



**ENCQOR** 5G

INNOVATION ENCQOR

**ENCQOR 5G**  
**FULFILLING A UNIQUE  
ROLE WITHIN THE  
CANADIAN 5G UNIVERSE**

**ACTIVITY  
REPORT**

**APRIL 2020 - MARCH 2021**

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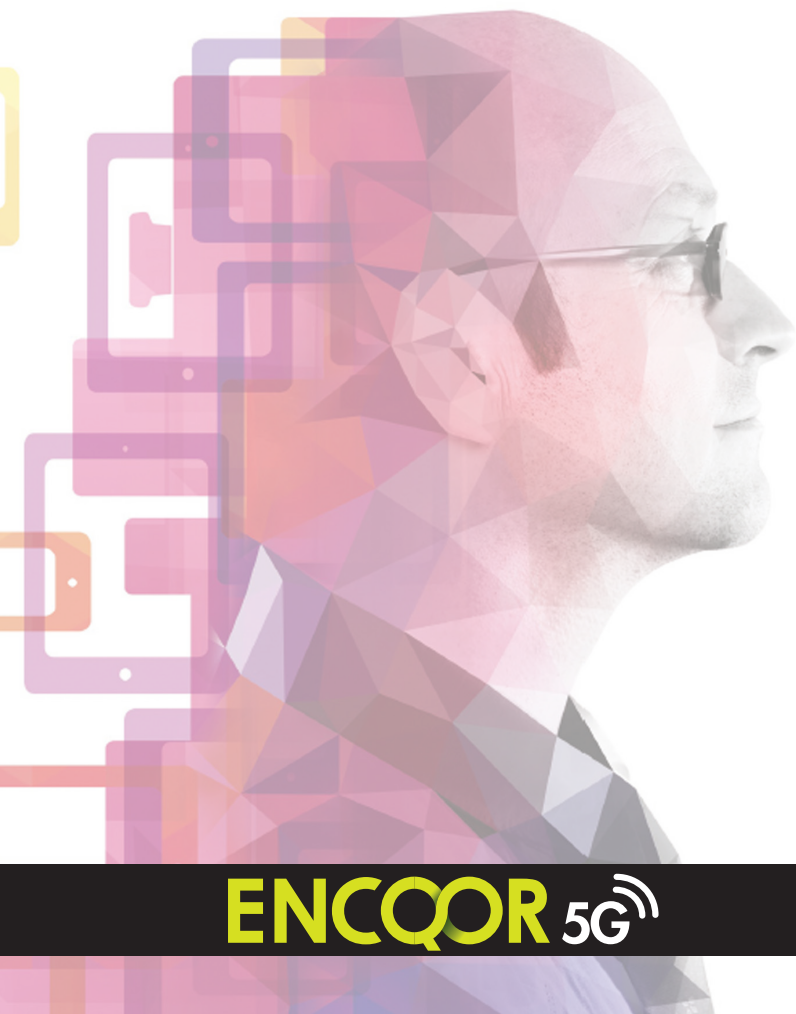
# STRONG FOUNDATIONS TO SUPPORT THE DEVELOPMENT OF A WORLD-CLASS 5G INNOVATION ECOSYSTEM IN CANADA

## ENCQOR 5G

[ENCQOR](#) has set up a 5G testbed network to allow companies of all sizes, IT professionals, public and private sector researchers, and graduate students to rapidly access a state-of-the-art 5G development and testing platform for the prototyping of products and services.

ENCQOR 5G has 5 innovation centres in Quebec and Ontario, located in Quebec City, Montreal, Ottawa, Toronto, and Waterloo respectively.

With potential speeds of up to 10 gigabits per second, increased network capacity and ultra-low latencies in the millisecond range, 5G will be critical to bringing a whole new generation of products and services to market, including connected and autonomous vehicles, remote health systems, virtual solutions, smart cities, and new Internet of Things (IoT) applications.



# A MESSAGE FROM THE CHAIRMAN OF THE BOARD



## **ENCQOR 5G CONTINUES TO BUILD MOMENTUM DESPITE THE PANDEMIC**

The past year has seen significant progress in the ENCQOR 5G program, despite the constraints posed by the pandemic. While placing safety at the heart of our priorities, we were able to maintain our momentum and reach the milestone of 565 SMEs committed to the program by the end of the last fiscal year, on March 31, 2021. In the months that followed, the program maintained an accelerated pace of deployment to pass the 700 SME mark in July.

We can be very proud of these results, which demonstrate ENCQOR's growing footprint in Canada and the willingness of our SMEs to innovate and take advantage of the many opportunities 5G offers. The high quality of ENCQOR's 5G network, as well as its state-of-the-art services and equipment, allow SMEs to develop and test 5G solutions in a technological environment that is at the forefront of new trends and market realities.

### **New autonomous 5G network**

In this regard, I would like to highlight the commissioning of ENCQOR's Standalone 5G network, with the valuable contribution of one of our five anchor partners, Ericsson. The ENCQOR 5G testbed is now capable of serving edge applications with one-way latency tolerances of less than five milliseconds, a critical advance for the success of future innovations such as autonomous driving, robotics, and public safety.

Of course, talent development is another essential requirement for the successful deployment of 5G technology. Thanks to the commitment of various partners, in particular the academic community, the Ontario Centre of Innovation and Mitacs, ENCQOR 5G will have facilitated some 400 internships to date, involving hundreds of graduate students and dozens of supervising professors. These cohorts of students will have acquired concrete and enriching work experience by participating directly in 5G research and development work, whether in a large company or in an SME.

### **Continuing to support 5G deployment**

These various accomplishments have prepared us well for what's next as ENCQOR 5G completes the final year of its initial 5-year program. There is no doubt that we will need to continue to provide strong support for the deployment of 5G technology over the next few years in Canada, with an increased focus on its adoption in various high-value sectors. These include manufacturing, healthcare, transportation, smart cities, mining, and the environment, to name a few.

The success of the ENCQOR 5G program relies on the collaboration of several key players whom I would like to thank. I am thinking, particularly, of our five anchor partners, CGI, Ciena, Ericsson, IBM and Thales, whose commitment and expertise enable ENCQOR to offer a leading-edge, high-performance 5G network and ecosystem. I would also like to acknowledge the unwavering support of our three government partners, the federal, Quebec and Ontario governments, who share our belief in the strategic importance of supporting the development of 5G technology in Canada.

### **Competitiveness and new technologies**

The competitiveness of the Canadian economy and our collective prosperity in the future will depend in large part on our ability to adopt and exploit new «disruptive» technologies, such as 5G. We will also need to be able to take advantage of other emerging technologies, such as artificial intelligence, cloud computing and cybersecurity, for which the development of 5G is key.

In this context, a program like ENCQOR 5G, which brings us together to combine our strengths, increases the quality and impact of our efforts, enabling us to better compete internationally. This is certainly an approach that should inspire and guide us as we pursue the deployment of 5G technology in Canada over the next few years.

**Germain Lamonde**

*Chairman of the Board*  
INNOVATION ENCQOR



## GENERAL MANAGER'S MESSAGE



Over the year, ENCQOR 5G demonstrated that its collaborative model works well, taking advantage of a leverage effect with all its partners, be it governments and founding partners, as well as NPOs such as OCI, Prompt and ADRIQ and our innovation sites Centech in Montreal, Communitech in Waterloo, MaRS in Toronto, Invest Ottawa and IID in Quebec City. No less than a hundred people across Quebec and Ontario were able to raise awareness and mobilize innovators to see 5G applied not only in the technology sector, but also in many other areas, from agriculture to transportation, health, manufacturing, and smart cities, among others.

A significant aspect of the ENCQOR program (in addition to engaging and supporting Canadian SMEs looking to take advantage of 5G in their product development) is the support of 5G research, in combination with related areas such as artificial intelligence applied to network management and resiliency; quantum computing applied to cybersecurity; edge cloud computing; optics-photonics for 5G circuits; the Internet of Things; big data; and cybersecurity applied to and enabled by 5G. These research efforts in partnership with established academic institutions in Ontario and Quebec, as well as with our founding partners, have resulted in the development of new 5G knowledge. This work is paving the way to further push research into 5G applications.

This year also saw 5G begin to be deployed commercially in Canada with the upgrade of service providers' cellular networks and the introduction of new 5G-enabled devices. In this context, ENCQOR's pre-commercial network has remained relevant by enabling 5G trials that are not currently possible on commercial networks, such as the use of 5G millimeter frequencies, the possibility of conducting 5G tests without access fees, or to test prototype devices or sensors using 5G.

I must also underline the extensive training to which ENCQOR's NPO partners (OCI, Prompt, ADRIQ, Invest Ottawa, Communitech, MaRS, IID, Centech) have contributed by setting up webinars, bootcamps, training sessions, demo days, newsletters, and video testimonials of success stories where 5G is used. I also would like to acknowledge their support of the development of startups that wish to use 5G. Thanks also to Mr. Pierre Fitzgibbon, then Quebec Minister of Economy and Innovation, for his participation in an interactive virtual session for those using and developing 5G.

This year's accomplishments set the stage for the next step: accelerating the adoption of 5G in various fields to realize its economic and social benefits in order to help Canada recover from the pandemic and remain internationally competitive.

**Pierre Boucher**  
*General Manager*  
INNOVATION ENCQOR

## ENCQOR 5G PROGRAM PARTNERS



The ENCQOR 5G program is a transformative \$400 million partnership that brings together five global leaders in digital technologies (Ericsson, Ciena Canada Inc., Thales Canada Inc., IBM Canada, and CGI) and the following mobilization partners: Prompt, ADRIQ, and the Ontario Centre of Innovation (OCI).

This partnership is made possible in part by funding from the Government of Canada, and the governments of Quebec and Ontario.

### ANCHOR PARTNERS

ERICSSON 

ciena

THALES

IBM

CGI

### GOVERNMENT PARTNERS

Canada 

Ontario 

Québec 

# GOVERNMENT PARTICIPATION

## CANADA

“More than ever, Canadians rely on technology and connectivity in their everyday lives to work, study, and to stay in touch with their loved ones. Through its 5G ecosystem, ENCQOR has maintained thousands of qualified jobs in Canada and is now helping our country to play a leadership role in 5G network capability. We will always support Canadian businesses who are succeeding in the global innovation race.”



Canada

The Honourable  
**FRANÇOIS-PHILIPPE  
CHAMPAGNE,**  
Minister of Innovation,  
Science and Industry

## QUEBEC

“The ENCQOR 5G project is an opportunity to develop our digital infrastructure and technologies for the next generations. It aims to create a synergy at the heart of the information technology and communications industry in order to accelerate innovation and improve the productivity of our businesses. We are counting on the benefits of this initiative to continue Quebec’s transition to a new, more efficient and prosperous economy.”



Québec

**PIERRE FITZGIBBON,**  
Quebec’s Minister  
of Economy  
and Innovation

## ONTARIO

“Too many people, especially those living in rural and Northern communities, do not have fast and reliable connectivity. The ENCQOR 5G program is an incredible opportunity for Ontario’s businesses to create and test innovative homegrown solutions for the benefit of our communities as we continue together on our path to a full economic recovery from the COVID-19 outbreak.”



