Call for Request for Solution: Wireless Infrastructure and Turnkey Services for Smart Ag Greenhouse Living Lab

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Overview

This call for a "Request for Solution" (RFS) is for eligible technology applicants that are prepared to supply all or part of the required suite of wireless IoT sensors, IoT gateways, and wireless cloud/internet access services required to support projects for small and medium enterprise (SME) client product testing of a wide-range of sensors, devices, robotics, or autonomous equipment in a commercial hydroponic vegetable greenhouse operation in Southwestern Ontario.

This infrastructure and services project is looking for technology applicants interested in designing, supplying, installing, and supporting innovative wireless technology solutions to deliver both narrow-band and broadband data access services. This set of wireless IoT services will be used to connect to a small self-contained edge-computing centre on-site, or through high-speed internet access to CENGN and/or other commercial cloud or data processing centres.

CENGN, Canada's Centre of Excellence in Next Generation Networks, under the Next Generation Network Program (NGNP), is looking to fund an innovative Smart Ag Living Lab project that will support up to 10 SME Smart Ag projects per year that will help accelerate commercialization of products that will bring new technology and increased productivity to the Greenhouse Vegetable Growing Industry in Ontario and across Canada. Through this RFS process, CENGN is looking for one or more best of breed candidate technology applicants who can work with CENGN and our vegetable greenhouse operator (DC Farms) to offer a well supported wireless environment with a wide-range of wireless options to support Smart Agriculture product testing in a commercial greenhouse environment. The technology solution required for this RFS will need to provide innovative, and high-performance turn-key solutions that will meet or exceed the project capacity requirements, with a combination of usage-based monthly charge plans for any commercial services, and a mix of installed private networks of wireless equipment on site utilizing commercially available licensed or unlicensed wireless access services.

Technology applicants are asked to propose a solution through an RFS submission which responds to the questions in this document in one or more of the following categories:

1) IoT Sensors – Light/Sunlight, Temperature, Humidity, O2, CO2, electrical connectivity, pH, and moisture sensors.

2) IoT or IIoT Gateways – Long Range Wide Area Networking (LoRaWAN), Bluetooth Low Energy (BLE), and Wireless Fidelity (Wifi).

3) Device and Data Mgt Platform(s) – for LoRaWAN, BLE, and WIFI IoT sensors.

4) Turnkey Private Wireless Network – WIFI.

5) Commercial Wireless IoT Networks – LTE and LTE-M.

Each of the 5 cateogories will be individually rated and evaluated by an independent External Review Panel (ERP) that will be using the ratings to make a recommendation on which technology applicants will be selected as best of breed technology solution providers for the CENGN Smart Ag Greenhouse Living Lab.

Process

The RFS responses from this Call for RFS process will be evaluated by an independent External Review Panel (ERP). The ERP will offer recommendations to the CENGN Internal Review Panel (IRP) to select the technology applicant(s) who will be awarded the opportunity to install, commission, and support their technology solution in the DC Farms vegetable greenhouse.

The DC Farms vegetable greenhouse operation was selected as CENGN's host greenhouse facility through an evaluation of industry and government recommended greenhouse operators in an earlier process. DC Farms, as CENGN's host greenhouse operator, and ERP members including academic, industry, and technology experts will access the proposed wireless services and IoT sensors, gateways, and commercial public IoT networks proposed by technology applicants through the RFS evaluation process.

A wide range of technology companies will be offered an opportunity to respond to the RFS with a network design solution and propose a diverse range of technology options for use in this greenhouse operation as part of this technology project. CENGN, will support technology applicants that wish to prepare a submission to this Call for RFS document, which details a technology solution that closely matches the needs of the host greenhouse operator and CENGN, as part of the RFS submission process. The Call for RFS process requires a detailed technical response, which will be evaluated to determine which of the technology applicants will be awarded CENGN funding to install, commission, and support a diverse IoT and wireless solution in the selected greenhouse. For more details on the RFS process, please refer to the CENGN document titled "Smart Ag Living Lab Program - RFS Process Document".

