone seller by shipment volumes.<sup>39</sup> Led by its flagship P20/P20 Pro smartphone models, Huawei's global smartphone market share reached 14.6% in the third fiscal quarter of 2018, second only to Samsung. Driven by the smartphone business, the Consumer Business group stands as the biggest revenue contributor to Huawei, accounting for 48.4% of Huawei's total revenue in 2018.<sup>40</sup>

FIGURE 4

Source: Huawei, Bloomberg Opinion

## Revenue by Business Group



Huawei Carrier provides solutions, products, and services in the realm of telecommunications network technology. The company's product line has evolved to include an array of modern products and services, including 5G technology, wireless networks, fixed networks, cloud core networks, carrier software, IT infrastructure, and network energy.<sup>41</sup> Huawei is now the largest telecommunications equipment provider in the world, passing Swedish rival Ericsson in 2018.<sup>42</sup> Huawei Carrier accounted for 40.8% of Huawei's total revenue in 2018.<sup>43</sup> **Figure 4** illustrates the breakdown of Huawei's overall revenue by business group.<sup>44</sup>

Huawei is poised to grow further as the world shifts toward the next standard for wireless networks, referred to as "5G". The onset of 5G will lead to increased data transfer speeds, enhance data response times, and support more cellular-connected devices - vastly improving the function of modern wireless networks.<sup>45</sup> Existing telecommunications infrastructure in Canada is to be upgraded to meet 5G standards, as will be the case for the networks of most economies. Huawei, as a global leader in the industry, is competing on a global stage to provide next-generation solutions for 5G. Although slightly outpaced by rival Nokia, Huawei has secured roughly forty commercial 5G contracts globally as of April 2019.<sup>46</sup>

# HUAWEI AROUND THE WORLD: WEST VS. EAST?

## AMERICAN PERSPECTIVES & CONCERNS

The emergence of Huawei as a global telecommunications equipment provider has generated mixed reactions. A number of Western states have expressed concerns over the company's growing influence in their telecommunications sector, while less developed countries have largely welcomed Huawei as a provider of affordable equipment that could help modernize their infrastructure. To some extent, the reaction to Huawei's ascendancy parallels geopolitical relations: Western countries that see Beijing as a potential adversary seem more likely to be suspicious of Huawei when compared to states that view China's rise more positively. Intelligence agencies in several Western countries, most prominently the U.S., have warned that Huawei maintains close relations to the Chinese Communist Party and is "effectively an arm of the Chinese government."<sup>47</sup> American concern over Huawei is also bipartisan. Most prominently, Democratic Senator Mark Warner and Republican Senator Marco Rubio have been vocal in their opposition to the company.<sup>48</sup>

The U.S. government, under both President Obama and President Trump, has pressured its allies to curtail Huawei's expansion into their markets. In 2018, the Federal Bureau of Investigation (FBI), Central Intelligence Agency (CIA) and National Security Agency (NSA), all cautioned

Americans against using Huawei products, stressing that the company poses a serious national security risk. FBI Director Christopher Wray stressed that the American government was "deeply concerned about the risks of allowing any company or entity that is beholden to foreign governments that do not share our values to gain positions of power inside our telecommunications networks."<sup>49</sup> The use of Huawei products, he added, provides the Chinese government and/or its affiliates "capacity to maliciously modify or steal information. And it provides the capacity to conduct undetected espionage." These concerns date back to at least 2012, when the U.S. House Intelligence Committee produced a report alleging that Huawei poses a serious security threat to the United States, warning that the company has the ability to spy on Americans on behalf of the Chinese government. The 2012 report "conclud[ed] that the risks associated with Huawei's and ZTE's provision of equipment to U.S. critical infrastructure could undermine core U.S. national-security interests."<sup>50</sup> The U.S. Government, in August 2018, passed a law blocking the use of Huawei equipment in government networks as part of the Defence Authorization Act.<sup>51</sup>

These comments were reiterated by U.S. Vice President Mike Pence during the Munich Security Conference in 2019. Pence stated that the U.S. government would re-think its military relations with countries that use Huawei equipment. He reasoned that "we cannot ensure the defence of the West, if our allies are dependent on the East."<sup>52</sup> Vice President Pence further noted that Huawei is required by Chinese law to "provide Beijing's vast security apparatus with access to any data that touches their networks or equipment." He called upon U.S. allies to "be vigilant and to reject any enterprise that would compromise the integrity of our communications technology or national security systems."<sup>53</sup>

In addition to allegations of posing a threat to national security, Huawei has been accused circumventing American sanctions imposed on the Iranian regime, conspiring to commit bank and wire fraud, violating the International Emergency Economic Powers Act, laundering money and obstructing justice.<sup>54</sup> The U.S. Department of Justice announced the indictment on January 28, 2019, and confirmed that they were seeking the extradition of Huawei CFO Meng Wanzhou from Canada based on the aforementioned charges. Huawei has also been accused of providing North Korea with wireless equipment, directly contravening U.S. export controls on the country.<sup>55</sup>

The Bureau of Industry and Security of the U.S. Department of Commerce also placed Huawei on their “Entity List” in May 2019, a move that restricted Huawei’s access to American technology by requiring licensed approval for purchases.<sup>56</sup> Although the ultimate impact of the decision on Huawei’s global business remains unclear, it was a bold “straight shot” at the company from the Trump Administration.<sup>57</sup> In effect, the move effectively banned Huawei from purchasing from American suppliers. Huawei does not only use indigenous Chinese components. In fact, there are both hardware and software components in Huawei equipment from U.S. and foreign suppliers. As a result, the move had the potential to hurt Huawei by restricting its access to vital American supply chains. American chipmakers Intel, Qualcomm, and Broadcom, along with Google, immediately stopped supplying Huawei with crucial products and components after the decision.<sup>58</sup> The multinational British chip-designer ARM also halted business with Huawei and its chipmaking subsidiary HiSilicon due to the fact that ARM “chip designs include “US origin technology.””<sup>59</sup> Huawei and HiSilicon license these designs for internal manufacturing, meaning that restrictions could disrupt internal manufacturing capacity. Chinese technology executives have warned that restricted access to American technology - including “equipment, materials, IPs and chip design software” - could hinder the development of China’s domestic chip industry.<sup>60</sup>

