POLICY Brief

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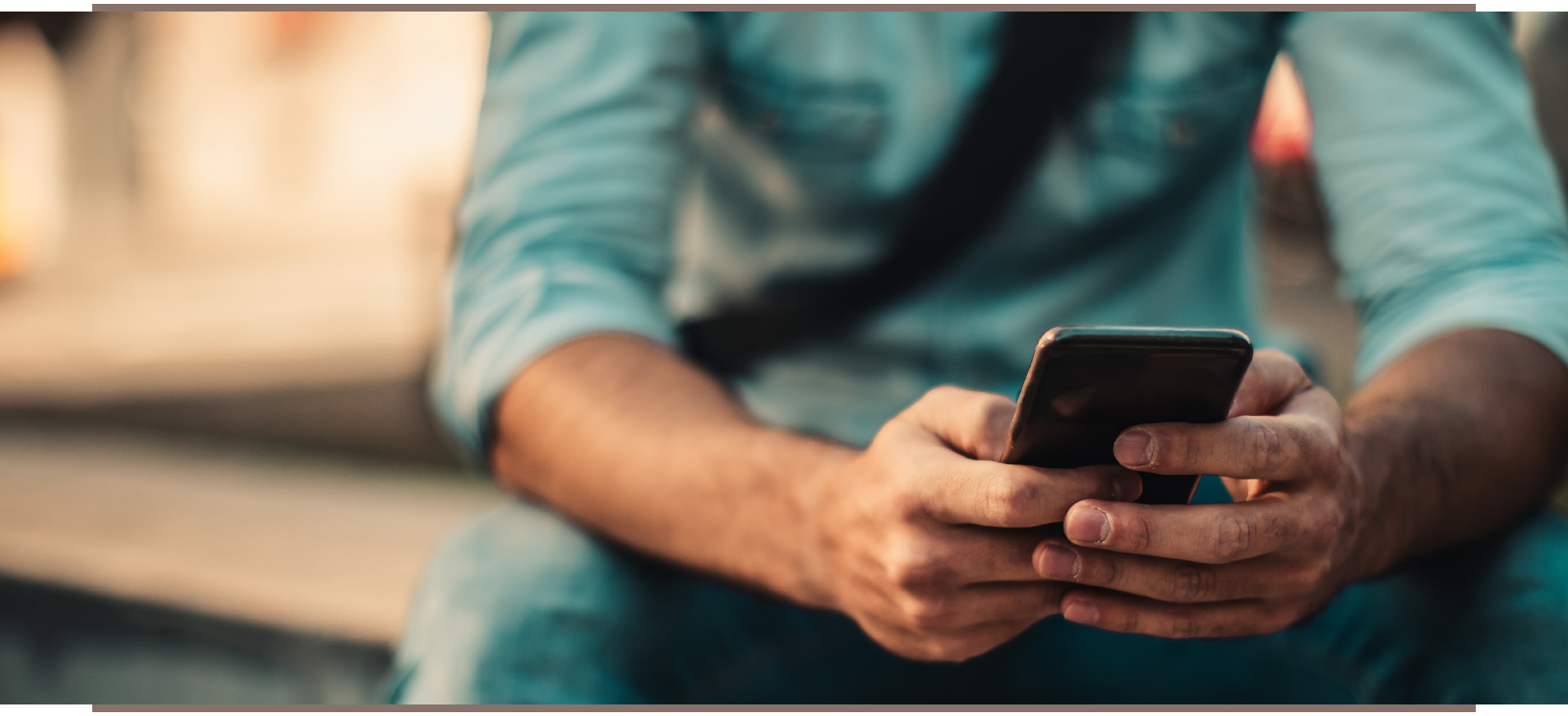

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5G Raises Tough Policy Choices for Canada

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Fifth generation wireless telecommunications technology, commonly referred to as 5G, could provide an important foundation for the future of Saskatchewan's rural areas and the application of advanced technology to industries like agriculture, and long-promised advances in telemedicine. But central to the development of Canada's 5G system is the role that the equipment from the Chinese firm Huawei will play. With the United States lobbying Canada to follow it in banning Huawei from its 5G infrastructure, tensions between Canada and China on this and other fronts require the Canadian government to tread carefully. Where domestic policy and international politics collide, hard choices emerge. The risk assessment currently underway in Canada should guide Canada's decision making on what to do about Huawei and 5G, though the inherent uncertainties in this case ultimately require what could be a costly decision.