Investment

CENGN will be providing funding for this infrastructure project up to $500,000 from its Smart Agriculture Greenhouse Living Lab Program as part of NGNP. NGNP is a Government of Ontario program offered through a partnership between CENGN and the Ontario Centres of Excellence (OCE), that provides funding for Smart Mining and Smart Agriculture programs.

Eligible technology applicant(s) must agree to co-invest by contributing cash and/or in-kind to the project of an equivalent amount to the CENGN funding. Technology applicants are welcome to submit proposals where CENGN's contribution is up to $500,000, spread across all 5 categories with a matching contribution by the technology applicant up to a $500,000 contribution. Technology applicants can commit to additional contributions beyond the maximum CENGN contribution if they wish. These funds must be expensed by the technology applicant, and then the CENGN reimbursements must be applied against eligible expenses associated with supporting a solution intended to be operational within 1 - 3 months in the host greenhouse operation.

Wireless Technology Overview

Wireless technologies under consideration for this project, must address the requirements to support cost effective and efficient IoT data access to support a wide range of SME projects thtat will accerate commercialization of Smart Agriculture technology targeted to meet the needs of the vegetable greenhouse growing industry in Canada.

Specifically technology applicants will be asked to propose technology solutions that utilize a blend of private network equipment solutions that CENGN could purchase or lease, and commercially available solutions with usage-based or unlimited-data plans with monthly payments that will support the following IoT applications:

- **Unlicensed Narrowband Wireless IoT Access** – WIFI, LoRaWAN, or Bluetooth Low Energy (BLE)
    - supporting kilo-bytes of backhaul per day (typically up to 27 kbps for LoRaWAN, up to 1 Mbps for BLE, and up to 50 Mbps for WIFI)

- **Licensed Narrowband Wireless IoT Commercial Services** – LTE-M
  - supporting kilo-bytes of backhaul per day (typically 100 – 150 kbps)
- **Unlicensed Private Broadband Wireless Networks** – 2.4 GHz WIFI6, 5 GHz WIFI6
  - supporting mega or giga-bytes of backhaul per day (up to 150 Mbps down/15 Mbps Up)
- **Licensed Broadband Wireless Commercial Services** – 3.65 GHz LTE or 5G (future)
  - supporting mega-bytes or giga-bytes of backhaul per day (min. 25 Mbps down/7 Mbps Up)
  - 50/10 Mbps service or higher preferred

The objective for this CENGN project, will be to provide a combination of installed "private network" wireless equipment/technology installed within the greenhouse, and commercially available public wireless IoT commercial services, to provide a wireless IoT access network for greenhouse sensor data upload to the on-site CENGN edge computing centre at the greenhouse facility or to one or more of CENGN's data/cloud processing centres. The public commercial IoT wireless network services utilized will provide access to the internet in order to access any of the four CENGN operated data/cloud processing centres, any commercial data/cloud processing centres, or the labs of SMEs testing their products at the CENGN Smart Ag Greenhouse Living Lab.

The wireless technologies supported in the living lab must offer multiple narrow-band wireless options, and multiple broadband wireless options, so that prospective SMEs can test multiple options for their products in the greenhouse operation to offer wider market opportunities for their products. The solutions proposed must cost-effective operating model to allow CENGN to support multiple technology options for SMEs to test their products in a working greenhouse. The multiple wireless solutions must be engineered and installed to ensure they can co-exist without interference or degradation of service.

It will also be important that the wireless solutions include tests and use cases that prove the technology would be able to scale to meet the greenhouse operator's needs and support at least 2 concurrent SME product testing sessions per wireless technology. The proposed technology solutions and associated infrastructure must be flexible, scalable, and commercially viable so that the solution can be shown to be applicable in other working greenhouse operations with similar data needs and technical challenges.