After initially downplaying the overall impact of the decision, Huawei announced that it had cut internal revenue projections by US\$30 billion for 2019 and expected global smartphone shipments to plunge.<sup>61</sup> American and foreign firms with exposure to Huawei will also feel an impact from the ban. Broadcom, an American chipmaker

that derived 4.3% (roughly \$900 million) of its total revenue from Huawei in the previous fiscal year, provides an illustrative example. It announced that it had downgraded its upcoming annual revenue projection by US\$2 billion. This shift reflects the ban, as well as the broader global economic and political uncertainty arising from the U.S.-China trade dispute.<sup>62</sup> Ripple effects from the embargo were also observed beyond American borders. Tokyo Electron, a massive Japanese semiconductor manufacturer, announced that it would follow the U.S. restrictions, demonstrating how the American move “is ensnaring non-American firms that are not obliged to follow U.S. law.”<sup>63</sup>

However, at a G20 Leaders Summit press conference in Osaka on June 29, 2019, President Trump, in a surprising reversal following a meeting with Chinese President Xi Jinping, announced that U.S. companies would be able to resume regular business with Huawei, although “the decision on whether to take Huawei off the Commerce Department’s entities list would be left to later.”<sup>64</sup> This was later verified by senior U.S. officials, who confirmed that export licenses would be granted to American companies, although equipment connected to American “national security” would still be barred. Larry Kudlow, a senior Trump administration official, said that the U.S. has “opened the door — relaxed a bit, the licensing requirements from the Commerce Department” with respect to American companies selling to Huawei.<sup>65</sup>

This shift in policy was likely made to placate the Chinese side in the on-again, off-again U.S.-China trade talks. Trade negotiations between the two countries had stalled for a number of months but were reenergized at the Summit, in part due to the Trump administration’s mild Huawei concession. President Trump had previously demonstrated a willingness to blend trade concerns with those of national security, stating in May 2019, that “it’s possible that Huawei even would be included in some kind of a trade deal. If we made a deal, I could imagine Huawei being possibly included in some form, some part of a trade deal.”<sup>66</sup> This prospect in itself demonstrates the importance of Huawei’s continued international success to Beijing. The lifting of U.S. sanctions on Huawei is clearly a Chinese priority in U.S.-China trade negotiations.

This approach has irked some American officials, including those who believe the President is placing a trade deal with

China over American national security interests.<sup>67</sup> Senior Republican Senator Marco Rubio of Florida, an outspoken Huawei critic, tweeted that “If President Trump has agreed to reverse recent sanctions against #Huawei he has made a catastrophic mistake. It will destroy the credibility of his administration’s warnings about the threat posed by the company; no one will ever again take them seriously.”<sup>68</sup> Another senior Republican Senator, Trump-allied Lindsay Graham of South Carolina, forewarned “[t]here’ll be a lot of pushback if this is a major concession. If it’s a minor concession, I think it’s part of the overall deal.” There is no clear unified “American” approach to this issue. Even allies of the Trump administration understand the potentially bruising effects of granting concessions to Huawei.

The longer-term results of even limited U.S. restrictions on Huawei are likely to include an accelerated effort to increasingly rely on Chinese domestic component suppliers, reducing over time the vulnerability of Huawei to U.S. sanctions but also reducing U.S. leverage over Huawei. This defensive strategy is likely to be followed by other PRC firms reliant on U.S. inputs. The “China 2025” industrial strategy, which aims to secure Chinese leadership in key technologies by 2025, was sharply criticized by Washington. China 2025 is now being given a lower priority, and it is likely that a program to reduce reliance on U.S. inputs will be quietly implemented.

Joining the U.S., a number of U.S.-allied countries have raised similar concerns. New Zealand and Australia have recently acted to block the use of Huawei equipment in their respective 5G networks, while Japan has barred Huawei from being able to win official public contracts. The Australian government justified its ban of Huawei by emphasizing that “companies that were likely to be subject to extrajudicial directions from a foreign government could present a security risk.”<sup>69</sup> New Zealand’s Government Communications Security Bureau Director-General Andrew Hampton agreed that the company’s growing influence would risk national security, but did not provide further details. However, in February 2019, New Zealand Prime Minister Jacinda Ardern emphasized there is no “final decision here yet”, emphasizing that her government is working to “mitigate the concerns that have been raised.”<sup>70</sup> The Japanese government did not comment on the decision to limit Huawei equipment in Japan, however, chief government spokesperson Yoshihide Suga

emphasized that “cybersecurity is becoming an important issue in Japan. We’ll take firm measures looking at it from a variety of perspectives.”<sup>71</sup>

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## EUROPEAN ATTITUDES & POLICIES

For many European countries, Huawei is an important provider of reliable and inexpensive equipment. Conscious of this, the EU has sought to develop an approach to Huawei that seeks to balance varying European interests, American pressures, and perceived security concerns.

Poland, in January 2019, called for a joint EU-NATO position concerning Huawei, a statement which came days after Polish authorities charged a Huawei employee with espionage.<sup>72</sup> However, Poland stopped short of calling for an outright ban of Huawei, in part due to concerns over cost.<sup>73</sup>

Security officials in the United Kingdom have stated that any Huawei-related security risk could be managed and mitigated without an outright ban.<sup>74</sup> Although a scathing March 2019 British intelligence report (which found evidence of significant security defects in Huawei software and equipment but stopped short of calling for an outright ban<sup>75</sup>) called this conclusion into question, the country successfully implemented a strong system of oversight and risk management that would potentially include barring Huawei equipment from “core” network infrastructure, while permitting involvement in “non-core” technology.<sup>76</sup>

German Chancellor Angela Merkel rejected U.S. pressure over Huawei, emphasizing in March 2019 that Berlin will define its own standards and will not exclude any company.<sup>77</sup> Jochen Homann, the president of Germany’s

network regulator (the Bundesnetzagentur), stated in an April 2019 interview with the Financial Times that no one equipment supplier should, or will, be excluded from 5G development if they meet the requisite security guidelines.<sup>78</sup> Homann added that such a ban would hurt German telecommunications firms already using Huawei technology and inevitably slow the country's 5G rollout. Germany's adoption of strict security standards for future 5G telecommunications development has garnered approval from U.S. officials even though it stops short of a full Huawei ban.<sup>79</sup> It may be that the security standards are so strict that they will represent a de facto ban to Huawei's expansion in German 5G, but it is still too early to know what the effect of these standards will be. The lack of overt U.S. criticism of Germany's latest actions may signal a degree of U.S. content with the German stance.

