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Chairman Glen and members of the Energy Policy Committee, thank you for the opportunity to address you this afternoon. I have worked my entire career in the technology sector. As the former President of Microsoft Canada, I have witnessed the incredible benefits technology can provide. I have also seen the potential risks if technology is not used appropriately. I believe there is potential harm in our current implementation of wireless devices today.

Five years ago I co-founded the organization, Canadians for Safe Technology. C4ST is a not-for-profit, completely volunteer-based coalition of parents, citizens and experts whose key mission is to educate and inform Canadians and their policy makers about the risk of exposure to unsafe levels of radiation from technology.

I hope my decision to travel in person to meet with you today, at my own expense, underscores my belief how important this topic is.

Five years ago I spent several months researching this issue. I met personally with over a dozen leading medical or research experts in the field of the effects of electromagnetic radiation. These experts are from institutions such as Yale, Harvard, Columbia, University of Toronto and McGill University. Other experts include a Nobel co-lauerate award recipient; another is the expert who wrote the section on Cancer in the WHO's latest designation of all wireless radiation as a possible human carcinogen.

After months of meetings, reading reports, attending presentations and my own analysis, I became convinced there is harm from wireless devices the way we use them today. Continued research and analysis over the last 5 years has re-inforced my opinion. I have resigned from all the Corporate boards on which I previously served, and am dedicating my efforts to C4ST and the Environmental Health Trust.

While we live in different countries, I believe we can agree on the following:

1. No manufacturer or distributor of cell phones, no one in my industry, nor any regulatory body says that cell phones or any other wireless enabled devices are safe. What they say is that they meet all safety regulations
2. Unfortunately, our track record in North America is not stellar. We reacted very late to the harmful effects of tobacco, asbestos, BPA, thalidomide, DDT and urea formaldehyde insulation
3. This is an issue that can be supported across all party lines

In North America, our guidelines and regulations are behind other countries.

China, Russia, Italy and Switzerland have guidelines that are 100 times safer than in Canada and the US.

In 2015 French Legislators passed articles into law that:

- Put restrictions on advertisements promoting cell phones

- Either banned or restricted the use of wi-fi in schools.

Also in 2015, Taiwanese lawmakers passed new legislation in which parents face fines who allow children under the age of two to use tablets and smartphones

As of March, 2014, it is illegal to market cell phones to children less than seven years of age in Belgium.

In my capacity as a board member advising CEO's and their executive staff for the previous 15 years, I have found it very important to focus on process. It is management's job to run the company. A board member's role is primarily governance and oversight. For this reason, I feel qualified to comment on the process used to evaluate the science regarding cell phone safety.

The process is broken. Our current North America guidelines are stuck in the early 1900's theory that non-ionizing radiation cannot cause harm, or if it does, it must heat tissue. Albert Einstein is one of the scientists credited with that statement. He passed away the same year that Steve Jobs was born. Canadian and FCC guidelines recognize only thermal effects causing harm (tissue heating). To think the science has not evolved since then is unacceptable and ignores the thousands of peer reviewed published evidence that show harm from wireless devices at levels below our current North American safety standards.

What I am most disappointed in, is the behaviour of my industry. Every wireless device carries a warning designating how far the device should be held from the body in order to meet Federal safety guidelines. A study by The Canadian Broadcasting Corporation's National program Marketplace reported that "81% of Canadians have never seen the message in their phone or manual about carrying their cell phone 5-15mm away from their body" and "67% of respondents say they carry their phones in their pocket or directly against their body".¹ The CBC also tested three of the more popular cell phones for radiation levels and found that all three phones emitted 3 to 4 times more radiation when held against the body than the FCC guidelines state is safe.²

No one in my industry is proactive in providing the information needed to use the devices safely. Instead, they hide behind the public relations buffer of their industry associations, who give the same tired excuse "our products meet federal guidelines". The time has passed when manufacturers and distributors can say they have no liability, by referencing a guideline that is thirty years out of date. Or that they have placed warnings somewhere in the product fine print where the buyer will never see them.

We are here to specifically discuss Bills SB 637, SB 894. There are significant concerns with the implementation of 5G technology.

1. The National Institute for Science, Law & Public Policy (NISLAPP) in Washington, D.C. published a report: "Re-Inventing Wires: The Future of Landlines and Networks". Written by Timothy Schoechle, PhD. Dr. Schoechle holds an M.S. in telecommunications engineering and a Ph.D. in communications policy from the University of Colorado, Boulder. His report challenges the current thinking that wireless solutions are the most optimum method to deliver high speed communications. There is no doubt that for limited, mobile situations, a wireless connection is necessary. But in the majority of situations requiring internet connections, wired solutions are better. My industry has been very effective in convincing individuals that wireless connections are necessary for internet access.

