



Delivering on the Promise of 5G: A Game Changer for Canadian Industry

Imagine a world in which doctors perform remote surgeries using Virtual Reality headsets and robotic arms, a world in which sensors report on the safety of bridges, cars save lives by applying their own brakes, and where a movie can be downloaded in the blink of an eye.

“It’s all on the near horizon,” says Mark Bryant, Chief Information Officer for construction giant PCL, “but we can’t get there without fifth-generation (5G) wide-area wireless networks. 5G is going to have a transformative impact on all industries.”

Hailed as the purveyor of billions of new connections, 5G will boost peak data speeds from today’s 100Mbps (megabits per second) to upwards of 10 Gbps (gigabits per second). Much faster speeds, greater reliability, and decreased latency will allow communication to take place in close to real time, thereby affecting everything from autonomous vehicle manufacturing, industrial automation and entertainment to health care, education and transportation.

Big changes ahead: Are you ready?

“You can’t overemphasize 5G’s capacity for disruption,” says Bryant. “Smart cities and smart buildings are going to be consuming and sending and receiving data like never before. The construction sector is already adapting to 4G advances in drone surveying, IoT in construction and Augmented Reality. The immense amount of data made possible by 5G will mean significant changes in the way PCL builds new structures and adapts those that are already built.

Indeed, a report by Canada's Information and Communications Technology Council (ICTC) describes 5G mobile technology as a catalyst for transformative change across multiple industries. "Look at the difference low latency will make for autonomous cars," says Namir Anani, ICTC's President and CEO. "This will be the backbone for that industry. When a vehicle needs to make a life or death decision, you can't afford any delays."

5G will spur on even more disruption

The combination of 5G and Virtual or Augmented Reality (VR/AR) will also be a boon for other sectors, according to the ICTC report. It could be used by shoppers to see how virtual furniture will look in their home before buying it or for police car windshields to detect stolen license plates. Within ten years, "everybody will wear a pair of glasses instead of a smart phone and the glasses will recognize you and your name will pop up and maybe with your LinkedIn, so I know who you are," says Alan Smithson, the CEO of MetaVRse, a Mississauga-based VR/AR company.

The advent of 5G is expected to have a significant impact on health care, especially in remote areas. "In medicine, you'll see robots doing surgery – a doctor in Toronto controlling a robot that's doing surgery in Yellowknife, for example," says Golrooz Taef, the program chair of the Wireless Systems Engineering Technology program at the Northern Alberta Institute of Technology. Emergency care will change with the emergence of 5G "super-ambulances". They will be equipped with high-definition video equipment and be able to transmit X-ray scans directly to the hospital.

The promise of the Internet of Things (IOT) will be realized with high-speed transmission of data from sensors. In industries such as oil and gas, manufacturing or transportation, "5G could help reduce equipment failures, maintenance costs and unplanned downtime while increasing safety," says Taef. Similarly, farmers will be able to make more precise decisions based on real-time data on air moisture, temperature and water requirements.

Understanding the Five 'Gs' in 5G

In only three decades, wireless technology has transformed the way we access and share information.

Here's how five generations of wireless technology have evolved.



1G

Released in the early 1990s, first generation analog cellular technology transmitted only voice.

Be prepared to get smarter

With 5G, smart communities will get smarter. “We are in a smart economy and 55% of the world’s population live in urban locations,” says Anani. “Buildings will become more and more smart with connected grids to manage everything from heat and lights to parking and security.

The process of rolling out 5G technology will also create new opportunities for many companies, including those in the construction industry, says Mark Bryant.

“We’ll have one role as a customer and consumer of new technologies, but there will be other exciting prospects as a construction management partner for telcos with their 5G rollout,” he explains. “Today’s 4G networks rely on large communications towers, while 5G requires a vast network of small cells that are mounted on public infrastructure such as buildings, utility poles and street lights. Carriers are neither prepared nor equipped to install the large volume of devices and access points. In order to be successful, they are going to need an experienced construction partner to deal with logistics and placement of cells.”

