



# VISION

Advancing global technology innovation for the prosperity of all Canadians.

# **MISSION**

CENGN, Canada's Centre of Excellence in Next Generation Networks, drives technology innovation and industry growth through our testbed, technical expertise, talent development, and partner ecosystem.

# ACCOMPLISHMENTS

224

2240

**SME** Projects

**People Trained** 

297 Internships

Members & Partners

21

Jobs Created\*

11k+ \$1.15B Contributed to GDP\*

Note: All numbers are since CENGN's inception, excluding Members & Partners figure.

\*per Nordicity Group Limited and Networks, Economics & Strategy (NE&S)



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# A LETTER FROM THE



**TOM ASTLE** Chair of the Board of Directors

CENGN has made tremendous progress in developing Canada's advanced networking sector over the past fiscal year. In collaboration with government, businesses, and academia, CENGN has worked to position itself as a leader in next-generation networks and technological innovation. This report will walk you through our key accomplishments, highlighting the completion of the 5-year Ontario Government-funded Next Generation Networking Program (NGNP).

Since beginning NGNP in 2018, CENGN's mission has remained focused on accelerating innovation and commercialization in the networking sector across Canada. Through our commercialization and talent development programs and supports, we create new jobs, drive competitiveness and leadership in technology, and accelerate economic development in Canada's tech sector.

Through the NGNP, CENGN has connected its Hybrid Cloud to innovation centers across Ontario, giving more startups, scaleups, and researchers access to our cuttingedge infrastructure and network expertise for validating innovative products and solutions. NGNP has empowered CENGN to complete hundreds of commercialization projects, train thousands of tech professionals, and further address the connectivity gap in rural Ontario. I am pleased to say we have well overachieved all our 5-year targets.

In particular to this year, the Smart Agriculture and Smart Mining programs flourished as our Smart Greenhouse and Mining Living Labs were put to full use by innovative tech validation projects. CENGN has also introduced three new CENGN Academy training courses focused on machine learning, cloud automation, and containerization; all topics of expertise needed to support talent growth in Canada. The Broadband program was also in full motion, bringing the number of rural communities that provided innovative and cost-effective solutions to connectivity barriers up to 14. Based on these solutions, CENGN is currently developing broadband blueprints to be made available as a resource for other communities facing similar connectivity challenges.

I want to thank our government partners for supporting our programs, CECR and NGNP, and for their continued assistance in helping us achieve our mission. As we transition to the next phase of our programs, we look forward to continuing to expand CENGN's impact on the Canadian tech landscape, advancing tech innovation and developing new programs to drive adoption of enabling tech in Canada's key vertical industries.

I would also like to thank our industry member ecosystem for their commitment and valuable contributions to helping us drive innovation in Canada. Each member contributes to building Canada's innovation programs and advancing CENGN's mission through encouraging collaboration between tech innovators.

Lastly, I would like to thank all the CENGN staff and student interns for their continuous hard work and dedication to contributing to company success. Thanks to your leadership, we can continue strengthening Canada's impact in the tech sector.

# A LETTER FROM THE **PRESIDENT & CEO**



JEAN-CHARLES FAHMY President & CEO

Canada's digital economy has continued to persevere through the many challenges facing the country over the past few years. This is a major testament to the tenacity of the tech leaders and businesses driving innovation in Canada. With economic uncertainty facing the country, Canada's tech ecosystem will be a key engine of growth and resilience, ensuring Canada can continue to thrive in whatever economic climate the country faces. This means tackling key challenges, such as the Canadian productivity gap, which has seen our labor productivity fall short of U.S. levels for decades. To propel our economic growth and boost productivity, we must harness the power of digital technology, an already massive economic engine worth \$230 billion.

Digital transformation will also be a significant driver in overcoming other critical challenges, such as the need for ubiquitous connectivity, curbing climate change, and addressing a growing labor shortage. Canada's tech ecosystem should remain steadfast in its commitment to providing the innovation needed to address these key goals for the country.

Digital tech presents a wide range of economic growth opportunities, especially in vertical sectors like health, manufacturing, smart cities, agriculture, mining and more. By adopting the latest digital technologies, these sectors are becoming more efficient and globally competitive. However, barriers like tech labor shortages, connectivity limitations, and the lack of innovation infrastructure to develop digital transformation strategies have become major obstacles for organizations looking to fully embrace digital technologies.

Fostering innovation starts with uplifting the start-ups and scale-ups looking to bring innovations to the market. A pan-Canadian testbed that provides industry-specific living labs will drive tech leadership across markets and spur the digital adoption and transformation needed to advance our country's global competitiveness. As CENGN looks to drive the evolution of its program, it will be imperative to enable innovation in the vertical sectors most important for Canada's economy.