Hence, the focus for European countries is centred on figuring out how to manage the potential risks the company poses on Europe. To this end, in April 2019, the European Commission called upon member states to assess Huawei's "cybersecurity threats to the 5G infrastructure in their national markets."<sup>80</sup> The results of these assessments will be shared with other member states by the end of the year in order to provide the necessary information to form an EU-wide approach to 5G security. Financial concerns further compound this debate. A June 2019 industry report indicated that a full European ban on Chinese telecommunications vendors would add US\$62 billion to 5G rollout and delay implementation by roughly 18 months.<sup>81</sup> Telecoms operators, if faced with such a ban, would potentially face higher input costs, be forced to replace existing infrastructure, and require new equipment orders. Up to this point, Huawei's operations have rapidly grown in Europe. After the domestic Chinese market, Europe, The Middle East and Africa (EMEA) represent Huawei's second biggest market, accounting for 28.4% of 2018's US\$105 billion total revenue.

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## CONTRASTING ATTITUDES IN THE DEVELOPING WORLD

In the developing world, Huawei is largely viewed positively as a supplier of high quality and affordable products, allowing countries to expand their telecommunications infrastructure. Huawei has championed its ability to work in remote and distant rural environments, especially in Africa and Asia, where other firms may have been reluctant to operate.<sup>82</sup> Experts have noted that the combination of quality and cost of Huawei's products are unrivaled by competitors. Huawei provides reliable 5G equipment that is at least 20-30% less costly than competitors.<sup>83</sup> This price difference is due to a number of factors - Huawei benefits greatly from China's system of relatively low wages, a highly skilled workforce, low interest loans from state banks, and access to hundreds of millions of dollars in government subsidies. According to the Washington Post, the firm received \$222 million in government grants in 2018.<sup>84</sup>

It is this combination of low cost and high quality that many developing countries in particular have welcomed Huawei - including India and the Philippines, whose relations with China are complicated by various geopolitical considerations.<sup>85</sup> India initially vowed to ban Huawei, but later invited the company to conduct 5G trials in the country. The Philippines has also affirmed that Huawei does not pose a security threat to the country. Allan Cabanlong, assistant secretary for Cybersecurity and Enabling Technologies of the Philippine Department of Information and Communications Technology noted that "[r]ight now, there is no scientific evidence on Huawei conducting espionage in the Philippines" emphasizing that "There's no cause for alarm for Huawei as of now."<sup>86</sup> It may be that improved China-Phillipine relations makes Manila unwilling to direct criticism at Huawei, but the low cost of Huawei equipment make it particularly attractive to countries such as the Philippines.

By offering affordable telecommunications equipment, Huawei has helped transform communications infrastructure in a number of developing countries. The expansion of communications technology into rural and sparsely populated areas is key in improving the quality of life for people struggling in poverty. Internet/mobile connectivity allows people access to information, data, online banking, and communication services. A UN report found that increased access to the internet has a positive impact on the livelihood of people living in rural areas, offering “limitless opportunities for sustainable development.”<sup>87</sup> A number of other studies have found that the access to internet/cellular services helps alleviate poverty by eliminating information poverty - “the lack of access to information and knowledge that could improve earnings potential.”<sup>88</sup> A recently published report found that “most sub-Saharan Africans feel positively about the role the internet plays in their country. Majorities say the increasing the internet use has had a good influence on education [79%], the economy [63%], personal relationships [62%] and politics [52%] in their country.”<sup>89</sup>

Huawei has built nearly 70% of Africa’s 4G networks according to Cobus van Staden, a senior China-Africa researcher at the South African Institute of International Affairs, and is currently working with mobile network operators in Kenya and South Africa to conduct first-stage testing for 5G technology.<sup>90</sup> The priority for many African governments is to expand telecommunications networks as a means of alleviating poverty and promoting commercial opportunities for citizens. For example, Huawei’s “compact rural cell towers have brought internet access to remote regions while the M-Pesa cellphone banking system, run on Huawei’s Mobile Money platform, has been lauded for helping millions in East Africa move into the formal financial system.”<sup>91</sup> This has given rise to a new form of digital economy, which plays an increasingly critical role in lifting people from poverty. Huawei appears to be the only company at the moment that is capable of building this infrastructure at such a comparatively low cost.

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## LEGAL DISPUTES

Huawei has also been involved in a number of prominent global legal disputes, further dividing global attitudes towards the company. Cisco Systems filed a lawsuit against Huawei in 2003, accusing the latter of infringing on its copyrights and misappropriating its trade secrets. After a year-and-a-half legal battle, Cisco dropped the Lawsuit in 2004. In 2010, Motorola filed a lawsuit against Huawei, alleging that Huawei had stolen trade secrets. Motorola claimed that technology was illegitimately shared by a former Motorola employee with Huawei’s founder, Ren Zhengfei. In 2011, Huawei filed a lawsuit against Motorola, alleging that the company would have illegally transferred trade secrets to Nokia Siemens through a proposed deal, where Motorola would sell its entire infrastructure business to Nokia. Huawei alleges that the deal would have resulted in the transfer of Motorola employees who possess direct knowledge of “Huawei’s confidential information”. Later in 2011, the two sides issued a joint statement “announcing an end to their feud over sharing trade secrets” and dropped the lawsuit.