Greenhouse Facility Details

The DC Farms facility is a commercial hydroponic vegetable growing greenhouse operation using approx. 6 acres of greenhouse space, with 3 acres of tomatoes grown and 3 acres of eggplant, that is located in Kingsville Ontario. This will be the site of the CENGN Smart Ag Vegetable Greenhouse Living Lab as shown below:

The Smart Ag Vegetable Greenhouse Living Lab is divided up into 10 zones for heating and irrigation. Irrigation Zones 1 - 6 support the part of the greenhouse operation focused on growing eggplants. Irrigation Zones 7 - 10 support the part of the greenhouse operation focused on growing tomatoes. Irrigation Zone 8 will be the zone where the majority of all SME product testing and evaluation will take place in the greenhouse and that is the area where the CENGN owned IoT environmental sensors will be installed.

The total hydroponic vegetable greenhouse facility layout is shown in Figure 1 below:

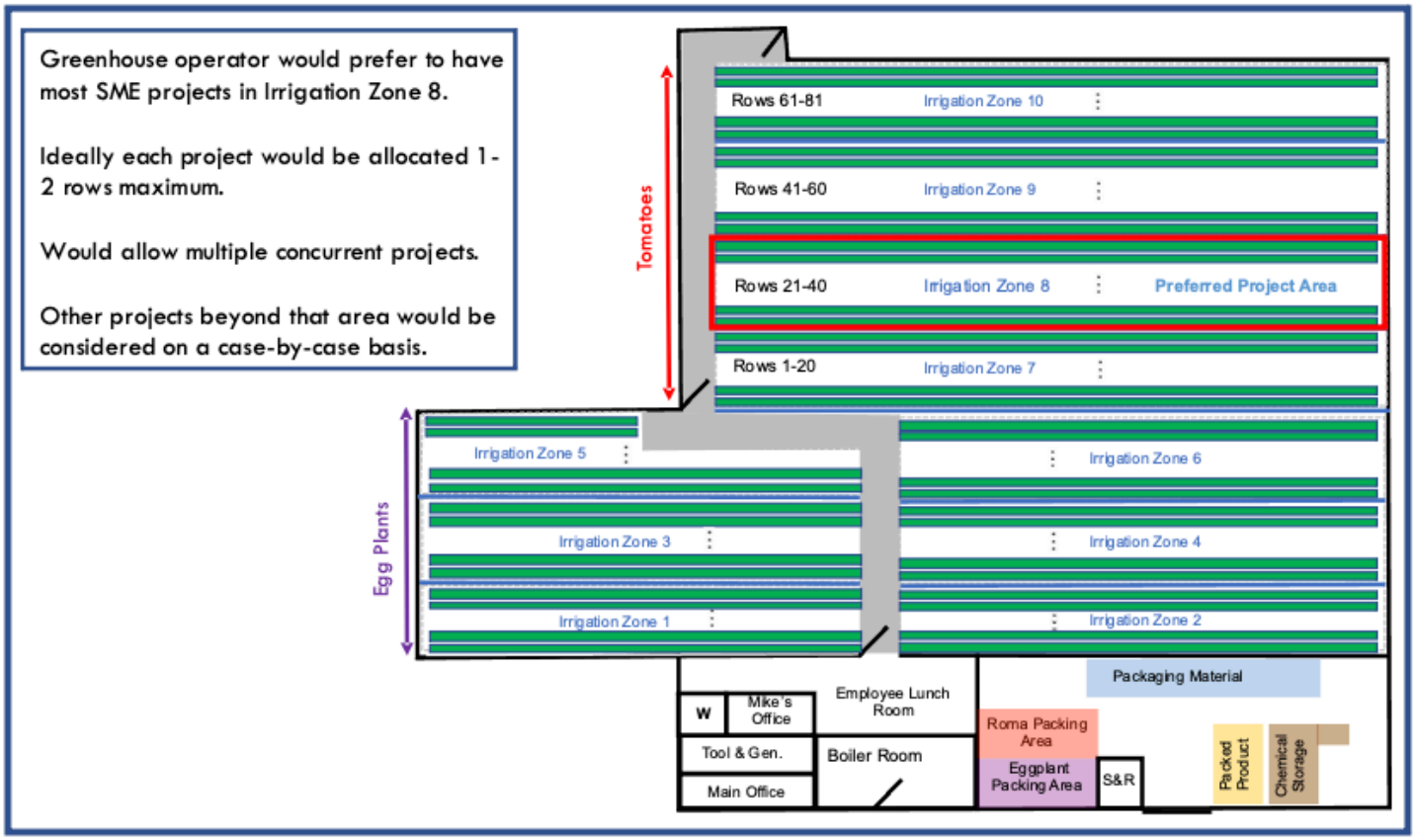

Figure 1: DC Farms - CENGN Smart Ag Vegetable Greenhouse Layout

The greenhouse is a fully commercial vegetable growing hydroponic greenhouse that plants small seedlings in early February and ends the growing season in early December. December is used to remove the prevous season's tomato and