Ontario

The Honourable  
**VIC FEDELI,**  
Minister of Economic  
Development,  
Job Creation and Trade

## TESTIMONIALS FROM OUR ANCHOR PARTNERS

"Now in its fourth year, ENCQOR 5G continues to drive forward Canada's 5G ecosystem. Our digital lifestyles are evermore dependent on high-performance connectivity, and ENCQOR's infrastructure-as-a-service approach has helped businesses improve the quality and performance of their solutions and speed time to market. Through its research investment initiatives, the collaborative has made it possible for academic researchers to tackle complex, real-world challenges. Looking ahead, we anticipate even greater innovations and results as we work to make the promise of 5G a reality."

**- Steve Alexander, Senior Vice President and Chief Technology Officer of Ciena**

[Ciena](#)



"We are proud of the work we accomplished this year with our other ENCQOR 5G partners. We have helped Canadian SMEs implement 5G capabilities for their future products and solutions. 5G is a disruptive technology, but its many benefits, including higher bandwidth, lower latency and the ability to connect billions of devices, will require all stakeholders in all sectors of Canada's economy to come together to make its adoption a reality. This concerted effort will have a major impact on the digital transformation of the Canadian economy, in communities large and small, and across markets from transportation to space."

**- Siegfried Usal, VP Digital Innovation, Thales North America General Manager**

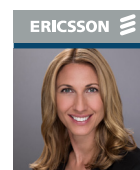
[THALES](#)



"Ericsson is committed to bringing 5G to Canada, and we are proud to support the evolution of the ENCQOR 5G program. Our research and development in Canada enabled us to maintain the ENCQOR 5G network with our latest technologies. Over the past year, we have seen increased interest from Canadian businesses who see 5G as a catalyst for their digital transformations. The ENCQOR 5G program, and all of its partners and participants, have played a major role in this transformation."

**- Jeanette Irekvist, Vice President and Head of Customer Unit, Ericsson Canada**

[ERICSSON](#)



"We are proud of our participation in the ENCQOR 5G program, an initiative that has introduced many small and medium-sized enterprises in Quebec and Ontario to cutting-edge 5G technology and expertise. The ecosystem created and maintained by ENCQOR 5G has stimulated growth and innovation in multiple sectors, spanning entertainment, telecommunications, transportation and logistics, utilities and many other fields. As one of the founding partners of ENCQOR 5G, we continue to support this program that will benefit many segments of the technology industry, now and in the future."

**- Frédéric Lesieur, Vice President Consulting Services, Manufacturing & Utilities at CGI**

[CGI](#)



"The ENCQOR 5G ecosystem continues to be a unique and essential catalyst for IBM Canada, particularly for the Bromont plant, to develop complex opto-electronic component packaging solutions adapted to the growing needs of emerging 5G networks. The development of these assembly processes and their integration into complex configurations are significant technological advances, which will contribute to a new offering of innovative solutions that will benefit our Canadian economy."

**- Louis Labelle, Director, Bromont Plant, IBM Canada**

[IBM](#)





# MOBILIZATION PARTNERS

## PROMPT

Prompt is the Industrial Research Regroupment for Information and Communication Technologies (ICT), Digital, Data Science, Artificial Intelligence and Cybersecurity in Quebec. Our mission is to propel and fund research and development with high potential for socio-economic benefits, coming from collaborative research partnerships, business, and public sector researchers working in these highly strategic sectors for Quebec.

[Prompt](#)

## ONTARIO CENTRE OF INNOVATION

OCI maximizes the commercial impact of research developed in Ontario's colleges, universities, and research hospitals, and accelerates the commercialization of emerging technologies. A pan-provincial collaboration platform, with a broad and deep network across industry, academia and government, OCI initiates unparalleled partnership opportunities, develops and manages successful industry-academic collaborations, supports high-potential SMEs in commercializing ground-breaking research and provides hands-on training and skills development opportunities for the next generation of highly-skilled talent.

[OCI](#)

## ADRIQ

ADRIQ addresses the main concerns and conveys the opportunities for research and innovation players in order to create favourable conditions for their success. Its mission is to support and promote research and innovation in Quebec in order to increase the competitiveness of businesses, both here and abroad. With the help of the various innovation players in Quebec, the association intends to maximize innovation efforts in order to offer its members a maximum return on their investment and accelerate the growth of their organizations.

[ADRIQ](#)



# ENCQOR 5G

## DIGITAL INNOVATION HUBS

### CENTECH

Dedicated to high-tech (deep tech) companies with high growth potential, Centech is a world-class business incubator based in Montreal. Centech is a non-profit organization open to everyone and offers two support programs for startups: the ACCELERATION program (12 weeks), then the strongest potential is selected to get into the PROPULSION program (24 months). Centech performs particularly well in the fields of medical technology, manufacturing, telecoms and microelectronics and other intelligent objects. In 2019, Centech was recognized by UBI Global as one of the most successful university incubators in the world.

[Centech](#)

### INSTITUTE INTELLIGENCE AND DATA

Inaugurated in January 2020, IID (Institute Intelligence and Data) at Université Laval brings together the driving forces of research and innovation in artificial intelligence and data valorization in the greater Quebec City area. From fundamental to applied research, including major ethical issues, IID members, collaborators and associate researchers are actively working today to develop methods, technologies and practices that will support the Quebec of tomorrow.

[IID](#)

### INVEST OTTAWA

Invest Ottawa is the lead economic development agency for knowledge-based industries in Canada's Capital, facilitating economic growth and job creation in the City of Ottawa. Guided by a vision to help realize Ottawa's full potential as a globally recognized, innovative and future-ready city, and the best place to learn, work, live, and play, Invest Ottawa delivers venture development and global expansion programs and services that catalyze the growth and success of entrepreneurs and firms.

[Invest Ottawa](#)

### COMMUNITTECH

Communittech was founded in 1997 by a group of entrepreneurs who came together to help one another build successful companies to help ensure the future prosperity of Canada. They created an organization to support the entire "Community of Tech" to help companies start, grow and succeed.

[Communittech](#)

### MaRS DISCOVERY DISTRICT

MaRS, a centre based in Toronto, supports over 1,200 Canadian science and tech companies that are tackling some of society's greatest challenges, providing them with tailored resources at every stage of their growth, from startups to scale-up. We focus on the four sectors — cleantech, health, fintech and enterprise software — where the potential is greatest to build high-impact companies that strengthen the economy.

[MaRS](#)



## SMES AT 5G SPEED

As of March 31, 2021, some 565 SMEs had joined the ENCQOR program since its launch in 2017 (over 730 as of August 31, 2021). SMEs participating in ENCQOR 5G are using 5G network solutions to modernize and transform a wide variety of sectors, including telecommunications, multimedia and entertainment, transportation, smart cities, healthcare, advanced manufacturing, agriculture, and mining.

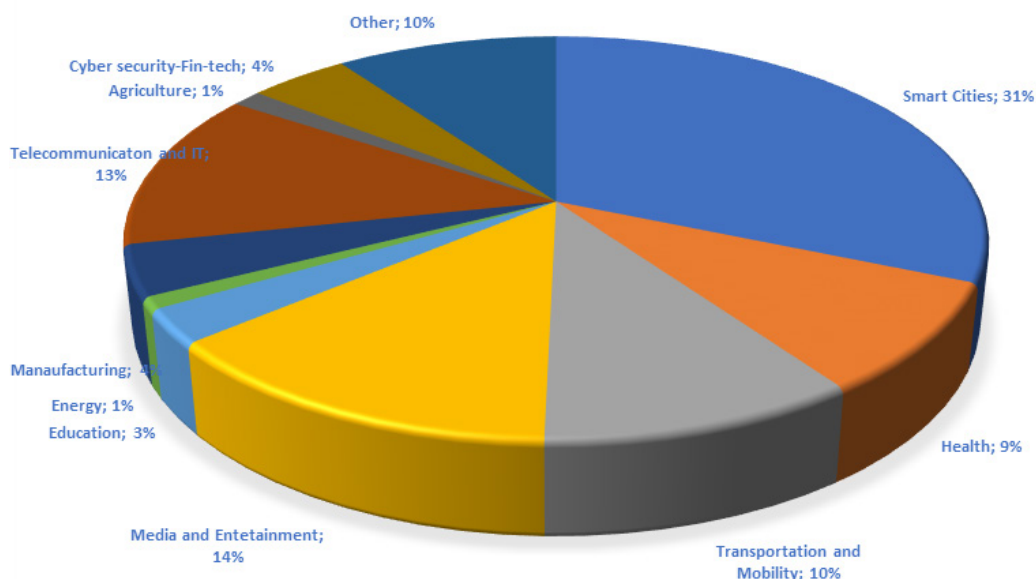
The achievement of this remarkable new milestone underscores the strategic importance and impact of ENCQOR in the development and testing of new 5G technologies in Canada. With so many SMEs participating in the program, ENCQOR has created a dynamic, diverse and innovative 5G ecosystem in just a few years.

Among other things, ENCQOR's participating SMEs have been given free access to ENCQOR's high-performance testbeds, providing them with access to all three of the 5G spectrum ranges.

Due to the pandemic, businesses are more dependent than ever on high-performance connectivity. Despite the challenges posed by COVID-19, the ENCQOR 5G team was able to keep the 5G testbed accessible throughout the pandemic. These efforts enabled ENCQOR to continue its successful deployment and reach the 500 SME milestone by March 31, 2021. SME's applications of 5G are many, as shown by sector in the illustration below.

### TARGETED SECTORS AND THEIR ECONOMIC IMPACT

**SMEs by sectors – ENCQOR 5G**  
(n=565)



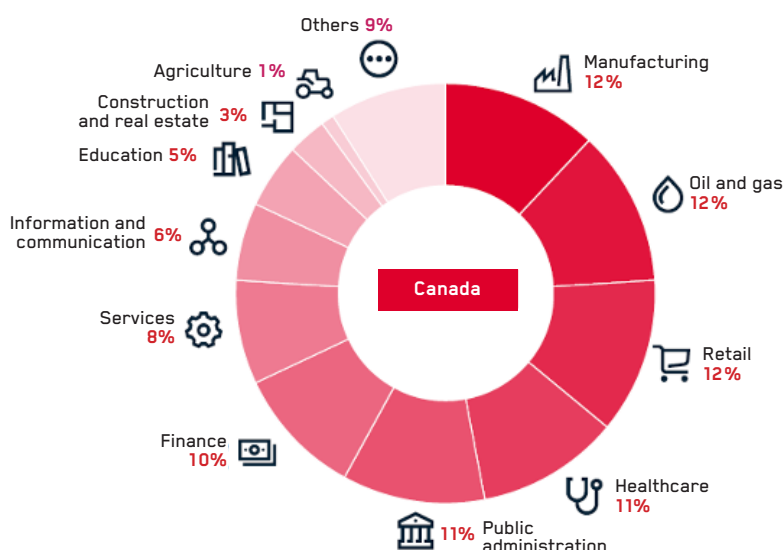
# SMES AT 5G SPEED

These multiple uses of the ENCQOR testbed illustrate that even if 5G is still in its infancy in terms of consumer use, it is already an important lever to support Canadian businesses in their digital transformation. This digital transition is now essential to ensure the competitiveness of our companies on an international scale.