On the other side of the equation is nurturing the talent to support tech adoption and innovation. Developing impactful experiential learning programs in collaboration with industry and post-secondary institutions will continue to be crucial to growing the tech workforce in Canada. This will remain a major focus of our student program and CENGN Academy as we continue to foster the next generation of ICT workers.

An increased reliance on digital technology also comes with the obligation for a responsible data governance strategy. Growing integration with networks has led to more cyberthreats, and unchecked big data can be a significant issue for privacy and inclusivity. As innovation leaders, we must ensure the development of technology is done responsibly, in a way that is both secure, inclusive, and beneficial for all.

Canada's tech ecosystem is heading towards a bright future, but work is to be done. I welcome you to join our mission of advancing global technology and bringing Canada to the forefront of digital innovation.

# BOARD OF **DIRECTORS**



TOM ASTLE Chair – Corporate Director & Partner, Longevity Funds



TOM BURSEY CFO & VP, Council of Canadian Academies

FIK GOUBRAN

VP & Chancellor's Professor,

**Carleton University** 

RA



TEPHANIE RATZA Vice Chair – CFO, Loopio



**KEITH DE ABREU** Regional Director Canada, Enterprise, Juniper Ne<u>tworks</u>

AL HURREN

EVP,

Engineering and Operations, Mitel



ROBERT BARTON Distinguished Systems Engineer, Cisco



JULIA ELVIDGE Co-founder, SheBoot



SUNIL KHARE Director – Chief Technology Office, TELUS



KIM BUTLER Corporate Director, Business and Financial Advisory



SACHA GERA President, IT and Cyber Solutions – Calian Group



NORM PETERS VP, Engineering, Ribbon Communications



MICHELLE SIMMS President & CEO, Genesis



SHAWN SPARLING VP, Enterprise and Public Sector, Nokia



JILL TIPPINC CEO, BC Tech

# CENGN MEMBERS

CENGN's Member Ecosystem promotes collaboration among technology innovators and adopters to drive Canadian technology innovation and industry growth. Members are organizations that value the role CENGN has as a unifying technical voice between academia, government, and the Canadian tech sector. Ecosystem members help shape Canada's innovation programs and strengthen CENGN's mission. The member ecosystem enhances dynamic interaction between members across industry verticals and supports CENGN's vision of advancing global technology innovation for the prosperity of all Canadians.

# MEMBER BENEFITS

#### **GOVERNANCE AND COMMUNITY ENGAGEMENT**

- Engage and collaborate with other members
- Shape Canada's innovation programs and strengthen CENGN's mission

#### CONNECT WITH CANADA'S TECH INNOVATORS

- Receive early exposure and introductions to start-ups and scale-ups
- Direct promising businesses to CENGN for a commercialization project

#### TALENT DEVELOPMENT AND RESOURCES

- Access CENGN Academy courses at a discount
- Gain access to highly educated and CENGNtrained students

#### MARKETING AND COMMUNICATIONS

• Leverage CENGN as a platform for brand visibility

OUR MI	EMBERS
BC TECH association	Bell
BOENTERPRISE CANADA'S FOOD & AGRI-TECH ENGINE	
CCCC MICROSYSTEMS	EXFO
<b>hub</b> 350	JUNIPE
KANDY. an EWCtechnologies company	🕅 Mitel
NOKIA	
TELUS®	💼 uOttawa
WNDI	7VR

# DRIVING INNOVATION AND ECONOMIC GROWTH ACROSS CANADA

CENGN's mission to drive Canada's technology innovation and industry growth is supported by the Networks of Centres of Excellence's (NCE) CECR Program and the Government of Ontario's NGNP. Through the support and funding provided by both programs, CENGN delivers commercialization services to Canadian tech start-ups and scale-ups and provides talent development through student and industry training. By enabling promising Canadian businesses and professionals to succeed, CENGN strengthens the innovation economy and develops job growth in Canada's tech sector.

# Ontario 😵

"CENGN has been an integral part of our ecosystem and the Ontario Government's innovation strategy... We look forward to continuing to work with CENGN on building a world class and transformative 2.0 program that will drive innovation, jobs, talent, growth, and prosperity."

Vic Fedeli Minister of Economic Development, Job Creation and Trade.

# NGNP

The Next Generation Network Program



NGNP supports Ontario's innovation economy by focusing on expanding digital infrastructure across the province, developing talent and high-quality jobs, and overall enhancing Ontario's global competitiveness and economic strength with technology. CENGN, in partnership with the Ontario Centre of Innovation (OCI) and ORION, delivers this program through funding by the Ontario Government's Ministry of Economic Development, Job Creation and Trade.

### NGNP COMPLETION

The end of FY22 marked the completion of the first funding cycle of NGNP. Over the past 5 years, CENGN has made significant impacts on advancing Ontario's tech innovation sector and accelerating the digital transformation of the province. Through the NGNP, CENGN expanded its Hybrid Cloud across Ontario, including three more data centres beyond CENGN HQ as well as two Living Labs. Currently, CENGN's multisite testbed is located in the four major ICT regions in Ontario: Kanata, Ottawa, Toronto, and Waterloo. We look forward to continuing our partnership with OCI and the Ontario government as we move towards a new program that will build upon the foundation of innovation created by NGNP.