In 2011, Huawei filed lawsuits in Germany, France and Hungary against Chinese telecommunications rival ZTE, alleging that the latter “infringed a series of its patents relating to data card and LTE (long term evolution) technologies and illegally used a Huawei-registered trademark on some of its data card products.” In 2011, a day after Huawei filed lawsuits against ZTE in Europe, ZTE filed a lawsuit in China against Huawei for alleged “patent infringement over its fourth-generation LTE (long term evolution) technology.” In 2013, a German court ruled in favor of Huawei, barring ZTE from selling 4G stations in Germany. In 2016, Huawei filed lawsuits against Samsung in both China and the U.S., alleging that Samsung has unlawfully used Huawei technology.<sup>92</sup> Subsequently in 2017, a Chinese court ruled in favour of Huawei, ordering Samsung to pay US\$11.6 million for infringing on Huawei’s cellular technology. Patent infringement suits are hardly rare in the telecommunications industry, where intellectual protection and intellectual property is of primordial importance.

# CRITICISM OF HUAWEI: RESPONSES & PERSPECTIVES

As illustrated in the previous section, Huawei faces pointed global criticism. Recently, the company has stepped up efforts to dispel alleged “mistruths”. Huawei founder and CEO Ren Zhengfei has been especially outspoken. In a recent interview with BBC, Ren accused the U.S. government of trying to undermine the company because of its growing success.<sup>93</sup> He described the arrest of his daughter Meng Wanzhou “as politically motivated”. Ren stressed that “the world cannot leave us because we are more advanced. Even if they [the U.S.] persuade more countries not to use us temporarily, we can always scale things down a bit.” He vehemently denies that Huawei spies for the Chinese state, stating “[o]ur company will never undertake any spying activities. If we have any such actions, then I’ll shut the company down.” Ren further stated “If the lights go out in the West, the East will still shine. And if the North goes dark, there is still the South. America doesn’t represent the world. America only represents a portion of the world.”

Ren affirmed his company’s commitment to moving forward regardless of political opposition in the U.S.. In May 2019, following the U.S. Government’s decision to blacklist Huawei and cut it off “from the U.S. software and components it needs to make its products”, Ren vowed to overcome the impact of this decision. He further stressed that the company is capable of finding alternative solutions and increasing self-reliance by either “ramp[ing] up its own chip supply or find[ing] alternatives to keep its edge in smartphones and 5G.”<sup>94</sup>

He stressed that Huawei is a large organization with established rules and procedures and is committed to respecting the laws of the countries where the company operates. Huawei also denies accusations that it is an

‘arm of the (Communist Party of China, “CPC”), stressing that the company is privately owned and operated. The company acknowledges that “there is a communist party branch in Huawei”, but stresses that “there is one in Walmart, Nokia, Samsung and presumably BHP, Rio Tinto and any other large company operating in China.”<sup>95</sup> The company affirms that the Party branch has no say in its operations. The CPC branch, according to Huawei, “meets in non-working hours and looks after staff social issues and activities”, and that it is not involved in day-to-day business operations.

It should be noted that such a relationship between a private Chinese company and the ruling Communist Party is not unique to Huawei in particular. It is possible that some of the CPC’s Western critics overplay the significance of a CPC cell within Huawei. However, it is just as likely that, as with any major Chinese corporation, government and party views may be conveyed directly to senior management through the Party branch or directly to individual senior executives, many of whom are likely to have CPC party membership.

The relationship between the Chinese state and the Chinese private sector further complicates this issue. China’s privately owned companies play an “important role in China’s economy, contributing more than 50 percent of tax revenue, 60 percent of GDP, 70 percent of technological innovation, 80 percent of urban employment and 90 percent of new jobs and new firms.”<sup>96</sup> The private sector has contributed greatly to China’s meteoric economic rise, spurred on by free-market economic policies and favourable access to capital. China’s internal business environment has, however, transformed numerous times in modern history by “[swinging] between authoritarian

Communist control and a freewheeling capitalism where almost anything could happen.”<sup>97</sup> There is evidence to suggest that China, under the leadership of President Xi Jinping, is broadly moving towards the former. For instance, private companies in 2016 received only 11% of new bank loans, while Chinese state-owned enterprises received over 80%. This is strikingly compared to “2012, the year before President Xi Jinping assumed power, private sector companies and SOEs received, respectively, 52 per cent and 32 per cent of new loans.”<sup>98</sup> Although the party has broadly professed support for the entrepreneurial class, there is palpable unease reported amongst members of the private sector.<sup>99</sup> Shifting economic priorities, as illustrated by the shift in Chinese capital towards state-owned enterprises, may be indicative of a broader trend of state control in China, where President Xi, “who has sought greater party control over the military, the media and civil society, is now focusing on business.”<sup>100</sup>

Huawei, owing to its financial success and global reach, is undoubtedly a unique company in China’s private sector. Despite its power and prestige, however, there is little doubt that Huawei is still impacted by state control in the affairs of private firms. Two highly publicized Chinese laws, the 2017 National Intelligence Law and the 2014 Counter-Espionage Law, state that Huawei would, if prompted, be required to cooperate with Chinese state security forces and hand over relevant data. Although Ren has rejected the notion that Huawei would act on behalf of the Chinese state in matters of espionage or data collection, it is unclear if this claim is realistic. According to Jerome Cohen, a New York University law professor and Council on Foreign Relations adjunct senior fellow, this means “[t]here is no way Huawei can resist any order from the [People’s Republic of China] Government or the Chinese Communist Party to do its bidding in any context, commercial or otherwise. Huawei would have to turn over all requested data and perform whatever other surveillance activities are required.”<sup>101</sup>

Other countries, including the United States, have reportedly used private telecommunications firms for intelligence purposes.<sup>102</sup> To some extent, Western concerns about Chinese telecom firms may arise from detailed knowledge regarding their own government’s capabilities. One’s view of a given finding may in part depend on which side of the East-West division one is standing.