ENCQOR's experience during the last year has clearly highlighted that support for the implementation of 5G within Canadian companies is essential to allow them to continue to innovate and carry out their digital transformations. For these companies, we have seen through our various mobilization activities that 5G also poses various challenges, including understanding this technology and the benefits it can generate, particularly in terms of operational efficiency.

A recent study on the economic impact of 5G in different sectors in Canada highlights the benefits of this technology by sector, as shown in the illustration below.

## 5G benefit distribution, by sector



Source : GMSA Intelligence, *5G and economic growth – An assessment of GDP impacts in Canada*, November 2020, p.21 et 35

To date, the SMEs participating in ENCQOR come from many of these sectors, including the manufacturing sector, health, the financial sector, information and communications, education and agriculture.

Below we present some testimonials from SMEs about the impact that 5G can have in the sectors.



# SMES AT 5G SPEED

## THE TELECOMMUNICATIONS AND INFORMATION TECHNOLOGY SECTOR



### LATENCE TECHNOLOGIES: CLOUD COMPUTING IN REAL TIME

Latence Technologies is a company that develops an AI-based cloud solution to track and monetize, in real time, the new benefits of 5G, including ultra-low latency and high reliability.

Latence Technologies collects real-time, continuous latency and reliability data from the five ENCQOR 5G network sites and can predict their development. The solution developed by Latence Technologies also performs advanced analysis including trend prediction and benchmarking.

Finally, Latence Technologies develops a monetization tool based on the concept of Bonus-Malus (a business model based on the fluctuation of the price of a service according to its quality) allowing the quality of 5G service to be optimized for industrial uses.

### 5G deployment in industrial environments

Latence Technologies' objective is to commercialize a cloud solution based on artificial intelligence to help mobile operators deploy 5G connectivity in the industrial environment.

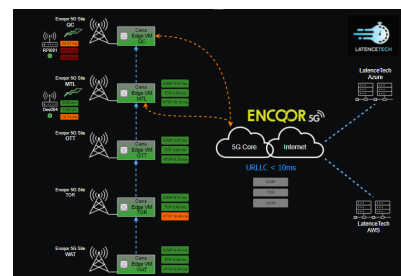
To date, Latence Technologies has carried out the following work with the support of ENCQOR 5G:

- 24/7 ENCQOR 5G network testing and data collection;
- 24/7 ENCQOR 5G network testing and data collection using Ciena EDGE nodes;
- Developed a tool for real-time monitoring of ENCQOR 5G network latency, reliability and bandwidth.

ENCQOR 5G offered strong technical support in Montreal and Quebec City, helping Latence Technologies when the 5G modems used had problems and to gain access to the ENCQOR network. In addition, access to ENCQOR 5G networks in Montreal and Quebec City allowed the company to collect data continuously.



Benoit Gendron, Founder & CEO  
and Zara Khani, Co-founder and AI/ML Expert



### **NIOSENSE: INTELLIGENT TRAFFIC**

Niosense, a company that adapts traffic lights to each user, aims to reduce greenhouse gas (GHG) emissions related to transportation by creating intelligent infrastructure.

Niosense is currently implementing its technological showcase in the city of Trois-Rivières with a fleet of 50 vehicles on 15 intersections with traffic lights. This fleet will allow for better management of heavy vehicle traffic in the city and thus reduce the nuisances associated with trucking, including reducing GHG emissions.

“The important thing is to respect the fact that mobility belongs to everyone. We believe that only business models that give cities ownership of their data and full autonomy over the management of their infrastructure will have the public’s support and, in the long run, will be able to aspire to success.” - Patrick Lauzière, CEO of Niosense

### **Benefits of ENCQOR 5G**

As part of the 5G project with ENCQOR, Niosense carried out a great deal of work following the acquisition of 5G hardware, including the creation of data architectures, tests and concepts, APIs and several data collection and analysis tools. These elements will allow Niosense to support development and demonstrations with tangible data, which will demonstrate the benefits of using 5G to improve urban mobility.

Niosense offers a product that enables heavy vehicle traffic management and allows cities and infrastructure managers to better target their interventions and adapt traffic signals to each user. Niosense also offers fleet managers a mobile application and hardware components to make vehicle management more efficient, both operationally and environmentally.

Working with ENCQOR 5G has been very simple and efficient. The terms of use are clear, the support is comprehensive, and the project management and monitoring teams are well versed in the operation of the entire platform. Niosense received full support in terms of access to various tools and the project is progressing smoothly. It is a pleasure for Niosense to work with the ENCQOR 5G team.



## SMES AT 5G SPEED

### THE HEALTHCARE SECTOR



#### ATEK: CONNECTED TECHNOLOGIES AND THE HEALTHCARE FIELD

ATEK is a company specialized in automating operational processes in the healthcare field with the help of connected technologies also known as the Internet of Things (IoT).

Their temperature management system monitors the operational parameters of sensitive and critical biomedical equipment such as refrigerators, freezers or incubators and notifies users of temperature deviations. Their laboratory sample traceability system is a platform that tracks samples in analytical laboratories. It ensures the traceability of samples and avoids losses during inter or intra site transportation. Finally, the ATEK cloud platform manages the client interfaces and the millions of daily connections and sensor recordings.

#### Important tests to develop concrete solutions

Within the framework of the ENCQOR 5G project, ATEK's objective was to adapt its infrastructure to take full advantage of 5G technology. Specifically, ATEK wants to use the 5G communication protocols NB-IoT and LTE-M to optimize the solutions developed.

Each avenue of development improves its infrastructure for a specific use. In this sense, LTE-M communication is particularly effective in the healthcare field. Our LTE-M network allows data exchange via a gateway between ATEK's server and the sensors deployed in the products developed. This communication protocol is more efficient because it reduces interference caused by physical obstacles and increases the transmission range. As for 5G NB-IoT, it optimizes battery consumption, a crucial improvement when sensors are scattered across Quebec's vaccination sites.

These advances were made possible thanks to the series of tests that were conducted during the project with ENCQOR 5G. ATEK was able to conduct both office and field tests, and the company plans to conduct tests at ENCQOR 5G's IpaaS site soon.



## SMES AT 5G SPEED

### THE HIGH TECHNOLOGY SECTOR



#### ARVIZIO: TOWARDS MIXED AND AUGMENTED REALITY

Ottawa-based Arvizio is on a mission to deliver the next generation of mixed reality team collaboration and visualization technology, remotely and in real time, to a wide range of markets including architecture, engineering, construction and more. Their platform has a variety of capabilities to allow users to share 3D models on multiple types of headsets and mobile devices, as well as allowing documents, images and other project data to be included in the Augmented Reality / Mixed Reality experience without the development of custom application software.

#### A productive partnership with ENCQOR 5G

Through an ENCQOR 5G project, Arvizio focused on testing and demonstrating the use of 5G wireless technology and edge computing for AR/MR collaboration. The high network bandwidth and low latency that is delivered through 5G technology was a requirement that Arvizio looked for to allow them to run next generation MR applications. The project provided the company access to a live 5G test environment for them to test and validate their solution, create a proven test reference, demonstrate the advantages of their solution to potential customers and strategic partners, and accelerate the time to market for the solution.

The project allowed Arvizio to build into their mobile application many of the features that previously could only be offered on a desktop version, making the software more attractive to many types of users.

"When we founded Arvizio, our goal was to offer the industry's first mixed and augmented reality platform for real-time visualization and collaboration with large scale 3D models used in engineering, advanced manufacturing, energy and other industry verticals," says Alex Berlin, President and COO of Arvizio. "It's exciting to see this vision advance and deliver leading edge technology to companies around the world. The next phase will be even more exciting, as the worlds of AR, AI, IoT and 5G begin to align for a whole new phase in the digital transformation of industry."

Arvizio is continuing to test and expand their product and solution offering, increase their customer base and grow recurring revenue. Recently, the company secured large customers, and is looking to expand their team to support this growth and bring their solution to a range of industries.





## SMES AT 5G SPEED

### THE HIGH TECHNOLOGY SECTOR

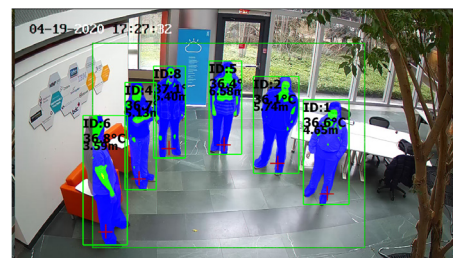


#### FIGHTING COVID-19 WITH INTELLIGENT VIDEO ANALYTICS POWERED BY ARTIFICIAL INTELLIGENCE

Finding a silver lining during a pandemic may seem unrealistic for most businesses, but for EAIGLE, it was an opportunity waiting to happen.

Operating in Markham and Waterloo, EAIGLE is a computer vision and Artificial Intelligence (AI) company that designs and implements AI software technologies that non-invasively detects people within indoor and outdoor spaces in real time. The company began with co-founders Amir Hoss, OCI and Mahdi Marsousi, CTO, and their goal of finding ways to optimize space, energy, and labor operations for facilities and buildings sustainable operations. Now, the technology is being applied in ways that go beyond saving money and toward helping people stay safe and healthy during uncertain times.

When the pandemic struck, EAIGLE pivoted their original business strategy towards building a solution to help mitigate the spread of COVID-19. EAIGLE makes all the steps of COVID-19 screening unmanned and fully automated targeting all the main areas of concern, such as self-declaring questions, social distance measurement, temperature screening, people counting, occupancy monitoring and mask detection. By using their same technology to detect people who might have contracted the virus, EAIGLE has effectively reduced labor, time and interactions between people for their clients.



Their system uses AI to monitor numerous cameras at once to count people, assess mask compliance, and detect fevers in an automated process that doesn't interrupt normal traffic flow or require stationed staff. As the cameras monitor people within a designated monitoring area, real-time notifications are provided when elevated body temperature is detected, or social distancing and mask compliance isn't being followed.

EAIGLE's engagement with OCI helped to develop a made-in-Ontario AI solution that is scalable and expandable to a variety of verticals and industries. "Access to OCI's ENCQOR 5G program helped to optimize hardware cost and overall system architecture, especially in outdoor discrete locations which allows us to expand our AI solution to smart city applications at much lower cost and an improved business model," says Hoss.

"The value to us, first and foremost, is OCI's credibility as a partner and investor, which is key in gaining the trust of private investors, and strategic customers especially in the Canadian market. For our customers, knowing OCI is supporting a local tech company is a great help towards our go to market strategies," says Hoss. "Second is the advice and network connections that we get through OCI and their strategic partners, which is a key step in our expansion strategies that is especially prominent within the commercial real estate and retail sectors."

The COVID-19 automated screening solution helps industries and businesses plan their safe return-to-work strategy so that employers, employees and visitors can go to work with the confidence that state-of-the-art protection and detection is in place. EAIGLE's technology is currently used in a variety of businesses and industries, from government and public facilities to commercial real estate and retail, from manufacturing and warehousing to healthcare and pharmaceuticals. It is also exported to the US market.