#### **CECR** The Centres of Excellence for Commercialization & Research

The CECR Program, developed by NCE, bridges the gap between innovation and commercialization in different sectors by matching clusters of expertise with the respective community to exchange the knowledge and resources needed to bring innovations to market faster. The environment, natural resources and energy, health and life sciences, and information and communications technology are the four key areas in which CECR promotes research and supports commercialization.

# RESIDENTIAL BROADBAND PROGRAM

All communities rely on high-speed Internet access to communicate, run businesses, and provide social services like e-Learning and eHealth. The CENGN Residential Broadband Program works to close the digital gap facing Rural, Northern, and Indigenous communities by enabling commercial broadband deployments that address the barriers to providing high-speed Internet. Each project entails the deployment of an innovative technology solution that provides flexible, lower-cost, higherperformance residential broadband access for remote Ontario communities. CENGN compiles the details and learnings from these projects into blueprint documents as a resource for other communities facing similar barriers to broadband access.

#### BLUEPRINT: HILLY TERRAIN COMMUNITY

#### CHALLENGE

**CENGN** 

Extending residential high-speed Internet service to a distant rural neighbourhood, separated from a larger community with an existing high-speed Internet POP by more than ten km of hilly and rocky forested terrain across a large waterbody.

#### TECH SOLUTIONS

- Two 200' smart towers
- Wireless licensed microwave backhaul link
- 4 km fibre ring
- Fibre-to-the-home
- Buried fibre in shoulder of the road

#### Download our full blueprints here:

cengn.ca/resources/white-papers/ruralhigh-speed-internet-blueprints/

### 14 BROADBAND PROJECTS



## CHALLENGES OVERCOME

- Extending service distances of 5 10 km from a POP in a host community across extensive flat farmlands with a limited number of trees, rolling hills of farmlands with moderate tree cover, and long and narrow valleys.
- Using one or more available access corridors, in whole or in part, to extend service to residents.
- Providing service for distances greater than 5km to residents across or around a large lake.
- Extending service from an existing broadband POP using a new self-configuring, high-resilience, point-to-multipoint, fixed-wireless last-kilometer solution.
- Providing service for distances greater than 5km to residents within a community's municipal boundaries.

Visit <u>cengn.ca/residential-broadband-program</u> to learn more about the program and each broadband project.



# STUDENT PROGRAM

CENGN collaborated with colleges and universities across Canada to host 36 student interns this past fiscal year. Internships are offered in the fields of engineering, training, marketing, and human resources to provide students with valuable hands-on experience. Throughout their term, each student intern contributes greatly to CENGN's success, augmenting their academic learning to make a valuable impact on the industry while developing their professional skills. With the unpredictability of COVID-19, students continued to work remotely across Canada, contributing to the overall success of the organization.

Visit <u>cengn.ca/about/careers/student-</u> <u>opportunities/</u> to learn about becoming a student intern at CENGN

## STUDENT SPOTLIGHTS



Omar Abotahoor University of Ottawa Cloud Infrastructure Engineering Student

Significant contribution to the CENGN automation framework



Alexandre Lott Carleton University Cloud Infrastructure Engineering Student

Automated the upgrade of critical network devices



Amy Truong Carleton University Video & Design Marketing Student

Developed the CENGN Marketing Illustration Guide

Contact us at student-hr@cengn.ca to see how your organization can hire a CENGN student



297 97% Internships Employment Rate

## **ACADEMIC** PARTNERS



# CENGN ACADEMY

CENGN Academy is a key driver in bridging the skills gap identified by the most advanced companies in cloud computing and network technology. By arming experienced professionals, new graduates, and students with the most relevant skills in one of the most fast paced, growing industries in the world, CENGN Academy is working to advance the global competitiveness of the Canadian ICT workforce. CENGN Academy provides practical training on leading edge opensource technologies, through self-paced courses with enhanced learner support and a truly independent perspective. After training, learners can take a formal exam, with a professional remote proctor, for a digital badge that they can post on their LinkedIn profiles.