Ten years ago, smartphones accounted for less than five percent of total Internet traffic. As the cost of mobile data plans continue to fall, and smartphones become commonplace, their share of Internet traffic will grow rapidly. One recent forecast estimates that by 2022, fully 20 per cent of Internet traffic will be from mobile. And most of that growth will come from Internet-connected devices—ranging from smart home thermostats to autonomous vehicles— which operate independently in response to their environment, act in response to commands sent across the Internet, or interact with other devices.

Our current standard for mobile networks—fourth generation, or 4G—manages roughly five billion connected devices with download speeds maxing out at about 20 Mbps (megabits per second). Fifth generation, or 5G, wireless telecommunications technology is a new standard designed to connect an increasing number of devices, provide near-zero latency, and offer increased data transfer speeds.

Based on the experience of moving from 3G to 4G, we shouldn't expect to see new 5G applications for at least a couple of years. For the time being, 5G will be sold as higher-speed wireless mobile and wireless broadband. In some cases it will rival current wired Internet service through cable and phone lines, helping to solve some of the "last-mile" problems[1] in getting broadband service to remote and rural customers. As for mobile 5G service on your smartphone, you can go out today and buy a Samsung Galaxy S10 5G—the first commercially available smartphone able to connect to a 5G network—or wait for the Huawei 5G phone due this fall. But they won't use any 5G networks in Canada just yet for the simple reason there aren't any operating other than a small test hub at the University of British Columbia.

What is more likely is that 5G's advantages in device capacity and low latency will mean its applications will to be in the device-to-

device realm rather than what we experience on our personal smartphones. 5G can support a massive increase in the number of devices, from thousands of devices per square kilometre under 4G up to a million devices in a 5G network. Already, some carriers are suggesting that 5G will be good news for those who go to stadium events like football and baseball games. But as more and more autonomous devices are connected to the Internet, this increase in capacity will be more important than the increased speeds. The potential benefits are immense.

5G will make it possible to connect many small, cheap, low-power devices using cellular service, increasing the number of Internet connected devices. For example, in rural areas, the greatest opportunity will be in remote industrial applications such as agriculture and mining, connecting devices like sensors, drones, robotics, and other smart machinery to further reduce labour needs and increase yields.

For Saskatchewan's agricultural sector and elsewhere, smart systems that connect sensors and monitors continually could mean dramatic advances for innovative and smart agribusiness. A large scale trial in the United Kingdom, for example, is aimed at showing how 5G can transform agriculture[2] on remote-managed land using autonomous tractors, remote monitoring of a fishery, and connected cow collars and ear tags that can transmit biometric herd data.

For Saskatchewan's health care sector, the near-zero latency of 5G can improve prospects for remote medical assessment, diagnosis, and treatment, bringing the promise of remote telemedicine closer to reality.

In more densely populated areas, 5G will improve the communication amongst autonomous vehicles, and between vehicles and the driving infrastructure, leading to safer driverless cars. In industrial applications, 5G will allow robots on warehouse floors to communicate with each other and their controllers, for drone-to-drone communication in flight, or for automating shipping facilities like ports. And for individuals, 5G will be used for wireless video gaming, remote virtual reality and augmented reality for things like education, training, and physical rehabilitation, and Internet-connected wearable devices to allow for continuous remote medical monitoring.

Wait! What? Huawei?

Under normal circumstances, the issues surrounding the development of 5G would focus on technical issues. For example, the efficient allocation of the radio spectrum bands necessary to support it; worries about industry concentration; whether a nationalized 5G network or an open access wholesale model should be considered; preparing for 13-digit dialling; or if digital divide concerns might mean some citizens are shut out of its benefits due to either their location or ability to afford it. Some will be concerned about the possible health impacts of additional radiofrequency radiation, a fear being stoked by the Russian network RT America, in an effort to do to 5G what it did to the 2016 U.S. presidential election, vaccinations, and genetically-modified organisms.

But, as with many things in the Donald Trump era, these are not normal times. Instead, one issue has come to dominate the discussion around 5G: the Chinese telecommunications giant Huawei.

Five companies dominate the 5G equipment market today: Huawei, ZTE, Nokia, Samsung, and Ericsson. Canada, along with many other countries, has been generally very welcoming towards Huawei in the past. Its hardware and software are in wide use here for fixed infrastructure broadband and 4G wireless, and Huawei is the second-biggest provider of cellphones globally. But Huawei's early dominance in 5G has raised a whole other category of concerns.