## SMES AT 5G SPEED

### THE MANUFACTURING SECTOR



#### OTTO MOTORS: AUTOMATED MATERIAL HANDLING

Waterloo's OTTO Motors provides autonomous mobile robots for material handling inside manufacturing facilities and warehouses. OTTO is trusted for mission-critical deliveries in the most demanding of industrial environments and its customers include some of the world's most recognized brands, including GE and Toyota.

Otto Motors had a successful formula, but they knew they could do more. They saw the inherent benefits 5G can provide — higher reliability of communications than wifi, lower latency and higher throughput. The company recognized that by utilizing 5G capabilities there was a potential to improve safety, reliability, and performance of their materials handling robots. But this new protocol would require new hardware, infrastructure and testing to get it working.

By participating in the ENCQOR 5G program, and utilizing the 5G testbed at Communtech, Otto Motors gained access to 5G modem equipment and test infrastructure which allowed for testing and final validation of their project. The program's shared funding opportunity also de-risked and accelerated the project, providing Otto Motors with a first-mover advantage over their competition. The project had the added benefit of connecting the company to Ericsson, a global 5G leader.

#### Safe and reliable products

It is an exciting time for OTTO Motors. Manufacturers are increasingly using Autonomous Mobile Robot (AMR) platforms for modernization and transformation of their material handling to decrease non-productive tasks for humans, improve safety, and increase productivity.

For Otto Motors, that means not only delivering industrial-strength robots that can carry and transport goods autonomously within a warehouse but also the underlying software and automation technology that enables them to safely take on the most dangerous and difficult jobs at enterprise scale.

"On the product side, this year, we are releasing new robots including an automated forklift so that our customers have access to the most comprehensive fleet on the market today. We're also continually releasing new software that enables our customers to use up to one hundred robots working in concert safely, reliably, and efficiently to transform their business." — Jay Judkowitz, VP of Product, Otto Motors

With increasing demand, Otto Motors will continue to expand globally while offering support locally due to their partner network around the world.



# SMES IN ACTION

You can learn more about SMEs involved in the ENCQOR program by viewing the videos presented below.

## ARVIZIO

Ottawa-based Arvizio is on a mission to deliver the next generation of mixed reality team collaboration and visualization technology, remotely and in real time, to a wide range of markets including engineering, construction, manufacturing, energy, mining, IT infrastructure and more.

<https://youtu.be/NdNpx5ISUME>

## AVO

Autonomous Vehicle Organization (AVO) is a Toronto-based company focused on connecting and protecting people from connected and autonomous vehicles. Through the ENCQOR 5G program, AVO was able to test their technology, Foresight, on a 5G network to further develop it to achieve maximum performance.

[https://youtu.be/zkV\\_eb7oCuY](https://youtu.be/zkV_eb7oCuY)

## MARION SURGICAL

Building the world's first Virtual Reality Surgical Simulator. Through virtual reality, Marion Surgical enable surgeons to learn, collaborate, practice, and share procedures in a realistic, safe, cloud-hosted environment.

<https://youtu.be/shEzQUz-o7c>

## OTTO MOTORS

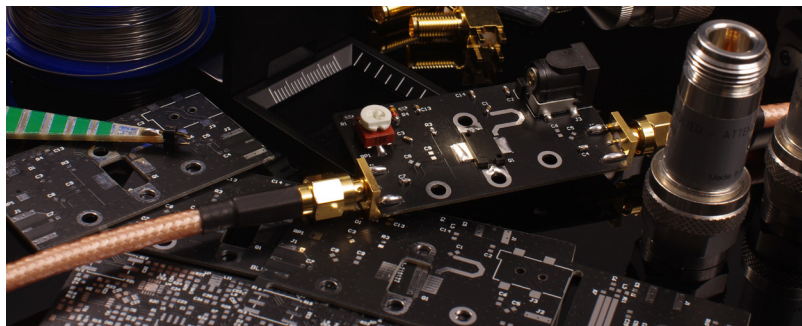
OTTO designs flexible and intelligent autonomous mobile robots for industry, with the ultimate goal of automating the world's dullest, dirtiest, and deadliest jobs.

<https://youtu.be/3yqv1GYA398>

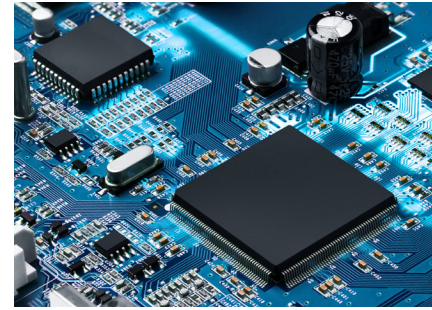
## OVA

With the help of its partners, OVA, a Quebec-based company, is helping both businesses and industries transform with space computing, artificial intelligence and extended reality (XR).

<https://www.youtube.com/watch?v=WJ1KfA3zKLQ>



# 5G RESEARCH AND DEVELOPMENT, A PRIORITY FOR THE ANCHOR PARTNERS OF ENCQOR



## SUMMARY

The pandemic turned the daily lives of all Canadians upside down, including those working in the technology field. However, the founding partners of ENCQOR 5G were able to adapt quickly to continue to advance 5G-related research and development. This section shows the work achieved by each partner through collaborative R&D with academia and R&D conducted internally.

## IBM

### COLLABORATIVE R&D

IBM's R&D work has focused on the development of innovations in the encapsulation of photonic chips that can be used in 5G. These innovations were designed by IBM's Bromont personnel (in particular a development team dedicated to photonic packaging) in collaboration with the NSERC/IBM Canada Research Chair in Microelectronic Packaging at the Université de Sherbrooke. Co-development work was carried out with companies such as LxSim, O-m6 Technologies and AEAPONYX, as well as through a partnership with the C2MI Centres of Excellence.

### OTHER R&D WORK

In its development work, IBM made many achievements in the coupling process using fiber arrays in v-grooves (on the photonic chip). Among the main achievements, reliable strain relief process solutions (choice of materials, definition of application and curing parameters, implementation of surface treatments) have been developed, ensuring the protection of optical connections as well as the reliability of modules under thermal cycling (modules subjected to thermal cycling aging tests). To achieve such results, different approaches using adhesives and polymeric tubes adapted to multi-fiber ribbons have been successfully studied. Also, alternative processes for positioning the fibers in the v-grooves of cambered chips (camber resulting from the difference in thermal coefficient between the chip and the other assembly components) have been developed to increase the robustness of the assembly and the optical performance in reliability.

IBM has ensured the design and planning of prototypes allowing to identify future assembly constraints on co-package optics with functional photonic and electrical chips, allowing to address several novelties and uncertainties in the assembly processes.

To obtain manufacturable and competitive processes, much effort has been focused on the development of new assembly capabilities to meet the technological requirements of silicon photonics. Several activities have been conducted to improve the optical adhesive application process, optimizing the selective coating of photonic chips with a very high yield level. Alternative cures with reduced UV exposure times of the different materials used to assemble the optical modules have also been studied to improve the competitiveness of the processes with new high volume manufacturing equipment.



# 5G RESEARCH AND DEVELOPMENT, A PRIORITY FOR THE ANCHOR PARTNERS OF ENCQOR

## ERICSSON

### COLLABORATIVE R&D

For Ericsson, which has more than 2,000 employees working on 5G development located in Ontario and Quebec, R&D work has focused on innovations in 5G radio, core network and network management technologies, as well as on some 5G applications, including autonomous and connected vehicles, buildings, tourism applications and holographic communications.

Part of this innovation work was conducted in collaboration with Concordia's new Industrial Research Chair (IRC) in Cloud and Edge Computing for 5G. In addition to this Chair, the collaboration with Concordia University was based on Mitacs internships and research in the areas of cybersecurity, intelligent agents, energy efficiency, smart buildings, cloud computing, model-based automation, or virtualized systems all applicable to 5G. With McGill University, Mitacs research internships were held in artificial intelligence and 5G applied to connected vehicles. Finally, with the École des technologies supérieures (ÉTS), Ericsson collaborated on a Mitacs project on the application of artificial intelligence (AI) and its effect on 5G and cybersecurity.

In 5G radio research, Ericsson is collaborating with the University of Toronto and Carleton University to predict the spatial and temporal characteristics of 5G channels. In addition, with the support of the University of Ottawa, Ericsson is exploring AI-facilitated 5G radio resource management, while with Western University, work is being done on real-time knowledge of radio characteristics for machine-like communications and self-optimization and self-correction of radio access networks (RANs).

Ericsson's 5G academic collaborations, which are partially funded by ENCQOR, have resulted in more than 30 scientific publications. Dozens of research teams from various academic institutions in Ontario and Quebec have participated in this work.

In addition to these academic research collaborations, Ericsson is also involved in co-development projects through «Challenge Statements» used in Ontario as part of the Technological Development Program managed by the OCI. In Quebec, technology challenges are launched through the ENCQOR-Quebec website. The collaborations resulting from these technology Challenge Statements include:

- Redline Communications for the use of 5G in unawarded spectrum,
- InDro Robotics and ARA Robotics for the use of drones with 5G,
- Cheetah Networks for 5G planning and indoor deployment tools,
- Iversoft for 5G public security solutions,
- Fidus and Clearpath Robotics for 5G indoor antennas,
- Awastoki for data processing for holographic communications,
- Mixa Vision for a 5G tourism application,
- and Elits for a maritime communications application using 5G.





# 5G RESEARCH AND DEVELOPMENT, A PRIORITY FOR THE ANCHOR PARTNERS OF ENCQOR

## ERICSSON

### OTHER R&D WORK

Ericsson Canada employees have continued to develop new 5G technologies in line with evolving standards, both for radio access products and for the internal parts of these networks. This is 5G “made in Canada by Canadians for Canadians and the world”. Ericsson is achieving this through very strong collaborations with several local universities. Even during the worst of the pandemic, the company maintained all its student internships, though telecommuting. Ericsson is focused on applying artificial intelligence and machine learning techniques, not only within solutions, but also as part of how these 5G networks are tested, deployed, operated, maintained and optimized.

Ericsson’s Canadian R&D focuses on many different aspects of 5G: software tools used to achieve the full potential of this technology; software supply chain security; cloud-native environments (allowing all necessary infrastructure to be in the cloud, without a physical presence); and advanced service orchestration. Ericsson has also partnered with several local small and medium-sized enterprises through the ENCQOR 5G program to co-develop new use cases not possible with 4G. Approximately 2000 of Ericsson’s 3000 Canadian employees are involved in creating or delivering 5G solutions to its customers.





# 5G RESEARCH AND DEVELOPMENT, A PRIORITY FOR THE ANCHOR PARTNERS OF ENCQOR

## CIENA

### COLLABORATIVE R&D

Ciena has nearly 1,000 employees involved in the research and development of 5G adaptive Networks. The research is focused within Ciena's Adaptive Network™ vision, which combines the following three main areas, programmable infrastructure, Control & automation, and Analytics & Intelligence.

As part of its ENCQOR 5G partnership, Ciena has established research and innovation partnerships with academia and small/medium size businesses. These collaborations, both in Ontario & Quebec, include activities in the use of optical data transport systems, artificial intelligence, and its Self-Optimizing Fabric program.