> CENGN Cloud System Specialists Certified in FY22

263 Total Learners in FY22

Total Number of Digital Badges Issued in FY22

## COURSES OFFERED

- CENGN Cloud System Specialist (CCSS) Certification Program
- Docker + Kubernetes Overview
- Docker + Kubernetes Basics
- Docker + Kubernetes Advanced
- Intro to DevOps
- Machine Learning Overview
- Machine Learning with Python
- Infrastructure as Code
- Automation with Terraform and Ansible

## FY22 ACCOMPLISHMENTS

CENGN Academy continued to grow in FY22, launching three new courses, enhancing training lab capacity, and breaking new ground in learner responsiveness. Overall, CENGN Academy exceeded total program targets, here are the key highlights:

- The introduction of new courses Docker + Kubernetes Advanced and Automation with Terraform and Ansible filled the need for deeper training in containerization and cloud automation. Additionally, CENGN's Machine Learning Overview course provides an accessible hands-on introduction to the fundamentals of Machine Learning.
- Further collaboration with uOttawa focused on Continuing Education offerings through their Professional Development Institute (PDI). In particular, PDI and CENGN Academy delivered two CENGN courses as the pillars of FX Innovation's CloudCampus training program. CloudCampus provides key DevOps training for the Canadian financial sector, which helps to enable cloud transformation amongst multiple well-known companies.
- As part of CENGN's continued response to the COVID-19 pandemic, CENGN once again offered training to college and university students at no charge. This year, CENGN offered three courses: Docker + Kubernetes Basics; Infrastructure as Code; and Machine Learning with Python.

### FY23 DIRECTION

FY23 will look a little different for CENGN Academy, as significant work will be done on strategy for an enhanced, pan-Canadian talent development program. This includes market research on current and future network skill gaps to align CENGN Academy's course offerings, processes, and tools to make the biggest impact on tech talent growth.

During this process, CENGN Academy will continue to deliver cutting-edge, hands-on training to highly qualified personnel across Ontario and Canada. This year will also include a new Multi-Cloud Application Deployment course, and substantial updates to existing courses.

Visit <u>cengn.ca/services/cengn-academy</u> for details on our course offerings and additional training opportunities.

# THE CANADIAN INNOVATION ECONOMY

## CANADA'S TECH TALENT

Canada has a strong presence in the digital economy with over 899,000 people employed in Information Technology. This tech talent accounts for 5.6% of Canada's labour force.



## 4th

**Toronto** 2021 Top Tech Talent Markets in

North America

#### +16% Average Increase In Jobs

Over the past year, the number of tech jobs increased in six of Canada's eight major tech markets

## CANADA'S DIGITAL SKILLS SHORTAGE



of tech entrepreneurs are struggling to hire employees they need



f businesses in Canada need more tech employees





## CENGN INNOVATION CENTRE

Positive leadership and action come through knowledge and understanding. Only through diving deep into the topics affecting Canada's tech landscape can we hope to fully harness the benefits of digital technology.



If you're interested in learning more about issues regarding the Canadian tech talent shortage, the opportunities of digital transformation across industries, and emerging technologies that are impacting both our ways of doing business and how we live, visit CENGN's innovation centre at <u>cengn.ca/information-centre/</u> <u>category/innovation/.</u>

## ENABLING INNOVATION

The digitization of our economy and society is essential in increasing economic development and quality of life. Today's sectors are primed to leverage cutting-edge technologies that promote growth, sustainability, and job creation in Canada.

## SMART MINING

#### **Smart Mining Operations** Projected to Triple by 2025

By then, 25% of mines will have deployed autonomous operations. Innovative mining methods can improve extraction efficiency, reduce expenses, and improve the extraction process.

#### +500% in Mineral Production

by 2050 as sustainable energy technology increases in demand



#### **Installed IoT Devices** in Mining

0.6 Million in 2018

1.2 Million in 2023 PROJECTED



## SMART AGRICULTURE



#### ~35,000 Farms

in Canada apply technology towards precision architecture

100,000+ Farms

in Canada report using on-farm digital technologies

#### **Vertical Farming Uses** 80-90% Less Water

On average, IoT and artificial intelligence have enabled vertical farms to use less water than conventional farms. Vertical farming plays an essential role in maximizing food production while reducing the resources required to cultivate crops.

Food Production can be Increased by Between 12-15%

if the majority of Canadian farmers embraced digital technologies

New IoT Tech can Reduce Agriculture Energy Costs by 35%

# SMART HEALTH

#### 40% of Canadians Track Their Health

Canadians use connected care technology to track their health, indicating a growing desire for digital health care connectivity.

#### 85% of Medical Practices use Electronic Records

Electronic medical records enable timely information sharing, and integration of care through connectivity.

#### Growing Telemedicine Use

84% of Canadian telemedicine users will continue to use this service after the pandemic is over.

#### Canada Ranks 23rd

in the 2021 World Index of Healthcare Innovation, a drop from 17th the year before.