The United States claims that Huawei is a threat to national security, and has taken steps to ban it from U.S. government contracts. Last year, President Trump signed a law that barred the federal government and its contractors from doing business with Huawei, citing national security concerns. And four major U.S. telecom carriers have pledged to the federal government that they will not use Huawei equipment in their networks. However, a number of rural carriers already use Huawei in their networks as a lower-cost alternative.

In May, Trump declared a "national emergency", claiming that foreign adversaries are exploiting vulnerabilities in U.S. telecommunications technology and services. Trump signed an executive order giving the government broad powers to bar American companies from doing business with certain foreign suppliers—including Huawei. Just one day later, the Commerce Department added Huawei to its "Entity List", claiming Huawei "is engaged in activities that are contrary to U.S. national security or foreign policy interests." The listing will force Huawei and its affiliates to obtain a U.S. government license to buy American technology.

Canada's Hard Choice

The Government of Canada is considering Huawei's possible role as a vendor in the development of our 5G systems and reviewing risks associated with the construction of 5G. The place of Huawei in that construction, and the associated national security implications, will be a key issue for the federal cabinet. A decision has now been delayed until after the October 2019 federal election.

The federal government's decision is complicated by a number of factors:

- Canada's current tenuous relationship with China over our detention of Huawei CFO Meng Wanzhou;
- our ongoing challenges with the United States on a number of economic fronts;
- our tradition of internationalism and of leading by keeping in step with others;
- domestic economic considerations; and,
- huge uncertainties in national, corporate, and personal security that accompany this issue.

China/Canada Relations

Mounting tensions between Ottawa and Beijing stem from the arrest of Huawei's CFO at the Vancouver airport last December in response to a U.S. warrant. The U.S. is seeking the extradition of Meng from Canada to face criminal charges of money laundering and theft of trade secrets. Ms. Meng's next court date is scheduled for September.

Former Chinese ambassador to Canada Lu Shaye accused Canada of "backstabbing" China by arresting Meng and warned of repercussions should Canada choose to ban Huawei. Those repercussions are already being felt, including the detention and arrest[3] of former Canadian diplomat Michael Kovrig and entrepreneur Michael Spavor, as well as Beijing's decision to stop buying Canadian canola.

Canada is being cast by some observers as the first casualty a U.S. economic proxy war with China. Others argue that Canada has to stand up to China now or risk being further bullied in the future. As David Mulroney, Canada's former Ambassador to China, advised: "China commonly seeks to compel its adversaries to capitulate without a struggle. We shouldn't be afraid to stick to our principles because we'll find that, despite its bluster, China is pragmatic and will seek to protect its own considerable interests in the relationship with Canada."

U.S./Canada Relations

The U.S. has made it clear that a Canadian decision on Huawei that runs counter to American wishes will have negative repercussions on U.S./Canada relations. "If a country adopts this [Huawei equipment] and puts it in some of their critical information systems, we won't be able to share information with them, we won't be able to work alongside them", says U.S. Secretary of State Mike Pompeo.[4]

Huawei can be seen as both an economic and a national security threat to the U.S. President Trump has already relied on national security arguments in attempting to influence trading relationships, stretching legal authority to suit his needs. He cited a national security provision of a 1962 law to impose tariffs on imported steel and aluminum. The U.S. lacks a leading player in the 5G-supplier game, fuelling speculation that Trump's focus on Huawei is propelled by domestic commercial worries as much as national security concerns.

But Trump has also signalled that his decisions can be interpreted as bargaining chips. For example, he first added then removed the Chinese company ZTE from the Commerce Department's "Entity List" during trade negotiations with Chinese leader Xi Jinping. A similar Huawei reversal is certainly possible. Under such a scenario, a decision to ban Huawei from Canada will have succeeded in angering China, incurring a massive domestic economic and technological hit, all in an attempt to appease a fickle U.S. president. One benefit of the Canadian delay on making a decision on Huawei until after the fall federal election is that Trump could change his mind between now and October.

Five Eyes

The U.S., U.K., Australia, New Zealand, and Canada co-operate on security and intelligence matters in an alliance known as the "Five Eyes". The U.S. and Australia have already blocked domestic companies from using Huawei technology. New Zealand has also blocked a domestic telecommunications company from using Huawei technology, but remains open to Huawei's participation in its 5G networks. Outside of the Five Eyes, Germany has also decided to allow Huawei equipment in its domestic 5G networks. With the Five Eyes already fracturing under pressure in the Trump era, some see the potential for the alliance to be permanently broken by the Huawei controversy.