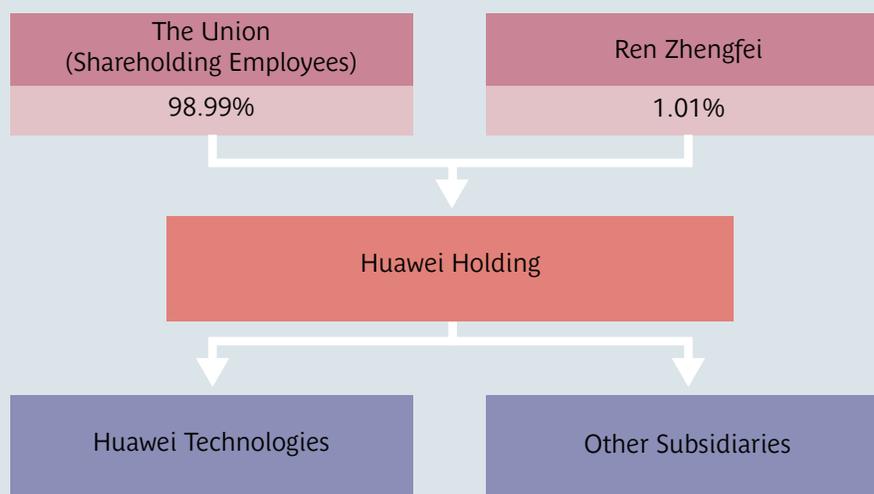
On balance, it is likely that Huawei management cannot simply disregard the views of senior Chinese government and party officials, and yet occasional direction from Beijing does not necessarily constitute direct state management of Huawei.

Recent controversies have also led critics to investigate Huawei’s claim that it is a “employee-owned” company. A recent, widely circulated paper, titled “Who Owns Huawei?” argued that Huawei has publicly misrepresented the true nature of its corporate structure. Huawei is wholly owned by a holding company, which is further owned by a trade union and Ren Zhengfei, as viewed in **Figure 5**.<sup>103</sup> The authors state, “given the public nature of trade unions in China...if the trade union and its committee function as trade unions generally do in China, then Huawei may be deemed effectively state-owned.” The report concludes, in examining the complex nature of Huawei’s internal workings, “[r]egardless of who, in a practical sense, owns and controls Huawei, it is clear that the employees do not.”<sup>104</sup>

FIGURE 5

Source: Nikkei Asian Review & Huawei

## Huawei's Structure



Jiang Xisheng, a Huawei executive, directly pushed back against this interpretation of the company's ownership at an April 25, 2019 press conference. He dispelled the notion that "shares" were simply a complex profit sharing scheme - because the permitted number of registered shareholders for non-listed stock and limited liability corporations in China is capped at a low number, Huawei's trade union "acts as a platform through which [Huawei] employees can hold shares"<sup>105</sup> Huawei's virtual shares are held by more than 90,000 employees. In short, "[s]hares of this

virtual stock let employees share the company's financial success (and its losses). And they entitle their holders to elect members to Huawei's Representatives' Commission, which in turn elects members of the board of directors."<sup>106</sup> Although an in-depth discussion of the inner workings of Huawei's corporate governance is beyond the scope of this report, it is clear that Huawei is working hard to dispel information it deems untruthful. The fact that Huawei's corporate structure does not have an equivalent in Western countries also complicates understanding of how the unusual structure functions.

# HUAWEI IN CANADA: A CASE STUDY

## BACKGROUND

Over the past several years, Huawei has increasingly received public, political, and media attention in Canada. Huawei works extensively with Canadian telecommunications companies, has announced research partnerships with various Canadian universities, and maintains offices and research centres across the country. Despite being a relatively recent entrant to the Canadian telecommunications and consumer electronics market, the company's size, scope of business operations, and relevance has grown rapidly in recent years. Huawei has emerged as a pressing topic in the domestic political landscape, as policymakers contemplate whether to ban Huawei from Canadian 5G telecommunications networks. This relationship with Canada is, in many ways, a microcosm of the various global challenges it faces in the West. This section provides an outline of Huawei's history and growth in Canada, examines the various economic, political, and security issues at play, and surveys Huawei's prominent partnerships with Canadian research institutions.

## HUAWEI'S CANADIAN EXPANSION & CONTROVERSY

One of Huawei's earliest reported connections to Canada dates back to a proposed joint-venture project with now-defunct Nortel in February 2006.<sup>107</sup> The two companies, then rivals in the global telecommunications equipment market, announced plans to collaboratively develop high-speed broadband equipment. Huawei's motivation behind the venture appeared to be the potential for increased North American market access, while Nortel was keen to re-enter the growing broadband access market it had left in 2001.<sup>108</sup> Four months later, however, the project was abandoned after deals with prospective customers failed to materialize.

Huawei has officially operated in Canada since 2008 after it won network contracts with Telus and Bell, Canada's second and third largest telecommunications firms.<sup>109</sup> Huawei maintains its Canadian head office in Markham, Ontario and has research offices in cities across the country, including Ottawa, Waterloo, Montreal, Vancouver, and Edmonton. As of December 2018, the company employs roughly 960 people in Canada, a significant proportion of whom work in R&D.<sup>110</sup>

Huawei's domestic profile remained relatively low until it entered the mainstream, consumer Canadian smartphone market. After the success of the Huawei-manufactured Nexus 6P smartphone in Canada, the company introduced its flagship "P" series smartphones to the major Canadian carrier market in 2017, the first time a top-end Huawei smartphone was available in the country.<sup>111</sup> Most recently, it released the highly acclaimed, co-flagship "Mate" series smartphone model in Canada.<sup>112</sup> Huawei phones are now available on the "big three" Canadian carriers. Huawei has invested heavily in marketing and brand management to grow its Canadian presence: for example, Huawei's prominent sponsorship of the well-known "Hockey Night in Canada" television program demonstrates its aim to garner local appeal among Canadian consumers.

Since entering the Canadian market in 2008, Huawei has developed deep ties with a number of telecom operators, including Telus, Bell, Freedom Mobile, and Sasktel. Both Telus and Bell have collaborated with Huawei to purchase network infrastructure equipment, install fibre optic network cables, and develop/test 5G technology.<sup>113</sup> Telus and Huawei established a 5G "Living Lab" in 2015 that has since conducted a successful 5G technology trial.<sup>114</sup> Bell has also used Huawei technology to conduct 5G trials, in addition to collaborating with rival Nokia.<sup>115</sup> Freedom Mobile, owned by Shaw Communications Inc., initially used Huawei network equipment, but later shifted to a partnership with Nokia.<sup>116</sup> Sasktel, a telecom firm based in Saskatchewan, uses Huawei radio and antenna equipment separate from its "core" network.<sup>117</sup> Rogers, Canada's largest telecom company has mainly collaborated with Ericsson for network equipment, although the company reportedly uses some Huawei equipment.<sup>118</sup>

The arrest and of Meng Wanzhou triggered a flood of media and public attention directed at Huawei's presence in Canada, reigniting concerns over the firm's involvement in Canadian 5G technology development and existing research partnerships. This, however, is not the first time Canadians have questioned Huawei's involvement in the country.