## SMART MANUFACTURING



#### **1.7 Million Jobs**

Manufacturing and Robotics is a key driver in Canada's economy and makes up 1.7 million jobs

of manufacturing companies are currently applying IoT to improve efficiency and enhance productivity

of Canadian manufacturers have experienced some type of cyberbreach or attack

50%

of workers in manufacturing will need to learn new skills to keep pace with the integration of technology

## CANADA NEEDS MORE INNOVATION

Canada Sits in 11th place out of 16 Peer Countries with a Grading Score of C on the Conference Board of Canada's Innovation Scorecard

# CENGN HYBRID CLOUD

All CENGN projects are carried out through the multisite CENGN Hybrid Cloud. The hybrid cloud is made up of the combination of four on-premise data centres in Ontario: CENGN HQ (Kanata), Invest Ottawa (Ottawa), MaRS (Toronto), and Communitech (Waterloo), all leveraging ORION network connectivity and the network integration of AWS and Azure services. It employs interoperability between software, hardware, open-source technology, and a multitude of products from CENGN's many vendors. The unique hybrid cloud environment enables companies to test and validate new and emerging digital technologies, cloud-native applications, IoT deployments, and services before scaling them in production.

## CENGN SECURE HYBRID CLOUD



- MPLS-SR Underlay
- Nvidia V100/T4 GPU
- AWS and Azure Integration
- 6000 Cores
- 50TB RAM
- x100Gbps

## OUR PRIORITY

Our priority is your privacy and security

- All infrastructure within Canada, no data leaves national borders
- Mutual non-disclosure agreement
- Intellectual property protection
- Secure infrastructure
- Isolated project space, secure from other projects, members, and partners

## CENGN INFRASTRUCTURE CONTRIBUTORS



# PROJECT OFFERINGS

CENGN is committed to removing barriers to commercialization and accelerating product introduction to the market for growing Canadian tech businesses. By working with CENGN's cutting-edge infrastructure and expert engineers, our clients can undertake high-value market readiness projects that would otherwise be out of reach. The unique physical and virtualized offerings from CENGN enable companies to test, containerize, and validate new and emerging technologies.

#### INTEROPERABILITY TESTING

Validating a product's ability to function with new systems or components

#### LOAD & STRESS TESTING

Determining system performance and resource requirements at given levels of load and determining what happens when maximum loads are exceeded

#### **FUNCTIONALITY TESTING**

Validating a product or one of its features is operational for market introduction

#### DEMONSTRATION

Demonstrating key product capabilities in a customer-like environment for the benefit of a specific strategic customer or partner

While every client project is unique, they are built up from a common set of CENGN service offerings. Beyond infrastructure offerings, CENGN works with each of its customers to provide technical expertise as well as business exposure to its ecosystem of multinationals.



**Traffic Generation** Tools for generating system loads



Hardware Hosting Hosting client hardware in CENGN's data centres



Cloud Tenancy Virtual machines on CENGN's OpenStack cloud



Custom OpenStack A fully dedicated Kubernetes opensource cloud with the option of OpenStack-Helm



Virtual Network Functions CENGN provides VNFs from Cisco, Juniper Networks and others



GPU & CPU Compute Highest performing data centre grade GPU, provisioned as part of bare metal or virtual machines



Bare Metal Fully dedicated highperformance servers



Cloud Native Expertise CENGN offers network and digital technology testing expertise



Smart Living Labs Real industry testing environments for IoTbased products

## NETWORK TECHNOLOGIES

Companies carrying out a CENGN project will have a solution or product that leverages digital or networking technology



SERVICE OFFERINGS

# PROJECT HIGHLIGHTS



#### AI-Powered Contact Tracing Platform for Commercial Offices and Campuses

**V** HALIFAX, NS

🕼 HEALTH

B-Line is a Green Building IoT company that has adapted its platform and technology to help with managing the COVID pandemic. Their AI-powered contact tracing solution enables building owners to easily collect occupant health and commuting data to help contain the spread of infectious disease in commercial offices and campuses.



ARTIFICIAL

INTELLIGENCE

B-line successfully evaluated the performance of their cloud-based back-end application under conditions of simulated load (i.e., high traffic of users). They developed a deeper understanding of the importance of cybersecurity for their platform, subsequently arranging for annual security testing to be performed.



#### **Real-Time Customer Experience Management**

#### 💡 OTTAWA, ON 🛛 🔞

#### CUSTOMER EXPERIENCE

Benbria is a leader in customer experience and engagement solutions, helping the world's most customer-centric companies offer a superior experience that exceeds their competition. Through their Loop Experience Platform, Benbria enables brands to collect feedback and insights about their customers.



DATA CENTRE

AND CLOUD

Benbria ensured that large volumes of data could be processed on their platform while maintaining performance consistency. They also successfully demonstrated that their new cluster reporting engine service is scalable horizontally within a Kubernetes environment.





# **SKYW\**TCH

#### Making Earth Observation Satellite Data Accessible

KITCHENER, ON

#### SATELLITE IMAGERY

SkyWatch uses AI to offer two solutions for earth observation needs: EarthCache and TerraStream. EarthCache collects all the world's satellite data in one location, while TerraStream is a costeffective automated data management and delivery platform designed for satellite operators. Their solutions employ AI models to detect clouds in a range of satellite image sources with different bands, resolutions, and dimensions.