With the Self-Optimizing Fabric (SOF) Program, Ciena has created an international research ecosystem with industry and academia to assess demand-side implications of fully-connected intelligent fabrics of the future. The results of these studies will inform new paradigms for planning, design, and operation of 5G era intelligence systems. In addition to Ciena, the members of this ecosystem include Mitacs, ÉTS University, University of Ottawa, Western Ontario University, Dawson College, CRIM, the Platform Lab at Stanford University, Menya, Humanitas and Tria Network Systems. The research ecosystem explores how a self-optimizing fabric (SOF) can address the complexity of distributing intelligence across disparate intelligent systems collaborating toward mutual tasks while maintaining separation of concerns.

This new collaborative effort expands ENCQOR 5G's mission that serves as the first Canadian pre-commercial corridor for 5G. SOF aims at evolving the ENCQOR 5G corridor with self-optimizing constructs for discovery and verification of real-world use-cases leveraging 5G, AI, and cloud technologies, all underpinned by the principles of Ciena's Adaptive Network™ vision.

Academic research and the development of young talent are essential components to the ENCQOR program. Ciena offers a large number of internship opportunities, both directly and through programs such as Mitacs. Through its ENCQOR participation & research initiatives, Ciena has sponsored 33 unique research investigations with 15 different Academic/Research Institutions, contributing to the technology leadership of the Canadian marketplace.



# 5G RESEARCH AND DEVELOPMENT, A PRIORITY FOR THE ANCHOR PARTNERS OF ENCQOR

## CIENA

### CIENA ACADEMIC RESEARCH PARTNERSHIPS AND PROJECT THROUGH ENCQOR INCLUDE

#### Ottawa University

- Machine Learning-Based Firewall-less Security Automation for the Network
- Self-optimized edge caching and computing fabric in 5G
- Enhanced Mobility Solutions for Ultra Reliable Low Latency Edge Computing
- Augmented Reality for Manufacturing
- The Smart Factory

#### University of Toronto

- VNF Development and Deployment on Galapagos
- Feasibility of Si-based Quantum Information Processing

#### Western Ontario & York Universities

- AI/ML Driven Multi-Layer Self-Optimizing Network (SON) for 5G era systems

#### Carleton University

- Algorithms for Virtualized Network Embedding

#### Waterloo University

- Comprehensive Clock Synch. Solution for 5G Networks

#### École de technologie supérieure (ETS)

- Self-Optimizing Fabric
- Self-Adaptive Machine Learning libraries for Forecasting and Anomaly Detection
- Multilayered Orchestration software platform (MLOP)

#### Centre de Recherche Informatique de Montréal (CRIM)

- Collaborative Networks in ENCQOR 5G Ecosystem

#### Concordia University

- Adaptive Slicing for Intelligent Network Automation

#### Polytechnique Montréal

- Automated monitoring and debugging of large-scale systems
- Developments in High-Speed Low Power Transceiver

#### McGill University

- Next Gen User Multilingual Machine Translation

#### Université du Québec à Montréal (UQAM)

- Towards Next Generation Translation Management with an adaptation to specialized and low-resources domains

#### Dawson College

- SOF - ENCQOR Distributed Fabric Development

In addition to these academic research collaborations, Ciena, is engaged in co-development projects based on key technology challenges. These initiatives have enabled Ciena to sponsor collaborative projects with the following small & medium size businesses:

- **Streamworx:** Preserving video transmission quality through an optical transport network, such as ENCQOR's, and the internet using machine learning techniques, among others.

- **TierOne OSS:** Development of a 5G network management system.

- **Invision AI:** Aims to use AI for recognition of obstacles to 5G signals using cameras on radio towers.

- **I-EMS group:** Investigating how some smart grid features can be applied to 5G.

- **Arvizio:** Working on the DRONE (Digital Reality for Operations & Network Enablement) project to use AI-assisted augmented and virtual reality to facilitate network operations.

- **Lemay Solutions Consulting:** Collaborating to detect data traffic anomalies using machine learning techniques.

- **Humanitas:** health care project on the use of edge computing in a hospital environment for the purpose contact tracing & asset tracking.

- **Menya:** The projects aim to develop the AI capabilities of the SOF platform and use them for fault detection in a testing environment.

- **Tria Networks:** Aims to create a verification environment for data centres that are linked together to form a virtual data centre.

- **MyValue Change Agents Inc:** End to End 5G Zero Touch Provisioning

- **Beslogic:** Adaptive Slicing for Intelligent Network Automation



# 5G RESEARCH AND DEVELOPMENT, A PRIORITY FOR THE ANCHOR PARTNERS OF ENCQOR

## CIENA

### OTHER R&D WORK

The pace of technological advancements in the field of network telecommunications did not diminish during the fiscal year 2020-2021. Network operators were placed under pressure, as massive changes in network traffic patterns occurred almost overnight. As the world took steps to manage the COVID-19 pandemic, network providers had to reconfigure and rebalance their networks. They did this in ways that were transparent to most end-users, adapting and responding to unique and extreme conditions. For many, the ability to quickly pivot was made possible by the Ciena portfolio of networking solutions, which includes optical, routing, switching, and software solutions enhanced by monitoring, orchestration, management, and security capabilities. These are the same technologies available to ENCQOR SMEs in the Innovation Platform as a Service (IPaaS) testbed, enabled for users seeking competitive advantages when developing new 5G-centric network solutions.

Throughout the last year, IPaaS continued to provide small and medium businesses and enterprises with a full suite of services, despite lockdowns and closures. While many sites were closed much of the year, end-to-end connectivity remained fully operational and available. New services with increased functionality for 5G backhaul site-to-site connectivity were supported by Ciena's 5170 Platform. Ciena provided Graphic Processing Unit (GPU) server enhancements for virtual cloud and edge compute capabilities which were made available to users prior to rollout in many commercial networks. Together with our partners, we provided access to enhanced edge compute platforms and cloud network simulation services.

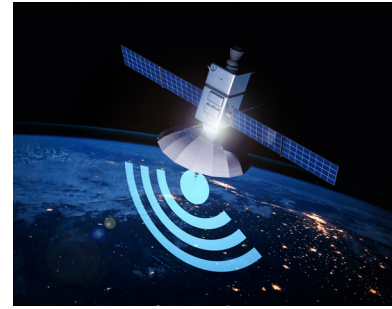
Application boot camps, led by Ciena, helped SMEs in multi-media and entertainment businesses get the most out of what ENCQOR has to offer. Of note were two sessions sponsored by the Kingston Development Corporation in partnership with Ericsson and the Centre of Excellence in Next Generation Networks (CENGN).

Significant network functionality advancement by researchers, and students through the Ciena-organized Self-Optimizing Fabric (SOF) research ecosystem led to the publication of 10 scholarly works. Additionally, participant SMEs connected to hub sites are improving the quality and performance of their solutions and accelerating time to market, gaining a strategic advantage.

A particularly important aspect of the ENCQOR 5G program is the fostering of young talent. Ciena offers many internship opportunities, both directly and through programs such as Mitacs. In 2020-2021 Ciena sponsored 28 unique research investigations at 12 Canadian universities, contributing to the technology leadership of the Canadian marketplace.



# 5G RESEARCH AND DEVELOPMENT, A PRIORITY FOR THE ANCHOR PARTNERS OF ENCQOR



## THALES

### COLLABORATIVE R&D

Thales has more than 1,200 employees working in 5G application areas such as transportation, smart cities, cyber security, and artificial intelligence. The company has established strong partnerships with several partners in Quebec and in Ontario.

With Concordia University, research has focused on cyber security as it applies to smart grids. With Université Laval, in collaboration with the Institute Intelligence and Data (IID) among others, research focused on urban fluidity with AI and 5G solutions applicable to bus transportation. Other projects with Université Laval focused on machine learning and a simulator to be used to evaluate cyber security. With École Polytechnique de Montréal and the Institut de valorisation des données (IVADO), research has focused on the valorization of operational data for public transportation systems, as well as on knowledge graphs that can help with intelligent conversational systems.

### OTHER R&D WORK

Over the past year, Thales continued to deploy the ENCQOR 5G ecosystem and focused its research activities on consolidating the results of analysis, prototyping and simulation work. This work is aimed at leveraging certain advances related to 5G as a disruptive technology for connected objects and secure communications, but also for real-time prediction and decision support systems related to security and intelligent urban mobility. The company also renewed the engaging smart city boot camp experience that uses Thales-developed image processing and data cross-referencing software.

With the deployment activities of the cyber security lab for IoT completed, Thales teams now have the right tool in 2021 to support research and analysis of connected object communications and security. New innovative technologies have been tested to secure the network while maintaining 5G data throughput at its highest level of performance.

The company also continued its work on the urban security prototype, focusing on the generic reasoning platform for visualizing theaters of operation and real-time decision support for police responders. The processing and augmentation of raw data acquired from 5G sensors has enriched the knowledge models and improved the performance of artificial intelligence algorithms. The continued exploration of different use cases for the connected police officer has made it possible to add physiological and capability dimensions of individuals, and to deepen the data processing performed.

Thales has also entered into a collaboration with an SME working in the field of inertial measurement units to support technological advances in the localization of autonomous or semi-autonomous vehicles. The co-development project is currently being launched.

The consolidation of its research activities for the collection, storage and processing of multi-source 5G data has enabled Thales to reach a level of maturity for its various building blocks within the framework of its mobilizing project. The latest algorithms for localization and data compression to power decision-making in a safety context have completed the overall integration qualification for the use case of 5G development and demonstration of real-time data analysis in support of autonomous vehicles in the face of obstacles and harsh Canadian weather conditions.

**THALES**

# 5G RESEARCH AND DEVELOPMENT, A PRIORITY FOR THE ANCHOR PARTNERS OF ENCQOR

## CGI

As part of the research and development related to the ENCQOR 5G program, CGI is continuing the fourth phase of the SaaS-Web (web-based software) deployment of the Pragma solution. Pragma provides North American utilities with an outage and personnel management platform that allows for the optimal deployment of mobile forces to manage the restoration of electrical services. The bandwidth available with 5G provides Pragma with the means to enrich the quality and quantity of data that is available to mobile users, enabling greater efficiency in operations. Research and development efforts on this component will continue until the end of the ENCQOR 5G program in 2022. The effects of the pandemic on North American utilities continue to reinforce the need to accelerate the migration of these critical systems to cloud computing.

The Pragma solution also manages mobile forces and power distribution networks, enabling a synoptic view of operations (PragmaGEO) that displays telemetry from multiple common utility IT systems. The PragmaGEO Re-architecture project touches on integration with the Geographic Information System (GIS), which contains the inventory of devices and lines that make up the electrical network. The use of PragmaGEO with this new architecture in a 5G context will allow mobile forces to have a view of the conditions that exist on the geography, powered by the GIS as well as Pragma's real-time data, which will ensure the safety of operations and personnel. Work linking Pragma to intelligent location of faults and failures also continued during this period, functions that enable faster and more accurate prediction of problems that cause electrical service outages.