Huawei's association with the now defunct Canadian telecommunications giant Nortel - dating back to the failed joint venture project in 2006 - faced significant criticism after it was widely reported that Huawei expressed

interest in purchasing Nortel's Metro Ethernet division in 2009. Huawei founder and CEO Ren Zhengfei, speaking to the Globe and Mail in July 2019, confirmed "sometime in Nortel's final chapter, Huawei offered to take it over." Although the deal was eventually scuttled, it raised initial security concerns among some of Nortel's biggest customers - large American telecommunications firms which, in turn, provided essential data services for the U.S. government. Andy Greenberg, a then-Forbes reporter, wrote in 2009 "[g]iven Huawei's history, a tie-up with the company would raise the specter of a hidden back door in a router or switch, siphoning that data to foreign spies."<sup>119</sup>

Huawei's alleged ties to the Chinese government were extensively outlined in a highly critical October 2012 U.S. House Intelligence Committee report, mentioned previously in this paper. At the time, American concern revolved around the possibility that "electronic bugs will be embedded in telecom systems to secretly transmit data back to China, also known as beaconing or opening back doors."<sup>120</sup> Committee chair Mike Rogers, emphasizing the integrated nature of U.S. and Canadian telecommunications systems, urged Canadian firms to follow the American lead and reconsider their business relationships with Huawei. Canada and the U.S. maintain close ties with respect to trade, defence, security, industry, and infrastructure. Bilateral partnerships, agreements, and arrangements, including shared defence production, have led to widespread integration between the two countries. For this reason, American lawmakers may be uneasy that Canadian policy directed at Huawei will not align fully with U.S. security interests, potentially accentuating U.S. security concerns.

The Canadian Department of Public Safety issued a similar caution via a 2011 internal memo, warning that foreign involvement in the domestic telecommunications market could pose a "considerable risk to public safety and national security." CBC News, who accessed the internal memo via the Access to Information Act, stated that although "large sections of the secret memo were withheld from release, intelligence sources say the biggest concern was the Chinese."<sup>121</sup> Another heavily redacted Department of Public Safety memo from 2011, accessed by Vice News' Motherboard, states that "As the U.S. has prohibited Huawei from providing equipment for their first responders network and Canada is seeking to harmonize with the U.S.

for public safety use of telecommunications spectrum; it will be critical that Canada ensures its telecommunications infrastructure and networks are secure.<sup>122</sup> This suggests that, at the time, some government officials may have been partial to aligning themselves with the U.S. and to taking a tougher stance on Huawei. Although Ottawa would later indicate that Huawei was not a welcome partner in the government's new telecommunications and email network,<sup>123</sup> this did not prevent the company's continued expansion into the Canadian commercial market.

Today the rhetoric surrounding Huawei is strikingly similar as Canada moves to develop its next-generation 5G wireless network. Western allies, particularly members of the "Five Eyes" intelligence alliance, are beginning to clamp down on Huawei's growing influence in their respective telecommunications sectors, particularly 5G network building. Prominent U.S. officials have been vocal to Canada about the importance of taking action against Huawei. Senators Mark Warner and Marco Rubio, members of the U.S. Senate intelligence committee, penned a letter to Prime Minister Justin Trudeau in October 2018, calling for Canada to "reconsider Huawei's inclusion in any aspect of Canada's 5G development, introduction, and maintenance."<sup>124</sup> Secretary of State Mike Pompeo has warned that the U.S. may refrain from sharing intelligence with countries who permit the use of Huawei equipment in its 5G infrastructure.<sup>125</sup> Given that we may assume Canada receives more intelligence from U.S. security agencies that Canada is able to provide to Canada's North American security guarantor, the Pompeo threat will be very carefully weighed in Ottawa before any Huawei 5G decision is reached.

Canadian officials, in the midst of an ongoing government security review of 5G technology, have emphasized the importance of taking a methodical approach to this issue.<sup>126</sup> Canada's information-security agency, the Communications Security Establishment, has an established review program for the mitigation of risk in telecommunications networks.<sup>127</sup> This has already led to the exclusion of Huawei equipment from "sensitive" areas of Canadian networks.<sup>128</sup> There is no clear timeline for a decision on whether this will expand to a full "ban" of Huawei technology and equipment. Canadian Public Safety Minister Ralph Goodale stated on April 30, 2019, that it would likely occur before the Canadian federal election in October.<sup>129</sup> However, a

subsequent Reuters article, published on July 15, 2019 that cites "three well-placed sources" stated that the decision would be postponed until after the election.<sup>130</sup>

The federal election will complicate this process considerably. October provides a hard deadline for the current Liberal government to make a decision on their own terms, as an election defeat would shift the balance of the national security review. Conservative leader Andrew Scheer has unequivocally declared that he would move to ban Huawei from Canada's 5G-network development.<sup>131</sup>

It is unclear what a Huawei "ban" would look like in Canada. The U.S. approach to 5G infrastructure "has created a zero-sum calculus in the Trump White House — a conviction that there must be a single winner in this arms race, and the loser must be banished."<sup>132</sup> America's allies in Europe, however, are largely avoiding calls for bans and taking a more nuanced approach to the same issue. This indicates that, for many countries, dealing with Huawei is not a binary question of "ban" or "no ban". The question, as it relates to Canada, is further complicated by potential economic or political ramifications.