5G will build community

As an entrepreneur who has spent the greater part of his career sorting out how to get cellular signals inside buildings, Ted Maulucci has a keen appreciation for the infrastructure involved in delivering on the potential of 5G. “You need infrastructure to connect people,” says Maulucci, President of SmartONE Solutions Inc., a Canadian company committed to creating smart communities. “There was far less involved when cell phones were simply mobile devices for transmitting voice outside the home. Now, with 5G, the majority of use is inside buildings. Infrastructure will be critical because high frequencies don’t pass through physical barriers, like concrete walls, as easily as lower frequencies. A far faster data network with faster data flows will mean many more antennas and cell towers.”



2G

Introduced in the late 1990s, 2G used new digital cellular technologies, such as GSM, CDMA and TDMA, to make text possible between two cellular devices.



3G

Popularized in the early 2000s, technologies such as EVDO, HSPA, UMTS resulted in faster transmissions, allowing users to use smart wireless devices to make phone calls, send texts, and surf the Internet.

Smartphones and iPads didn't exist when Maulucci began a 26-year career as the Chief Information Officer for a major, multi-family real estate developer in Toronto. He recalls taking a group of banking executives through a new condominium in Toronto. "The project looked fabulous," he says, "but when the bankers got inside the building, their cellphones wouldn't work. Even then it was a problem, but today it would be a deal breaker. Whether a condo, a mall, or an office building, no one wants to live or work in a space that isn't connected."

"Higher frequencies make penetration capability one of the challenges posed by 5G," agrees Namir Anani, President and CEO of Canada's Information and Communications Technology Council (ICTC). "The promise of this next generation technology is tremendous, but the realization of that promise will depend on enabling technologies that are currently in the design phase."

Huge economic potential

With an estimated impact of around \$26 billion on the Canadian economy, 5G has the potential to add about 82,000 new jobs by 2030. "Every phase of 5G will require ICT professionals with the skills to install and manage the new technologies," says Anani. "Canada's major telecom operators are already taking steps to ensure they have the human resources in place to handle the transition."

Despite higher interest rates and fluctuations in global markets, last year's digital job growth rose by 9% in Canada, compared to only 1.2% growth for other employment sectors. CTIA, the voice of America's wireless industry, predicts that in the United States, a \$275 billion investment in 5G will result in three million new jobs and an additional \$5 billion for the economy.



4G

Approximately 10 years later, technologies such as WiMAX and LTE reimagined the cellular phone as a device that could make phone calls, send texts, browse the web, and rapidly stream video files.



5G

Small cell technology will result in faster speed, lower latency, greater reliability and increased connections, impacting every interaction between humans and technology. Even our physical landscape will change, as small cells mounted on public infrastructure will replace large cellular towers.

It won't happen overnight, but planning ahead is critical

Broad deployment of 5G will take some time, with best estimates ranging between 2023 and 2025. “Over the next three years, the Canadian government has plans to hold three auctions to support the deployment of 5G,” says Anani. “The first of the spectrum auctions – which was held in mid-March 2019 – was for the low-frequency 600MHz (megahertz) range. The mid-band 3.5 GHz (gigahertz) spectrum auction is planned for 2020, and the final spectrum – the millimetre Wave (mmWave) – will be auctioned in 2021.”

The last two frequencies (3.5 GHz and mmWave) are crucial to the full deployment of 5G, so nothing will happen overnight. Still, there's no room for complacency when it comes to integrating new wireless connections. “Gathering resources and implementing deployment strategies will take time,” says Anani. “Businesses are advised to plan ahead.”

Mark Bryant's advice is to consider the potential impact of 5G and how dramatically things will change. “There will be significant costs and significant effort required,” he says, “but there will also be significant opportunities. Adopting emerging technologies is one of the best ways for organizations to distinguish themselves in the tech space. It might also be the only way to survive. Simply put, we can't get where we want to go without 5G.”



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