¹ Ibid time 14:24

² https://www.youtube.com/watch?v=Wm69ik_Qdb8&t=1s&list=PLeyJPHbRnGaZmzkCwy3-8ykUZm_8B9kKM&index=1
time 15:45

I have chosen 7 key conclusions from Dr. Schoechle's report:

- As the technology evolves, wired solutions continue to be about 100 times faster than wireless.
- Wireless technologies are unreliable, more vulnerable to security and privacy problems and prone to both latency and delay issues vs. wired systems.
- The cost of internet access can be significantly reduced with fiber networks.
- Wireless networks consume significant amounts of energy and are not sustainable. The average iPhone, for example, uses more energy than a mid-size ENERGY STAR® compliant refrigerator (about 361 kW-h counting wireless connections, data usage and battery charging). In the 3 years between 2012-2015, the wireless cloud increased its carbon footprint by the equivalent of adding 4.9 million cars to the road.
- Universal dependence on wireless systems leaves people vulnerable in the event of power grid failure. In the event of a prolonged power outage, mobile devices leave people with no service, compared to landlines with independent power sources.
- New USB, premises wiring and cabling technologies for inside homes and buildings provide a secure and reliable alternative to Wi-Fi and other wireless access platforms.
- There are many unanswered questions about the implementation of the Internet of Things (IoT). Unfortunately, based on my industry's track record, solutions will be implemented in the market without thorough answers. Without government direction and potentially intervention, the passage of Bills SB 637, SB 894 will allow the deployment of this technology unchecked. For eg.,
 - what protection will citizens have from the additional huge troves of data that will be collected about the most intimate details of our lives, details that can be sold and/or captured by botnets. When critical systems are linked to tens or hundreds of thousands more remote actuators and/or cloud-based software, those links can become vulnerable, inadequate or inappropriate. What additional protective measures are being taken?
 - IoT also raises many safety issues, one simple example is what if a stove or oven is activated by a cell phone when something flammable is nearby? Or a hacker in China, Iran or another country finds a way to control door locks, furnaces or the national grid system?

In addition to Schoechle's report, other concerns have been raised.

1. In Sept., 2017, over 200 scientists and doctors from 35 countries sent a declaration to officials of the European Commission demanding a moratorium on the increase of cell antennas for planned 5G expansion. They highlighted concerns over health effects from higher radiation exposure include potential neurological impacts, infertility, and cancer.³
2. 5G technology has major differences between current wireless technologies. It is effective only over short distances, and is poorly transmitted through solids. To automatically assume there are no health consequences because 5G fits between arbitrary limits set by FCC guidelines is a dangerous assumption.

³ <https://drive.google.com/file/d/0B14R6QNkmaXueIFrNWRQcThNV0U/view>

Neither the FCC, industry, nor any other credible organization can point to any peer-reviewed evidence-based science that shows 5G technology is safe.⁴ However, what we do know is of concern.

- **Skin will be most affected** - 5G radiation is chiefly absorbed by the skin, the largest organ of the body.^{5,6,7,8} As one example, some toxicants can concentrate in the skin, and interactions with wireless radiation may be one reason for increasing incidence of skin cancers on non-sun-exposed skin. 5G may magnify and accelerate this issue.⁹ We simply do not know.
 - Trials of short term exposures for therapeutic treatments for neurological conditions¹⁰ have shown that these frequencies have biological effects. What we don't know is what the health effects will be when people are exposed 24/7 from outside sources e.g. microcells on utility poles, as well as from inside sources from household appliances. In many cases the only difference between a medicine and a poison is the dosage.
 - The U.S., Russian and Chinese defense agencies have been developing weapons that rely on the capability of this electromagnetic frequency range to induce unpleasant burning sensations on the skin as a form of crowd control. This is exploiting the fact that sweat ducts may act as antennae for sub-millimetre wavelength radiation that can cause point heating and pain.¹¹ Again, at what levels does this 5G frequency move from a beneficial application to a harmful one?
3. Intensive infrastructure will be required due to the limitations of 5G technology. 5G requires unobstructed paths between transmitters and receivers. Thus, many antennae are necessary, preferably line-of-sight. As a result, full-scale implementation could result in powerful antennae every 3 to 10 houses in residential areas.¹²
 4. *Medical and scientific experts are publishing reports and papers that question the rollout of 5G technology.* Dr. Cindy Russell's article "A 5G Wireless Future: Will It Give Us a Smart Nation or Contribute to An Unhealthy One?" asks highly relevant questions challenging the North American industries' plans to roll out 5G technology.¹³ Another paper is written by Dr. Beatrice Alexandra Golomb, MD, PhD, Professor of Medicine, University of California San Diego School of Medicine. Dr. Golomb writes a very compelling argument on why individuals who will be adversely impacted by the 5G rollout need to be protected. Her argument is supported with references to 360 published articles and papers.¹⁴

4 No analyses or evaluation of biological effects were presented in Safety Code 6 (2015), the Safety Code 6 (2015) Rationale, nor in the authorities that are referred to in these reports.