In Canada, Telus Corp. and Bell Inc., which currently use Huawei equipment in their existing 3G and LTE infrastructure, have warned that a ban could lead to delays in 5G development and vastly increased internal costs. Telus' 2018 annual report states that any "decision prohibiting the deployment of Huawei technology without compensation or other accommodations being made by the Government of Canada could have a material, non-recurring, incremental increase in the cost of Telus' 5G network deployment and, potentially, the timing of such deployment."<sup>133</sup> According to anonymous internal Telus sources, "virtually 100 per cent of Telus's radio equipment comes from Huawei, while BCE has used the Chinese vendor for about 60 per cent to 70 per cent of its radio network."<sup>134</sup> Because Huawei network equipment isn't designed to function in tandem with equipment from other vendors, a Canadian Huawei ban would potentially force Telus to "rip and replace" existing Huawei equipment. Another internal Telus source, speaking anonymously, has stated that this "would mean millions of dollars to rip apart existing infrastructure in order to deploy new equipment that allows for the use of other vendors like Nokia or Ericsson."<sup>135</sup>

It is also unclear what the ultimate impact of a Huawei ban would be for rural networks utilizing Huawei equipment. Huawei is moving forward in supplying equipment for wireless infrastructure projects in rural Canada. ABC Communications is working with Huawei in the isolated British Columbia community of Lac la Hache to implement a broadband trial project. In addition to affordability and quality, the lack of viable competition is a strong selling point for Huawei equipment. According to Bob Allen, the CEO of ABC Communications, Ericsson and Nokia do not work in global rural markets.<sup>136</sup> Huawei has also announced plans to work “with two companies, Ice Wireless and Iristel, to connect 70 remote communities to faster wireless by 2025.”<sup>137</sup> With no clear alternatives in place, a ban could disrupt future essential internet infrastructure projects for rural areas such as Lac la Hache.

Lu Shaye, China’s former Ambassador to Canada, has also warned that there would be “repercussions” if Canada banned Huawei from its 5G network.<sup>138</sup> It is almost certain that a Huawei ban could further degrade the already-tenuous bilateral relationship, which was already strained by the arrest of Meng Wanzhou. Ambassador Lu’s remarks came a month after two Canadians were detained in China on charges of espionage. China has also since halted the importation of Canadian canola and meat products due to reports of insect infestation and fake export certificates, respectively.<sup>139 140</sup> Canada may be reluctant to commence a Huawei ban, faced with the possibility of further retaliatory action from China while broader issues of the bilateral relationship remain unsolved.

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## HUAWEI’S CANADIAN RESEARCH PARTNERSHIPS

Huawei’s head research facility is located in Ottawa, where it has “drawn on the talents of Ottawa’s once-booming telecommunications industry, including former Nortel staff, and currently employ[s] 300 people.”<sup>141</sup> In 2016, Huawei announced that it was investing up to \$303 million to expand 5G technology research in Ottawa, Markham, and Waterloo.<sup>142</sup> Kathleen Wynne, then the Premier of Ontario, conducted a trade mission to China in 2014 which helped solidify Huawei’s decision to invest in the province. The Ontario Government augmented the investment with \$16 million from the Ontario Jobs and Prosperity Fund.<sup>143</sup> As a whole, Huawei has committed \$500 million to Canadian R&D spending as a “commitment to an innovative and competitive telecommunications industry and a thriving Canadian ICT Ecosystem.”<sup>144</sup> **Figure 6** outlines Huawei’s growth in Canadian R&D investment from 2010 to 2017.<sup>145</sup>

Huawei has announced numerous research partnerships with universities and colleges across Canada, committing between \$6-9 million annually towards collaborative “advanced communications research projects.”<sup>146</sup> According to a May 2018 Globe and Mail report, Huawei has committed roughly \$50 million to 13 Canadian universities.<sup>147</sup> Although the investigation did not provide a full list of institutions, many have publicly confirmed an ongoing relationship, receive some level of research funding from the company, or have worked in conjunction with Huawei in some capacity.

FIGURE 6

Source: The Globe and Mail

## Huawei Canada's R&D Spending 2010-2017

(In Millions Canadian Dollar)



The **University of British Columbia** signed a 3-year, \$3 million research collaboration agreement with Huawei in October, 2017.<sup>148</sup> The agreement promotes advanced communications and 5G research projects. In 2017, **Simon Fraser University** selected Huawei as its research computer system and data switching equipment supplier. Huawei also sponsors one electrical and computer engineering project at the **University of Victoria**.<sup>149</sup>

The **University of Alberta** has received \$4.2 million from Huawei for “multi phased individual research projects” and signed an agreement for a joint innovation centre in 2018. As of February 2019, no projects associated with the centre have been initiated.<sup>150</sup> Huawei has also contributed \$60,000 in research funding to another Alberta institution, the **University of Calgary**.<sup>151</sup>

In 2016, the **University of Regina** partnered with Huawei and Sasktel to develop and test next generation wireless technology. The **University of Saskatchewan** has reported no active research projects with Huawei.<sup>152</sup>

**Carleton University** has been engaged in collaborative research with Huawei's Canada Research Centre since 2010. The partnership was extended in late 2017, with a renewed emphasis on future 5G technology research.<sup>153</sup>

The **University of Toronto** signed a research partnership with Huawei in the spring of 2016, and extended the agreement for an additional five years in the fall of 2018. According to the U of T, Huawei has provided over \$3.5 million in research funding to the University since 2016.<sup>154</sup>

The **University of Waterloo** and Huawei signed an agreement on a strategic research partnership in 2016.<sup>155</sup> Huawei pledged to invest \$3 million in the University by 2019 and has provided sponsorship for the Waterloo Artificial Intelligence Institute.<sup>156</sup> **Queen's University** accepted an undisclosed “research project funding” from Huawei in January, 2019. According to the University, this is the first instance of research funding from Huawei.<sup>157</sup>

**McMaster University** has also accepted Huawei research funding, totalling \$215,000, for two research projects.<sup>158</sup>

**Seneca College** is also the location of North America's first “Huawei Authorized Learning Partner (HALP)” training centre for network technicians. As of late 2017, the program had 57 students.