ARTIFICIAL INTELLIGENCE SkyWatch successfully validated that their cloud detection algorithm met the required accuracy and runtime criteria. With this validation, they were able to identify the most efficient machine learning model for their algorithm. SkyWatch also tested and confirmed that their image quality software could hold a large enough dataset for their minimum viable product.



#### **Connecting Professional and** Patient Data Virtually

💡 TORONTO, ON Se

HEALTH Health Espresso is a free mobile app that uses a private in-cloud platform to connect allied health professionals and enable health care providers to virtualize their practice. The app serves as a patient-centered collaborative platform that provides physicians with real-time patient data, allowing informed decision making



DATA CENTRE AND CLOUD

Health Espresso validated that their platform could scale to the target of 1000 users with low infrastructure and low error rates. They also identified further areas for scalability improvement that will allow them to go beyond their current targets.

# SMART MINING AND SMART AGRICULTURE PROGRAMS

During FY22, CENGN put into operation its first Smart Living Labs, enabling innovative digital tech companies access to industry specific commercial-grade deployment environments. The CENGN Smart Mining and Smart Greenhouse Living Labs, are real-world connected mining and greenhouse facilities that enable IoT-based validation projects. By providing these working environments, CENGN enables Canadian tech companies to commercialize their products and drive the digital transformation of the sector.

#### SMART AGRICULTURE PROGRAM

Through the Smart Agriculture Program, supports the CENGN commercial testing of Canadian-made solutions that increase farming revenue, efficiency. environmental friendliness. and This program focuses on technology that will help tackle food scarcity, make farming equipment more efficient, and support the sustainability of farming practices, such as reducing the use of pesticides. These technologies are designed to revolutionize how the agriculture industry functions, like production monitoring through sensors, using precision analysis to optimize harvests, implementing tools to better manage supply chains, and predicting pests and disease through AI tracking.

#### **SMART MINING PROGRAM**

The CENGN Smart Mining Program encourages the commercial testing of Canadian mining innovations that help boost efficiency, sustainability, and promote a safer work environment. This program focuses on technology that will help tackle issues such as mine navigation, climate change, and worker safety. These innovations seek to completely transform how the mining sector operates, incorporating solutions like smart clothing and wearables, autonomous mining devices, and drone surveillance.

#### SMART GREENHOUSE LIVING LAB



DC Farms in Kingsville, Ontario is home to the CENGN Smart Greenhouse Living Lab. The Living Lab enables companies to validate their digital solutions in the DC Farms connected greenhouse environment. With access to both the CENGN Testbed, and expertise from both CENGN and DC Farms. companies can perform validation testing of sophisticated artificial intelligence processing, as well as large-scale Internet of Things (IoT) deployments.

#### SMART MINING LIVING LAB



**PROJECT COMPANIES** 



FORTAI Improving Mining Productivity and Safety



ROCKMASS Revolutionizing Access to Geospatial and Geological Data



SMARTCONE Smart Positioning, Tracking and Alerting The CENGN Smart Mining Living Lab is hosted in the NORCAT Underground Centre in Onaping, Ontario. Featuring connective from Nokia technology and Northern Light Technologies, the Living Lab provides Canadian businesses access to commercialgrade network infrastructure state-of-the-art and wireless communications within a working mine. It supports applications that require IoT and low-power sensor deployments, mission-critical push-to-talk (PTT)/ push-to-video (PTV) services, and low-latency edge computing for remote and automated operations.