# MAJOR ACADEMIC PARTNERSHIPS FOR THE ADVANCEMENT OF 5G

## 5G AND ARTIFICIAL INTELLIGENCE GO HAND IN HAND IN THE CAPITALE-NATIONALE THANKS TO THE COLLABORATION BETWEEN ENCQOR AND LAVAL UNIVERSITY'S INTELLIGENCE AND DATA INSTITUTE



Laval University's Intelligence and Data Institute (IID) and ENCQOR 5G joined forces in September 2020, with the signing of a strategic partnership.

With this collaboration, hundreds of companies in the Capitale-Nationale region have access to cross-expertise between artificial intelligence and 5G. Indeed, SMEs now have access not only to antennas and 5G technologies available for R&D in a pre-commercial context, but also to experienced researchers with a wide range of expertise in fields related to artificial intelligence, data science or industry 4.0 in support of the digital transformation of organizations.

Through its unifying mandate as well as its actions, IID combines applied and fundamental research in these cutting-edge fields. Its member researchers develop methods, technologies and practices that will support the Quebec of tomorrow. The Institute's offer complements the ENCQOR 5G programs in the greater Quebec City area, allowing SMEs to test a wide range of applications with access to three 5G frequency ranges, and to obtain support in the development of innovative projects based on artificial intelligence.





# MAJOR ACADEMIC PARTNERSHIPS FOR THE ADVANCEMENT OF 5G

## PARTNERSHIP WITH THE UNIVERSITY OF OTTAWA TO SUPPORT THE DEVELOPMENT OF 5G PROJECTS



Since 2018, the University of Ottawa, ENCQOR 5G and some of its founding partners have been collaborating to develop 5G-related projects while fostering world-class talent specialized in the wireless communications industry and the internet of tomorrow.

The projects, also developed with the support of some of ENCQOR 5G's founding partners, touch on a multitude of fields including virtual reality, intelligent transportation, computer security and manufacturing, among others. For example, at the Networked Systems and Communications Research (NETCORE) Laboratory, directed by Dr. Melike Erol-Kantarci, a PI for 3 ENCQOR projects and Canada Research Chair in AI-enabled Next Generation Wireless Networks, students gain valuable skills on developing novel machine learning algorithms for optimizing the performance of 5G and paving the way to new technologies that have the promise to be adopted in 6G. The strong collaborations built around those ENCQOR projects have resulted in numerous innovations and academic publications, as well as creating a talent pipeline with several of the NETCORE graduates embarking on careers at the ENCQOR partners.

The University of Ottawa wishes to encourage collaboration between the various players in the technology industry and students and faculty members to find creative solutions to the needs of business and society. In addition, the research and projects conducted at the University of Ottawa will help develop a more reliable and secure 5G network in the long term.

This type of partnership allows students, professors and researchers to deepen the knowledge they have gained to date in the 5G community, while stimulating the economy by bringing specialists into the workforce who are ready to contribute to 5G technology projects within the companies that need them.



# HIGHLIGHTS OF THE YEAR 2020-2021

FROM APRIL 1, 2020 TO MARCH 30, 2021

## **NEW PARTNERSHIP BETWEEN MITACS AND ENCQOR 5G TO SUPPORT THE DEVELOPMENT OF 5G TECHNOLOGY IN CANADA**

**APRIL 27, 2020**

ENCQOR 5G and Mitacs announced a partnership agreement to support the development of a competitive 5G innovation ecosystem in Canada. Through this agreement, Mitacs is helping to connect 400 interns and supervising professors with small and medium-sized enterprises (SMEs) in Quebec and the industry at large to develop several projects under the ENCQOR 5G program.

## **OVA AND ELLICOM PARTICIPATE IN THE ENCQOR 5G PROJECT**

**MAY 28, 2020**

Ellicom, a leader in training and learning solutions, and OVA, an immersive technology company, announced a major collaboration with ENCQOR 5G. OVA's flagship product, StellarX™, has been available via the Steam platform online store since January 25, 2020. It is a powerful tool, supported by artificial intelligence and enabling the co-creation of augmented, virtual and mixed reality environments. The OVA team has been working tirelessly on its development for the past six years, and recently unveiled its new branding, as well as a completely revamped website.

## **CONCORDIA UNIVERSITY, ENCQOR 5G AND ERICSSON JOIN FORCES TO CREATE THE INDUSTRIAL RESEARCH CHAIR IN CLOUD AND EDGE COMPUTING FOR 5G AND BEYOND**

**JUNE 26, 2020**

Concordia University, ENCQOR 5G and Ericsson announced the creation of a new Industrial Research Chair (IRC) in Cloud and Edge Computing for 5G and beyond. The goal of the new chair is to increase the performance of the 5G network by leveraging cloud and edge computing, as well as artificial intelligence. The creation of this new advanced research team, which has a five-year mandate, was made possible by a total investment of \$2.7 million.

## **ENCQOR 5G COMBINES 5G TECHNOLOGY WITH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE AT ITS QUEBEC CITY INNOVATION CENTER**

**SEPTEMBER 3, 2020**

ENCQOR 5G announced a strategic partnership between Laval University's Institute for Intelligence and Data (IID) and Prompt to manage its Quebec City innovation site. Through this partnership, 5G will meet, more than ever, artificial intelligence and data science. Since September 1, 2020, IID and Prompt have joined forces to run this exceptional site and mobilize hundreds of Quebec SMEs to develop products and services using the new capabilities offered by 5G connectivity.

# HIGHLIGHTS OF THE YEAR 2020-2021

FROM APRIL 1, 2020 TO MARCH 30, 2021

## **IRISTEL ENTERS INTO COLLABORATION AGREEMENT WITH ENCQOR 5G** **OCTOBER 9, 2020**

ENCQOR 5G announced the signing of a new collaboration agreement with Iristel, an innovative telecommunications player based in Markham, Ontario, with operations across Canada. Through this agreement, Iristel will have access to ENCQOR's 5G testbed to perform various technological development work and test new solutions using 5G technology. Iristel joins the ranks of ENCQOR 5G, along with 6 other telecommunications companies: Bell, Cogeco, Ecotel (Ambra Solutions), Rogers, Telus and Videotron. These companies also signed memorandums of understanding last February to use ENCQOR 5G infrastructures for technological development purposes.

## **ENCQOR 5G AND OVA JOIN FORCES TO OFFER SMES THE OPPORTUNITY TO DEVELOP VIRTUAL REALITY SOLUTIONS POWERED BY 5G** **NOVEMBER 6, 2020**

ENCQOR 5G entered into a collaboration agreement with OVA Inc. to offer SMEs the opportunity to develop virtual and augmented reality solutions while leveraging the power of 5G technology. OVA is a company specialized in the field of spatial computing. Through its StellarX platform, which enables the development of augmented reality (AR) and virtual reality (VR) simulations, OVA seeks to democratize the use of immersive technologies in many business sectors.

## **VEXXHOST COLLABORATES WITH CIENA IN CANADIAN ENCQOR 5G PARTNERSHIP** **FEBRUARY 17, 2020**

VEXXHOST entered into a collaboration agreement with Ciena as part of the ENCQOR 5G partnership. As a certified specialist in OpenStack hosting and management, VEXXHOST's contribution to ENCQOR 5G will be to provide a fully managed service of the OpenStack cloud environment. As the cloud partner for this initiative, VEXXHOST will take care of ENCQOR 5G's internal IT network environment, supported by Ciena, and ensure that it is implemented with best practices. VEXXHOST's responsibility is to maintain ENCQOR 5G's IT resources across its 5 innovation centers located in Quebec (Montreal and Quebec City) and Ontario (Ottawa, Toronto and Waterloo) and to ensure the proper functioning and efficiency of cloud resources.

# HIGHLIGHTS OF THE YEAR 2020-2021

FROM APRIL 1, 2020 TO MARCH 30, 2021

## **ADRIQ ANNOUNCES 5G ADOPTION PROJECT WITH WALLRUS CREATIVE TECHNOLOGIES UNDER THE ENCQOR 5G PROGRAM** **FEBRUARY 25, 2020**



The Association pour le développement de la recherche et de l'innovation du Québec (ADRIQ) announced the 5G adoption project with Wallrus Creative Technologies. As a partner in the ENCQOR 5G program, ADRIQ is assisting Quebec companies from all walks of life in the adoption and integration of 5G technology. The application developed by Wallrus Creative Technologies is one of these projects.

## **KEPSTRUM GETS ENCQOR 5G SUPPORT FOR COLLABORATIVE 5G PROJECT TO IMPROVE QUALITY CONTROL AND SUPPLY CHAIN RELIABILITY** **MARCH 8, 2021**

ENCQOR 5G announced a collaborative research project between Kepstrum Inc. (inventor of Product DNA and a leading global provider of artificial intelligence and physics-based prognostics and health management technologies) and Ciena, a networking systems, services and software company. Using state-of-the-art learning methods and algorithms, Kepstrum and Ciena will explore ways to leverage artificial intelligence to ensure better quality control and reliability in supply chains. Dr. Pedram Ataee, author of Artificial Intelligence: Unorthodox Lessons, is leading the research in this collaboration.

## **AIOT CANADA TEAMS UP WITH ENCOQR 5G TO PROMOTE THE ADOPTION, DEVELOPMENT AND OPERATIONALIZATION OF IA AND IDO TECHNOLOGIES** **MARCH 17, 2021**

AIoT Canada and ENCQOR 5G have teamed up to accelerate the adoption of AI (Artificial Intelligence) and IoT (Internet of Things) technologies. AIoT Canada sees the Internet of Things combined with artificial intelligence as a key driver of economic and social development. The scope of this field is such that it is now essential to bring together best practices and key industry and research partners for Canada to maintain its leadership position on the international stage. Through this collaboration with ENCQOR 5G, AIoT will have the opportunity to establish synergies to propel education and training programs, technology demonstrations and various projects to drive 5G, AI and IoT innovation.

## **A MAJOR MILESTONE** **MARCH 18, 2021**

ENCQOR 5G passed the milestone of 500 SMEs joining the program since its launch in 2017. SMEs participating in ENCQOR 5G are using 5G network solutions to modernize and transform a wide variety of sectors, including telecommunications, multimedia and entertainment, transportation, smart cities, healthcare, advanced manufacturing, agriculture, and mining.

# MANY 5G EXCHANGES AND MOBILIZATION ACTIVITIES IN QUEBEC

## ENCQOR 5G EVENTS IN QUEBEC 2020-2021

### February 23, 2020

Video Games | Experiential and 5G: Opportunity or Threat?

Presentation by ENCQOR of the possibilities offered by 5G within the digital experience and video game industry to accelerate the shift of the digital economy and strengthen the competitiveness of our innovative SMEs.

### April 17 and May 15, 2020

Business Continuity: Augmented Reality Powered by 5G

Webinar with renowned 5G and industry experts, including ENCQOR, to discuss the potential of 5G and augmented reality in developing a technological and industrial advantage in Quebec.

### July 8 and September 16, 2020

Virtual Bootcamp - 5G and Smart Cities  
Bootcamp organized by ENCQOR 5G to explain how 5G technology can be used in smart cities and to support SMEs in their understanding of 5G issues and the eventual development of new use cases that can benefit from it.

### October 13, 2020

MTL Connects - «SILVER Partner» and “Health Pavilion Presenter”  
ENCQOR 5G presentation to introduce its program to the digital media ecosystem.