5 <https://ehtrust.org/wp-content/uploads/Yuri-Feldman-and-Paul-Ben-Ishai-Abstract.pdf>

6 https://www.researchgate.net/publication/51394628_Human_Skin_as_Arrays_of_Helical_Antennas_in_the_Millimeter_and_Submillimeter_Wave_Range

7 <http://aph.huji.ac.il/people/feldman/research.htm#Human%20Skin%20as%20Arrays%20of%20Helical%20Antennas%20in%20the%20Millimeter%20and%20Submillimeter%20Wave%20Range>

8 <https://www.ncbi.nlm.nih.gov/pubmed/21297244>

9 Kostoff, R. N., & Lau, C. G. Y. (2013). Combined biological and health effects of electromagnetic fields and other agents in the published literature. *Technological Forecasting & Social Change*, 80(7), 1331–1349 .

https://www.researchgate.net/publication/273830948_Combined_biological_and_health_effects_of_electromagnetic_fields_and_other_agents_in_the_published_literature

10 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1475937/>

11 https://www.researchgate.net/publication/51394628_Human_Skin_as_Arrays_of_Helical_Antennas_in_the_Millimeter_and_Submillimeter_Wave_Range

12 <https://ehtrust.org/key-issues/cell-phoneswireless/5g-networks-iot-scientific-overview-human-health-risks/>

13 <http://www.sccma-mcims.org/Portals/19/assets/docs/17ZZ-PDF.pdf?ver=2017-05-10-133815-897>

14 <https://drive.google.com/file/d/0B14R6QNkmaXubmZUbWl1aERpX1E/view>

5. In North America, our track record of protecting citizens in a timely manner is not exemplary, when you consider the ongoing delays regarding asbestos, cigarette smoking and bisphenol-A (BPA), as well as thalidomide and urea formaldehyde insulation in the past. The growing scientific evidence indicates that exposure from wireless device emissions are becoming a public health catastrophe of comparable magnitude.

My industry's reaction to any form of legislation, from any level of government, is predictable. We will yell long and loud about the potential impact. I don't believe there will be revenue or funding impacts. I don't believe there will be loss in productivity nor competitive advantage. What will happen is what I have seen for over 35 years. There will be initial grumbling. Then we will get to work and not only find a better solution, but a cheaper one. There are far too many benefits, personally, socially and for business for anything else to happen.

I am especially concerned about children. Children are not "little adults"; their brains are not fully developed until age 20. Their skulls are thinner and can't block the radiation as well as an adult brain. Studies show that the radiation from a cell phone penetrates 70% of the brain of a five year old vs. 10% for an adult.

I believe that my industry has lost the trust that it has been given the last few decades where new technology solutions are launched in the market with very few checks and balances. Almost on a daily basis there are reports of some breach of trust from my industry. Fortunately, not many impact the millions of customers like the recent Facebook issue or Yahoo's 2014 breach impacting 500 million customers that wasn't reported until 2016. Unfortunately, I doubt the \$35million fine given to Yahoo's new holding company will have any impact on the behaviour of companies with billions of dollars on their balance sheet.

I have no doubt that this laissez-faire approach has resulted in significant growth in the technology industry with significant benefits to customers and businesses. I submit that we have no idea at what cost. Given the significant acceptance of wireless technology where in some countries predictions are for more than one cell phone per individual, the impacts will only increase. I am not advocating for intervention. I am advocating for a more responsible rollout of technology. An excellent place to start is with the proposed 5G technology. Until we have a far better understanding of the potential harm to individuals, prove that there are solutions to the increased reliability, energy consumption, security and privacy breaches from 5G and get a clearer perspective of the real potential benefits, we should not give my industry carte-blanc to proceed full speed ahead.

I believe this is an opportunity to challenge my industry to come up with better solutions so we can have the best of both worlds; the implementation of solutions that provide continued access to the internet and interconnections that are safe.

For that reason, I ask that you vote against Bills SB 637, SB 894.

Thank you.