# EVENT HIGHLIGHTS

APRIL	29	Future Cities Canada: Information & Innovation Capacity Exchange
MAY	06 11 19 27	Algonquin College: Cyber Security Analysis IoT North ThingkFest 3.0 BC Tech: Vancouver Collision 2021 uOttawa: Cloud Computing – From Hype to Results
JUNE	03 16 17 22-23 24	Propel ICT: Designing for Business Growth CENGN Member Forum: Canada Emerging from the Global Pandemic CityAge: Ethical AI MaRS Impact: Health Google for Startups: Accelerator Demo Day
JULY	14	Ottawa Business Journal: Machine Learning in Business
AUGUST	15-18 20	AMO Conference Holland Marsh Residential Broadband Announcement
SEPTEMBER	16 21 23	uOttawa: TechOpia Live 2021 CENGN's Annual General Meeting CIRA: Canadians Connected 2021
OCTOBER	05-07 05-07 06 06-07 07 11-15 12-13 21	VM World 2021 ElasticON Global 2021 CENTECH: Accelerating Computing and the Age of Al Canadian Greenhouse Conference 2021 Innovation Expo Kubecon North America 2021 Americas Spectrum: Management Conference Ontario Innovation Expo 2021
OCTOBER	05-07 05-07 06 07 11-15 12-13 21 04 09 15-17 17-18 29-30	VM World 2021 ElasticON Global 2021 CENTECH: Accelerating Computing and the Age of Al Canadian Greenhouse Conference 2021 Innovation Expo Kubecon North America 2021 Americas Spectrum: Management Conference Ontario Innovation Expo 2021 uOttawa Kanata North: Doors Open CENGN Summit 2021 Canadian Telecom Summit 2021 SAAS North CIRA: OARC 36
OCTOBER NOVEMBER DECEMBER	05-07 05-07 06 06-07 07 11-15 12-13 21 04 09 15-17 17-18 29-30 01 13	VM World 2021 ElasticON Global 2021 CENTECH: Accelerating Computing and the Age of Al Canadian Greenhouse Conference 2021 Innovation Expo Kubecon North America 2021 Americas Spectrum: Management Conference Ontario Innovation Expo 2021 uOttawa Kanata North: Doors Open CENGN Summit 2021 Canadian Telecom Summit 2021 SAAS North CIRA: OARC 36 CANARIE: DAIR Program CRRBC Conference 2021
OCTOBER NOVEMBER DECEMBER JANUARY	05-07 05-07 06 06-07 07 11-15 12-13 21 04 09 15-17 17-18 29-30 01 13 19	VM World 2021 ElasticON Global 2021 CENTECH: Accelerating Computing and the Age of Al Canadian Greenhouse Conference 2021 Innovation Expo Kubecon North America 2021 Americas Spectrum: Management Conference Ontario Innovation Expo 2021 uOttawa Kanata North: Doors Open CENGN Summit 2021 Canadian Telecom Summit 2021 SAAS North CIRA: OARC 36 CANARIE: DAIR Program CRRBC Conference 2021 Le Camp Lunch & Learn: Considerations for Scaling your Cloud Application
OCTOBER NOVEMBER DECEMBER JANUARY FEBRUARY	05-07 05-07 06 06-07 07 11-15 12-13 21 04 09 15-17 17-18 29-30 01 13 19 24 25	VM World 2021 ElasticON Global 2021 CENTECH: Accelerating Computing and the Age of Al Canadian Greenhouse Conference 2021 Innovation Expo Kubecon North America 2021 Americas Spectrum: Management Conference Ontario Innovation Expo 2021 uOttawa Kanata North: Doors Open CENGN Summit 2021 Canadian Telecom Summit 2021 SAAS North CIRA: OARC 36 CANARIE: DAIR Program CRRBC Conference 2021 Le Camp Lunch & Learn: Considerations for Scaling your Cloud Application CANARIE: Machine Learning What Works: Industry Innovation 2022

Note: The list above is a sample of all events conducted throughout FY22.

# 110 TECH EVENTS

#### **VIRTUAL & IN-PERSON**

CENGN participated in both virtual and in person events, providing our leadership on various programs and taking advantage of speaking opportunities to promote the advancement of connectivity and digital transformation across Canada. These events allowed us to connect with other industry leaders, find the most innovative startups and scale-ups, and advance knowledge of emerging our technologies.



FY22 was an unusual year for events with the continued uncertainty of the pandemic making some events in person and others virtual. Despite these obstacles, Canada's tech community came together to foster collaboration and growth. This year, CENGN partnered with innovation hubs across the country to host events and network with tech professionals in the thriving tech regions of the East Coast, Quebec City, Montreal, and Vancouver. We plan to continue to grow our list of regions in the coming year. **CENGN** 

## NEW WEBSITE LAUNCH



**148K** Unique Pageviews

**183K** Website Visits

**02:10** Avg. Time on Page

> **99** Health Score

CENGN's ecosystem of engaged innovators, professionals, and top talent continues to grow. CENGN has experienced a consistent increase in interactions with the Canadian tech community since its founding.

In FY22, CENGN saw:

**212K** 

Twitter Impressions

4055

20%

Newsletter Subscribers

Newsletter Open Rate

# Our Platforms Saw Significant Growth in Engagement



+37%

LinkedIn Engagement Growth



+15%

Facebook Follower Growth



+35%

Twitter Clicks & Engagement Growth



+9% Youtube Subscribers Growth

# COVERAGE

During FY22, CENGN appeared in the media 255 times, an 87.5% growth from FY21. The articles reflect CENGN's growing presence provincially, nationally, and internationally.

## COVERAGE BREAKDOWN

Provincial: 58%

National: 17%

International: 28%

## TOPIC



CENGN enables agtech startups to test and validate promising technologies, removing barriers to product commercialization and accelerating market growth. The CENGN ecosystem...drives technology innovation and industry growth through their test bed, technical expertise, talent development, and partner ecosystem..

MEDIUM, MAY 2021

In March 2020, Nokia collaborated with CENGN and NORCAT to install and operate a private LTE/4.9G wireless connectivity network in NORCAT's Underground Centre. NORCAT and CENGN will serve as a hub for the future of mining technology, while Nokia will help in furthering its commitment towards advancing worldwide mining innovation.