### October 27, 2020 and November 10, 2020

5G and industrial digital transformation  
The critical Internet of Things and 5G: a catalyst for industrial digital transformation  
Webinars hosted by ENCQOR demonstrating how ENCQOR can help Quebec industry prepare for the arrival of 5G.

### November 24, 2020

AI and 5G: Take advantage of the potential  
Webinar hosted by ENCQOR to present 5G technology and make industry expertise accessible.

### November 27 and December 8, 2020

5G Showcase: Get to know 5G  
Technology showcase in partnership with ENCQOR 5G to discover the program and the innovative projects of SMEs involved with ENCQOR.

### January 18, 2021

Ericsson AAP Information Session  
Information session to discover Ericsson's new 5G and AI projects in partnership with ENCQOR.

### February 25, 2021

AQTR Round Table  
ENCQOR's participation in a roundtable discussion on the changes that will impact the various fields of transportation with the development of 5G technology.

### March 30, 2021

AR-VR Bootcamp  
Bootcamp organized by ENCQOR to highlight the opportunities of 5G within the experiential industry.





# MANY 5G EXCHANGE AND MOBILIZATION ACTIVITIES IN ONTARIO

## ENCQOR 5G EVENTS IN ONTARIO 2020-2021

**May 11, 2020**

Virtual Roundtable: How technology will contribute to the recovery and success of Ontario's small businesses after COVID-19.

ENCQOR 5G participation in a roundtable discussion with the federal government on SME participation in the OCI Advanced Technology Platform.

**June 11, 2020**

Virtual Roundtable: Digital technology and Ontario's path to economic recovery and supply chain resilience.

ENCQOR 5G participation in a roundtable discussion with the federal government on SME participation in the OCI Advanced Technology Platform.

**July 22, 2021**

Virtual Roundtable: Enabling the digital economy: leveraging Canadian data for innovation, resilience and global competitiveness

ENCQOR 5G participation in a roundtable discussion with the federal government on SME participation in OCI's advanced technology platform.

**October 21, 2020**

Virtual Conference: Ontario East Municipal Conference  
OCI presentation on its advanced technology platform, including the ENCQOR 5G program.

**November 19, 2020**

Canadian Telecom Summit  
What's next? Panel on innovative 5G opportunities and applications  
OCI-led panel discussion with Ericsson and Cienna and ENCQOR 5G SMEs.

**November 20, 2020**

OCI General Meeting  
Presentation on the advanced technology platform, including the ENCQOR 5G program and interactive exhibition with company profiles from the ENCQOR 5G program.

**November 26, 2020**

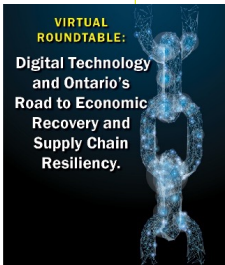
5G Demo Day - Invest Ottawa  
Four Ottawa technology companies demonstrated how they have embraced 5G to stay ahead of their competitors at the first-ever 5G Demo Day hosted by Invest Ottawa.

**December 8, 2020**

2020 VISTA Innovation & Technology Symposium  
York University Symposium. OCI exhibit space showcasing advanced technology platform programs and companies, including ENCQOR 5G.

**March 2, 2021**

Queen's Partnerships and Innovation Roundtable discussion with OCI and Queen's Partnerships and Innovation with three Kingston-based companies that have benefited from OCI's advanced technology platform programs, including ENCQOR 5G.





# ENCQOR 5G IN NUMBERS

*as of March 31, 2021*

## 5G: A TRANSVERSAL AND TRANSFORMATIVE TECHNOLOGY

5G is a technology that is comparable to artificial intelligence, quantum and cybersecurity. It is a transversal technology that will have a structuring impact on a large number of sectors. This technology will enable significant productivity gains, in addition to improving the lives of citizens in a multitude of aspects of their daily lives.

5G will also optimize the performance of new technologies such as artificial intelligence and cybersecurity, thanks in particular to its very low latency and very high speed. Artificial intelligence needs to rely on processing and transmitting large amounts of data to perform at its full potential, which 5G is able to do very efficiently, with latency times never seen before for mobile use cases.

**565** As of March 31, 2021, 565 SMEs had joined the ranks of ENCQOR 5G to develop and test solutions using 5G technology in a variety of sectors, including telecommunications, smart cities, media and entertainment, and transportation and mobility.

By the end of its last fiscal year, March 31, 2021, ENCQOR 5G had approved the support of 5G R&D projects for a total value (including government and private contribution) of more than \$15M in Quebec and more than \$16M in Ontario.

In collaborative R&D with academia, at least \$16M has been invested in 5G research projects.



**1800** The ENCQOR 5G program contributes to the maintenance or creation of more than 1800 high-level research and development jobs in Quebec and Ontario. These researchers and developers work mainly within the five founding partner companies of ENCQOR 5G, but also with SMEs that have projects with ENCQOR.



**15** ENCQOR 5G currently has collaborative projects with some 15 higher education institutions in Quebec and Ontario. These institutions in Ontario are the University of Ottawa, Carleton, Ryerson, Queens, University of Toronto, Western and the University of Waterloo. In Quebec they are the École de Technologie Supérieure, École Polytechnique de Montréal, INRS, UQAM, Laval University, University of Sherbrooke, Concordia and McGill.



**400** There are approximately 400 student internships in Quebec and Ontario that have been completed or are currently underway as part of the ENCQOR 5G program. These internships allow hundreds of university graduate students to participate in numerous 5G research and development projects, particularly in companies, with the support and guidance of supervising professors.



# MEMBERS OF THE BOARD OF DIRECTORS OF INNOVATION ENCQOR INC.

## VOTING MEMBERS

**Germain Lamonde**, Chairman of the Board

**Paul Baptista**

**Peter A. Barnes**

**Frédéric Bastien**

**Corinne Charette**

**Étienne Lemieux**

**Andrew Hrymak**

**John Luszczek**

**Jonathan Milne**

**Nizar Ladak**

**Claude Carrier**

**Catherine Samson**

**Mark Shorey**

**Rodney G. Wilson**

**Suhayya Abu-Hakima**

## BOARD OBSERVERS

**Anne Bermonte**, Government of Ontario

**Éric Dagenais**, Government of Canada

**Mathieu Gervais**, Government of Québec

**Claudia Krywiak**, Ontario Centre of Innovation (OCI)

**Pierre Boucher**, General Manager of Innovation ENCQOR



# ENCQOR : A VAST 5G ECOSYSTEM OF INNOVATIVE SMES WORKING IN A MULTITUDE OF BUSINESS SECTORS

*as of December 31, 2020*



IOAIRFLOW  
ITMANAGER.NET INC.  
10840939 CANADA INC.  
26 DAY INC. DBA ROADLAUNCH  
2718645 ONTARIO INC (C/O WATFLY)  
3D VIRTUAL CRAFTING INC  
3S TECHNOLOGIES  
8XLABS  
9406395 CANADA INC  
A.I. VALI INC.  
ABLE INNOVATIONS INC.  
ABRAFO NEGAJoule  
ACCU-TEMP SYSTEMS  
ADEXFLOW  
ADEXFLOW INTERNATIONAL INC.  
ADVANCED OPTO-MECHANICAL SYSTEMS  
AND TECHNOLOGIES INC. (AOMS)  
ADVANCED PROCESS AUTOMATION  
TECHNOLOGIES INC  
AERONYX  
AFFORDANCE STUDIO  
AGRITECH URBAIN INC  
AHA PLATFORM INC  
AI VIEW  
AIH TECHNOLOGY INC  
AIH TECHNOLOGY INC.  
AIRSHARE INC.  
AIRSHARE INC.  
AIZTECH INC  
AIZTECH INC.  
ALBEDO INFORMATICS INC.  
ALBORÉA  
ALCEA TECHNOLOGIES  
ALGONAT  
ALPHABET COMMUNICATION (ALPHC)  
ALTIS LABS  
ALTKEY  
A-MALGAM  
AMOTUS SOLUTIONS  
ANAGRAPH  
AP RENEWABLES  
APERIUM

APP MASTERY INC.  
APPLIED RECOGNITION  
AQUARIUS INNOVATION INC.  
AQUARIUS INNOVATION INC.  
[10757969 CANADA CORPORATION]  
AQUASENSING INC  
ARA ROBOTIQUE  
ARVIZIO INC.  
ARVIZIO INC.  
ARVIZIO INC.  
ASSETFLO INC.  
ATEK  
ATHENA INTEGRATED SYSTEMS INC  
ATHENA TECHNOLOG-G INC.  
ATTITUDE MARKETING  
AUDACE TECHNOLOGIES  
AUDESSE  
AUTONOM  
AUTONOMOUS VEHICLE ORGANIZATION LTD.  
AUTZU INC  
AWASTOKI  
AWVENTXR INC.  
AXIONABLE  
AXIS LABS INC  
AYE3D INC.  
AZAPPLIED TECH INC.  
AZURDEV  
B DATA SOLUTIONS INC.  
BAYSIL INC  
BBA  
BEAM.CITY INC.  
BEAM.CITY INC.  
BEAUCE TELECOM  
BEHR TECHNOLOGIES INC.  
BG LATENCE  
BI EXPERTISE  
BIOCONNECT  
BIOLIFT  
BIONIC-I INC.  
BLACKSPARK CORPORATION  
BLAISE TRANSIT  
BLOQS4

BLUBRIM SYSTEMS INC.  
BLUE CITY TECHNOLOGY  
BLUEROVER INC.  
BLUERUSH INC.  
BLUWAVE AI  
BLUWAVE-AI  
BOOMBOX  
BOSS INSIGHTS  
BRIOWIRELESS  
CAMAUPOINT  
CANSCANTECH  
CATHERINE BÉLANGER, ARTISTE  
CERBO CANADA INC  
CHAAC TECHNOLOGIES  
CHANGE WIRELESS  
CHARGELAB INC.  
CHEETAH NETWORKS  
CHIRP APP INC  
CHROMASCOPE  
CIVALGO  
CIVILIA  
CLARIDION  
CLAUSEHOUND  
CLEARPATH ROBOTICS INC.  
CLICKMOX SOLUTIONS INC  
CLINIQUE MULTISENS  
CLOUD MONITORING OBJECT (CMO)  
CLOUDCONSTABLE INCORPORATED  
CLOUDHAWK  
CLOUDVISOR WEALTH INC.  
COENG ADVISORS 2020 INC.  
COMMUNITY SMART LIVING INC.  
CONTENANTS CANO  
CONTEXTERE CORPORATION  
CONTINUUMS  
COTEACHER  
CRATER LABS  
CRÉO  
CRYP LABS  
CYA INC  
CYBERDEFENSE AI

# ENCQOR : A VAST 5G ECOSYSTEM OF INNOVATIVE SMES WORKING IN A MULTITUDE OF BUSINESS SECTORS

*as of December 31, 2020*



CYBERWORKS ROBOTICS

DAXYON

DEEPSIGHT

DEJERO LABS INC.

DESKLINX INC.

DIMONOFF

DISTAPPS

DIZIFILMS

DRONE DES CHAMPS

DUOLOGIK

E2027

E2IP

EAIGLE INC.