The United Kingdom, however, may permit Huawei's involvement in 5G, allowing some limited deployment of its next-generation wireless gear. The U.K. National Cyber Security Centre (in a report leaked in February) has found Huawei equipment can be used safely in 5G networks with appropriate safeguards. If the U.K. does stop short of a ban on Huawei, it will give Canada greater room to make a decision that does not ignore American warning, while at the same time avoids further antagonizing China.

Domestic Economics

Two major Canadian telecommunications companies—Bell and Telus—along with SaskTel, are heavily invested in Huawei technology for developing their 5G networks. As such, they would be negatively affected by a Huawei ban. Rogers would not be directly affected as it uses Ericsson products. If Canada does ban Huawei, Bell, Telus, and others like SaskTel could face $1 billion in costs to remove the equipment and re-tool for 5G. Under such a scenario, those firms could reasonably counter that they should be relieved of the CRTC push for low-cost Internet service options in Canada. In Canada's ongoing efforts to bring high-speed Internet to rural areas, and facilitate the growth of high-technology in major centres, the Huawei decision has real implications for sunk costs and future opportunities.

Uncertainty

Is Huawei equipment a risk? Finding out that we guessed wrong will be too late, and the consequences could be catastrophic.

If Huawei equipment does contains a backdoor (a secret method for bypassing authentication or encryption in a computer system or device, allowing for remote access to a computer device), and the data that moves through that equipment is made available to Chinese intelligence services, Huawei's central role in 5G could undermine the entire security of our wireless telecommunications networks. This vulnerability could result in user data being compromised, or foreign adversaries interfering with critical Internet-enabled services.

Huawei denies all charges of wrongdoing and says its network equipment does not provide a backdoor for Chinese intelligence services. Despite years of hearings, investigations, and hardware

inspections, there is no public, direct evidence that Huawei equipment has been used to spy on network traffic. Huawei allows governments to assess its devices, with some concerns identified and addressed. However, this does not mean that Huawei devices cannot be used in the future for either espionage or sabotage. Despite the absence of proof, the U.S. position is that the company can be "leveraged by the Chinese government" and be forced to turn over secrets or exploit vulnerabilities.

Conclusion

The policy dilemma for Canada is what to do? Conservative leader Andrew Scheer, if elected this October, appears set to ban Huawei[5] from participating in Canada's 5G wireless networks believing Huawei "poses a threat to Canada's national security". This mirrors the emerging mood of the country, which leans towards supporting a ban on Huawei in 5G. A February 2019 online national survey by Research Co.[6] found that 57% of Canadians think the federal government should not allow Huawei to participate in 5G, with support for a ban highest in B.C., Ontario, and Alberta. And an August 2018 Nanos telephone/online survey[7] found 54% of Canadians support a ban.

Some analysts are convinced that Canada will follow the U.S. lead, while others see an opening in the U.K. position. Some further speculation, then, seems in order.

Much, of course, depends on the ongoing security review, now delayed until after the election. Because of the impossibility in concluding that Huawei products do not contain backdoor vulnerabilities, the report is likely to hedge and come down firmly on the side of an inconclusive determination that one is always wise in issues of technology and national security to remain highly risk averse.[8]

No matter the outcome of the federal election in October, Canada will most likely choose the "we don't really have a choice" option. In other words, do as it did with the Meng detention, and accede to the American position.

If that happens, there will be a price to be paid in terms of a more expensive 5G system than would be the case if we used Huawei equipment. Keep this in mind the next time you feel the urge to complain about your cell phone bill.

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[8] "As far as we can see, looking at it by and large, taking one thing with another in terms of the average, in the final analysis it is probably true to say, that at the end of the day, in general terms, you would probably find that, not to put too fine a point on it, there probably wasn't very much in it one way or the other. As far as one can see. At this stage" —Sir Humphrey Appleby.

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People who are passionate about public policy know that the Province of Saskatchewan has pioneered some of Canada's major policy innovations. The two distinguished public servants after whom the school is named, Albert W. Johnson and Thomas K. Shoyama, used their practical and theoretical knowledge to challenge existing policies and practices, as well as to explore new policies and organizational forms. Earning the label, "the Greatest Generation," they and their colleagues became part of a group of modernizers who saw government as a positive catalyst of change in post-war Canada. They created a legacy of achievement in public administration and professionalism in public service that remains a continuing inspiration for public servants in Saskatchewan and across the country. The Johnson Shoyama Graduate School of Public Policy is proud to carry on the tradition by educating students interested in and devoted to advancing public value.