YAHOO FINANCE, JUNE 2021

A new 5G Innovation Hub is launching in Ottawa in partnership with Telus, the Kanata North Business Association (KNBA) and Canada's Centre of Excellence in Next Generation Networks (CENGN). The 5G Innovation Zone will allow some of the country's greatest innovators to leverage new IoT technologies to improve upon solutions for public safety, autonomous vehicles, medical technologies, manufacturing automation, and positive outcomes for Canadians overall.

#### MOBILE SYRUP, JUNE 2021

A new project launching this fall in the Kenora area hopes to serve as a new model for bringing highspeed internet to rural areas. CENGN...is funding the project, which will make use of radio equipment installed in trees to bring high-speed internet to Black Sturgeon, Schnarr, Grassy, and Austin Lake areas.

**CBC**, JUNE 2021

# CENGN SUMMIT

CENGN Summit is a full-day event for any business or technical professional looking to understand how the market is preparing for the oncoming wave of ultra-high-speed connectivity, smart cities, and the growth of disruptive network technology. It brings together an innovation ecosystem of multinational companies, start-ups and scale-ups, government, and academia to build partnerships and discuss the latest trends in the networking and Information Technology sectors.

## CENGN SUMMIT 2021



November 9th marked the sixth instalment of our summit, and the second time the event was held virtually. The event comprised of both technical and visionary presentations, targeting discussion on the biggest challenges and opportunities facing Canada's tech sector.

#### SUMMIT TOPICS

- Preparing for Digital Transformation in Canada with Cloud Computing, 5G, and IoT
- IT Sustainability and Combating Climate Change
- Using AI to Prevent & Detect Cyber Attacks

## ATTENDANCE BREAKDOWN



# Join us on February 9th, 2023 for the 7th annual CENGN Summit!

After two years of virtual, we're thrilled to announce next year's CENGN Summit will be in-person at the Brookstreet Hotel! Prepare yourself for what is sure to be the tech networking event of the year. In 2019, we filled the house with tech leaders from across Canada. This time, we're looking to continue to grow the event for every stakeholder of our tech community, making it the place to meet leading vendors and service providers, as well as the most innovative companies pushing digital transformation across sectors.



With Canada looking to rebound its economy, harness the full value of digital tech and connectivity, as well as harden its supply chain and cybersecurity, there will be plenty to discuss. You won't want to miss this opportunity to hear from leaders and key decision makers as they give their take on the best path forward in Canada's tech landscape.

Visit <u>cengnsummit.ca</u> for registration and sponsorship details!

# CENGN



## CENGN PARTNERS TO VALIDATE DDoS MITIGATION SYSTEM ON HYBRID CLOUD

CENGN's collaborative project with Keysight Technologies and ORION was a significant highlight in FY22. In this project, CENGN used Keysight's CyPerf test traffic simulator to run the first ever validation test of a DDoS mitigation system on a hybrid cloud environment.

The partner project saw CyPerf used for the first time to simulate traffic containing malicious DDoS attacks. This traffic was used over the CENGN Hybrid Cloud to validate ORION's DDoS Threat and Mitigation solution.

The project was highly successful and saw significant results demonstrating both products' value. ORION's DDoS Threat and Mitigation solution successfully detected all excessive applications, unauthorized traffic, bad requests, and spoofed UDP data provided by CyPerf. In addition, 100% of blocklisted source IPs were auto filtered.

Overall, CENGN gathered relevant experience around CyPerf's functionality while improving its security posture through proper validation beyond generic or default configuration. As a next step, CENGN will be incorporating this testing as a potential offering to augment our already comprehensive set of commercialization validation services for Canada's start-ups and scale-ups.

To learn more about CENGN's project with Keysight Technologies and ORION, visit <u>cengn.ca/information-centre/news/cengn-demonstrates-</u> <u>orion-ddos-mitigation-system-with-keysights-cyperf/.</u>

## CELEBRATING 5 YEARS

Congratulations to all staff members celebrating 5 years at CENGN!



Rick Penwarden Sr. Manager, Marketing & Comms Started May 11, 2016



Robin Ramrup Vice President, Finance Started September 22, 2016



Loralie Ness Administration Specialist Started January 21, 2017



Nathalie Guthrie Director, Human Resources Started January 31, 2017



Jungwhan Cho Cloud Infrastructure Engineer Started March 6, 2017



Join our team: <u>cengn.ca/about/</u> <u>careers</u>





### CANADA'S CENTRE OF EXCELLENCE FOR NEXT GENERATION NETWORKS

CENGN Headquarters 555 Legget Drive, Tower A, Suite 600 Ottawa, ON, Canada, K2K 2X3

Sources: cengn.ca/resources/annual-reports

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