ECOGREENCROPS

ECOPIA TECH CORPORATION

ECOSYSTEM INFORMATICS INC.

EDGE GAP

EGGDEMY INC

ELASTALINK

ELECTRONILINE EQUIPEMENT INC.

ELEVEN-X INCORPORATED

ELITS CANADA INC.

ELLICOM

ENERTICS INC.

ENERTICS INC.

ENVISION INTEGRATED

EON MEDIA CORP.

ET GROW

EUGERIA

EVOA

EWARREN FINANCIAL SERVICES

EXDIALYUL

EXO INSIGHTS CORP.

EXO TACTIK

EYFUL

FABLAB4D

FICTION MINE

FIDUS SYSTEMS INCORPORATED

FINTROS - 9823565 CANADA CORP

FIRST30

FLAGTOWN QC INC.

FLARE SYSTEMS INC.

FLEX GROUPS

FLEXUR SYSTEMS INC.

FLIGHT DATA TECHNOLOGIES, INC.

FLYSCAN SYSTEMS

FORAHEALTHYME INC.

FORMI 3DP INC.

G.S.D GROUP INC.

GAN SYSTEMS

GENBU TECHNOLOGIES INC.

GÉNIE LAB

GEOMATE INC

GIMME360 INC.

GLOBAL LIFI TECH

GNOWISE INC.

GNOWIT INC.

GOLD SENTINEL INC.

GPS SOLUTION

GRAIN DISCOVERY CORP.

GREENEE ÉNERGIE INC

GROUPE ALPHARD INC.

GROUPE ENO

GROUPE HUMACO

GROWRATIO

GSS SOLUTIONS

H.H. ANGUS & ASSOCIATES LTD.

H2O GEOMATICS

HALION DISPLAYS INC.

HAULERADS INC

HAULERADS INC

HAVELAAR CANADA

HEALTHIM

HELLO ART

HIGHCLOUD

HILITE

HOLY CITY VR INC.

HOOKMOTION

HORSE SHOW SERVICES

HYIVY

IDEOCONCEPT

IDEVOPS.CA

I-EMS GROUP LIMITED

I-EMS GROUP LIMITED

ILLOGIKA

IMC BUSINESS ARCHITECTURE INC.

IMERCIV INC

IMERCIV INC.

IMPORTANT SAFETY TECHNOLOGY

INCUVERS INC.

INDRO ROBOTICS INC.

INDUSTRIAL LOT INC./ALTUS TECHNOLOGIE

INSTAGE

INTELENSE INC.

INTELLICULTURE

INVISION AI, INC.

IOL SYSTEMS INC.

IPTOKI

IREGAINED INC.

IRIS R&D GROUP INC.

ISB GLOBAL SERVICES

ISCAN

ISR TRANSIT

IVERSOFT

IVIRTUAL

JAKARTA

JEU VERT INC. (GREENPLAY)

JL CORRIVEAU

JNA LEBLANC

JOMBONE INC.

KAMAZOOIE DEVELOPMENT CORPORATION

KANKEI GROUP

KANKEI GROUP

KEPSTRUM INC.

KINGS DISTRIBUTED SYSTEMS LTD

KINGS DISTRIBUTED SYSTEMS LTD.

KLASHWERSK

KOMUTEL

KORAH LIMITED

KORECHI INNOVATIONS INC

KROWDX

KWILT INC.

L.V.I.C.T. SOLUTIONS INC.

# ENCQOR : A VAST 5G ECOSYSTEM OF INNOVATIVE SMES WORKING IN A MULTITUDE OF BUSINESS SECTORS

*as of December 31, 2020*



LANTERN INSTITUTE	MEDIA ONE CREATIVE INC.	ONGOING
LANTERNE DIGITALE	MELIOREM WORD	OPEN FLEET
LAROCHELLE GROUPE CONSEIL	MERO TECHNOLOGIES INC.	OPENMIND TECHNOLOGIES
LAZAR ENTERTAINMENT	METROPOLIS	OPERA CANADA
LCI	MICROGREEN SOLAR CORPORATION	ORANGE TRAFFIC
LE TECHSTOLOGUE	MIFKA TECHNOLOGIES INC.	ORMUCO
LEAP CONSEIL	MINETELL	OSCPs MOTION SENSING INC.
LEDDARTECH	MIXA VISION	OSMAN ZEKI - WALLRUS
LEMAY SOLUTIONS CONSULTING INC.	MLAI ANALYTICS INC.	OSSICLES
LES VIOLONS DU ROY	MOBISTREAM SOLUTIONS	OVA
LEVEL SOFTWARE INC	MORELLI DESIGNERS	OVERBOND
LIMA CHARLIE - WALLRUS	MOVIWEAR	PAIDIEM PAYMENT SOLUTIONS INC.
LOCATEMOTION INC.	MTLIGHT COLLECTIVE INC.	PALEO DOCTOR
LOG5DATA	MULTI PRESSION	PARALLEL GEOMETRY
LOGICIEL RADIO IP	MVT GEO SOLUTIONS	PARSEDATA 2020 INC
LONGAN VISION	MY LIL' HEALTHMART	PATTERNEDSCIENCE
LONGTERM TECHNOLOGY SERVICES INC.	MY LIL' HEALTHMART INC	PCPVR INC.
LOPHIRA LTD	MYVALUE CHANGE AGENTS INC. (CHANGENT.IO)	PEYTEC INC.
LTI INFORMATIQUE ET GÉNIE	NECTAR	PIERRE-LUC THIVIERGE
LUCID	NEIGHBOURHOOD WATCH PLUS	PILOT THINGS
LUCID INC	NERONIC WORKS	PINCH VR
LUMCA INC	NESTING SAFE	PLC GROUP
LYNXFIELD CANADA	NEW VISION SYSTEMS CANADA INC.	PLEORA TECHNOLOGIES
LYTICA INC.	NEWEB LABS	PM SCADA CYBER DEFFENSE
MADSUS	NEXAPP	PMG TECHNOLOGIES
MAESTRIA SOLUTIONS INC.	NIDINE TECHNO	POSTALGIA INC.
MAJIK SYSTEMS INC	NIOSENSE	POWERSHIFT CLOUD
MAKILA	NOESIS DIGITAL	PREVU3D
MANTLE BLOCKCHAIN	NORDEXCO	PROCESS
MANYETA	NORDICOM INC.	PROJECT1
MAPLE PRECISION INC	NORMAL STUDIO - WALLRUS	PROLOGUE AI
MAPYOURPROPERTY INC.	NORMATIVE INC	PROTOLAB QUEBEC
MARGAL CANADA	NORTH POINT LIFE SCIENCES	PUBLIVATE INC.
MARID TECHNOLOGIES	NOTIO	PULSE INDUSTRIAL
MARION SURGICAL	NOVA INSTITUTE	PURELOAD SOFTWARE CANADA INC
MARTELLO TECHNOLOGIES	NUPORT ROBOTICS INC.	PUSH DESIGN SOLUTIONS INC.
MASV INC.	NUUTOK	QIDNI LABS
MATAGAMI TECHNOLOGIES	NUVOOLA	QOHERENT INC.
MECH SOLUTIONS LTD	NXM TECHNOLOGIES INC	QUALI AI
MEDCOMXCHANGE	NYTILUS INC.	QUANTOLIO
MEDELLA HEALTH	OLYMPIC TOOL AND DIE	QUANTUM CAPTURE



# ENCQOR : A VAST 5G ECOSYSTEM OF INNOVATIVE SMES WORKING IN A MULTITUDE OF BUSINESS SECTORS

*as of December 31, 2020*



QUBE 4D VENTURES INC.	SOLID STATE OF MIND	TRIFIDE
RACHID_9411-9641	SOLUTIONS CONNEKTICA	TRISTAR MULTICOPTERS
RAKR	SOLUTIONS REXYS INC.	TROES CORP.
RE-AK	SOS INFOTECH	TROES CORP.
REAL THIBAUT	SOULROOMS INC.	TRYON TECHNOLOGY LTD
REALIZE MEDICAL INC.	SPACECARD INC	TSI ECO
REDLINE COMMUNICATIONS INC	SPARK MICRO	TUIO
REDLORE CANADA INC.	SPECTRUM MOBILE HEALTH INC.	UKKO AGRO INC.
RENALCAN INC.	SPOTEV	UZINAKOD
RESADEHBOZORGI	SPY POINT / VOSKER	VALIDERE TECHNOLOGIES INC.
RFIC TECHNOLOGIES	SSIMWAVE	VALKARI
ROLL TECHNOLOGIES INC.	STAGE TEN	VANADATA INC.
ROMAERIS CORPORATION	STAGEKEEP	VEREM INC.
RUBICON	STRATODYNAMICS AVIATION INC	VERSAGILIT INC.
SALIMA BELLILI	STREAMWORX.AI INC.	VIDEOLATITUDE
SATWII	STRIPE STUDIOS INC.	VIDEOLINQ
SAVINTE	STUDIO IREGULAR INC.	VIDEOSHIP
SAVORMETRICS INC.	SWIDGET CORP	VINCI LABS
SBB	SYNAPSE C	VIRGIL SYSTEMS
SCHEDULE 101	SYNCSTATS	VIRTRO ENTERTAINMENT
SCRATCHVOX INC	SYNERVOZ COMMUNICATIONS INC.	VIRTUOLABS
SCUTO EVENTS INC.	SYNGLI INC	VISION MÉTÉO
SEED INTERACTIVE INC.	SYSTEME VIREO	VITALTRACER LTD.
SEMAPHOR.AI	TALEAM SYSTEMS	VR VALLEY
SENSEQUAKE	TAMVOES	VUBBLE
SHIPHAUL LOGISTIQUE	TANDEMLAUNCH	VYOO
SHOWFLOOR	TECHGUILDS CONSULTING	WALLRUS
SIA-PARTNERS	TECHNOLOGIES IN A BLINK INC	WAVESHAPE
SIGNALISATION KALITEC	TECHNOLOGIES LIVING SAFE INC.	WAVE BOATING INC.
SII	TECHNOLOGY TRACE INC.	WEBCOACHS
SINEXO	TELENET COMMUNICATIONS	WITTI INC.
SKY	TELESIGNAL	WW8 HEALTH TECH INC
SKYGRID SOLUTIONS	TEOPS SYSTEMS INC.	XESTO
SMART HALO	TERMONT	XPERT VR
SMARTCONE TECHNOLOGIES, INC.	TESGO	XYZ TECHNOLOGIES
SMARTONE SOLUTIONS INC.	THE WORKING GROUP INC.	YABTRONIX
SMATS TRAFFIC SOLUTIONS	TIDI NEW URBAN DESIGN	YBT SOFTWARE SOLUTIONS
SNAPSORT INC. (DBA SORTABLE)	TIERONEOSS TECHNOLOGIES INC.	YUSER INC.
SNOWM INCORPORATED	TILIKUM MÉDIA	YVES R. HAMEL & ASSOCIÉS INC. - YRH
SOCIALBUS	TINYMILE	
SOLANA NETWORKS	TOTAL	
SOLERTMIND	TOUMORO	





**ENCQOR** 5G

INNOVATION ENCQOR