Huawei currently provides an undisclosed amount of research funding for around 20 **McGill University** academics.<sup>159</sup> **Polytechnique Montréal** launched a joint research venture with Huawei in February, 2017 to establish the “Natural Sciences and Engineering Research Council (NSERC)/Huawei Industrial Research Chair in Future Wireless Technologies.” Huawei announced \$2.45 million in investments over a five-year period, matched equally by the Natural Sciences and Engineering Research Council of Canada (NSERC).<sup>160</sup> **École de Technologie Supérieure** (ETS), another Montreal-based engineering school, has reportedly received research funding from Huawei.<sup>161</sup> The **University of Laval** is, as of May 2019, in talks with NSERC and Huawei to establish a joint venture project. This would reportedly create a NSERC/Huawei Research Chair position at the University.<sup>162</sup>

The world of academic research, where the search for funding is constant, has generally accepted Huawei’s funding with open arms. Academics and graduate students, conducting research in a variety of disciplines, have benefited from this influx of cash from Huawei. Some critics have, however, expressed concerns over Huawei’s push to promote research investment in Canada. According to the aforementioned *Globe and Mail* story, Huawei received the exclusive intellectual property rights to work conducted in partnership with Canadian academics in 40 research cases, despite the fact that many of the same projects are also funded by federal government grants.<sup>163</sup> This relationship was viewed by some as one-sided and out of sync with domestic interests, as Canadian taxpayers were effectively subsidizing a Huawei research pipeline. Huawei would subsequently announce in February 2019 that it was “changing [its] R&D investment practices to ensure all intellectual property (IP) generated in collaboration with Canadian institutions remains in the country.”<sup>164</sup> Since the initial *Globe and Mail* report was released, “the U.S. Patent and Trademark Office database shows just one patent was assigned from a Canadian university to Huawei.”<sup>165</sup> Although the long term implications are still unclear, it appears that this shift in policy may have been made in response to the aforementioned reports in Canadian media. This practice is, however, not unique to Huawei. Foreign firms acquired “58 per cent of the patents granted to Canadian inventors” in 2016.<sup>166</sup> It is common for large foreign companies to provide funding to Canadian researchers with the intention

of extracting intellectual property from the projects that they have funded.

Few firms in Canada, or potentially even the world, have Huawei’s drive and resources for technological innovation, as illustrated by its heavy R&D investment across Canada and globally. But while it is not unexpected for a corporation to vigorously pursue return on investment, the potential security dimensions of Huawei’s research investment, in addition to its pursuit of intellectual property, has drawn widespread attention. Officials from Canadian Security Intelligence Service (CSIS), Canada’s domestic security agency, provided a warning to Canadian university research vice-presidents at a meeting in December, 2018.<sup>167</sup> Although very few details have been revealed, security officials clearly view this “pipeline” of research and intellectual property as a potential national security threat. This is the key issue at hand - while there is little evidence to suggest that Huawei’s Canadian research investment is nefarious in nature, technology developed by Canadian researchers, even for purely commercial purposes, could have eventual security or military applications. Given the sensitive nature of Canada-China relations and prevailing Western attitudes towards companies with alleged ties to the Chinese state, the optics of Huawei’s research ties to Canada are predictably negative to many.

Some top-ranked American and British research universities, including Stanford, Berkeley, Oxford, and MIT, have stopped accepting new funds from Huawei amidst security warnings. Canadian universities have largely remained mute on the issue, deciding instead to maintain existing funding relationships unless directed otherwise by the federal government.<sup>168</sup> As with other policy issues related to technology partnerships in the 21st century, security concerns have to be balanced against the benefits of additional funding for researchers and research institutions. Of note is that there appears to be no other telecommunications company willing to make investment in Canadian research and development at the same magnitude as Huawei is prepared to do.

Chinese investment and technology in Canada is a rapidly expanding area of national importance and interest for Canada’s policymakers. There is a need to balance the multitude of risks and opportunities in the global

technology and security ecosystem, as developments in this area directly compound political and economic tension. Huawei's high profile involvement in the Canadian telecommunications and research landscape is generating policy responses from Canadian policymakers. However, it may be unwise to pursue policy measures that paint all Chinese investment, technology, and funding with the same brush, as opposed to a case-by-case basis or, alternatively, applying guidelines that would separate problematic research from research that has a net benefit to Canadian institutions.

# CONCLUSION

Established in Shenzhen in 1987, Huawei grew rapidly to become one of the world's largest information and communication technology providers. This growth catapulted the company onto the world stage, paralleling the rapid expansion of China's economy, telecommunications infrastructure, and technology sector. Today, Huawei provides essential equipment, devices, and services to consumers around the world.

The company's ascendancy has generated mixed reactions: it is welcomed as a provider of reliable and affordable equipment in some countries, while in others it has been accused of posing a threat to national security and, in some cases, being closely connected to the Chinese government. Despite a strong public relations push by Huawei, mixed reactions persist: broadly speaking, Huawei is viewed more favourably in the developing world. Many Western countries have sought to limit Huawei's access to their domestic markets (telecommunication infrastructure in particular), as well as to government procurement contracts. In contrast, many developing countries view Huawei positively, and have sought further engagement. This paper suggests that Canada's tense relationship with Huawei is symptomatic of broader political trends.

Huawei has invested heavily in its Canadian operations, rapidly growing its presence in the country. This, combined with the Meng Wanzhou case and national debate surrounding 5G development, has raised the company's

profile in Canada. Despite the controversy, Huawei remains ingrained in the domestic telecommunications industry and has invested extensively in Canadian research and development. In spite of calls for a Huawei "ban" in Canada, government officials have yet to make a final decision.

Huawei can be seen, perhaps, as an allegory for the broad challenges of the China-West rivalry, which makes an easy solution problematic. If Western security concerns regarding Huawei are even partially generated by broader issues arising from heightened great power rivalry, finding pragmatic and workable solutions that allow Western and Chinese high-tech firms to collaborate and to operate in the same economic space may be particularly challenging.

The Huawei debate in Canada, the U.S. and other Western states is a subset of broader discussion of how Western and Chinese firms should compete for market share and technological dominance. That debate, in turn, is a part of an even broader question of U.S.-China relations, including relations between U.S. allies and China.

Huawei will continue to generate debate in coming years as its profile grows around the world. It is beyond the scope of this paper to provide a definitive assessment of Huawei's operations and practices. The focus, therefore, has been to discuss the company's history, growth, and development into a powerful global organization, in addition to exploring its Canadian operations. We hope that this paper will provide meaningful background information to inform discussion and support future research on Huawei and Chinese technology firms more generally.

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