eggplant vines, rockwool growing medium, and then clean the greenhouse. January is used to put in new rockwool, prepare the greenhouse for the next growning season, and plant new small tomato or eggplant seedlings.

Most SME product testing in the living lab will be restricted to a specific part of the greenhouse to reduce operational impact to DC Farms greenhouse workers involved in plant trimming and harvesting activities throughout the growing season. Projects will in most cases be planned for around 5-8 weeks in the greenhouse unless a wider growing season analysis is needed to test the product or application.

The primary SME project test area will be focused on Irrigation Zone 8 within the tomato growing part of the greenhouse as shown in Figure 2 below:

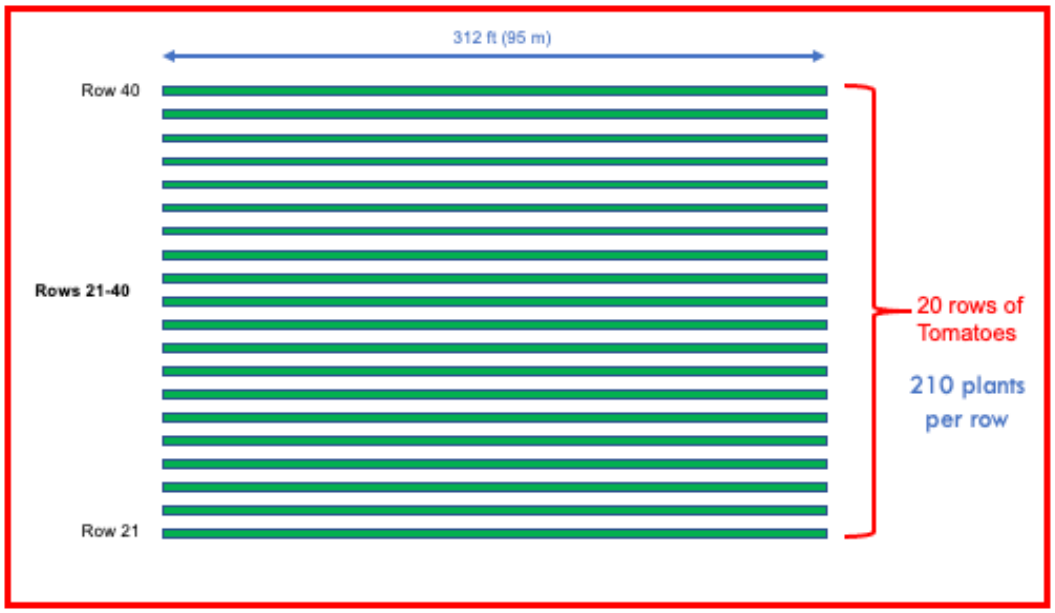

Figure 2: Irrigation Zone 8 – Primary Test Area for SME Projects

The greenhouse operation requires extensive and frequent manual trimming of the plants in the greenhouse by workers in electric scissor lift carts, and plant vines also have to be continuously be adjusted for height once the reach the maximum indoor height of the row (typically 12 feet) and can grow up to 20 feet diagonally along twine. A view of the inside of the greenhouse in shown in Figure 3 below:

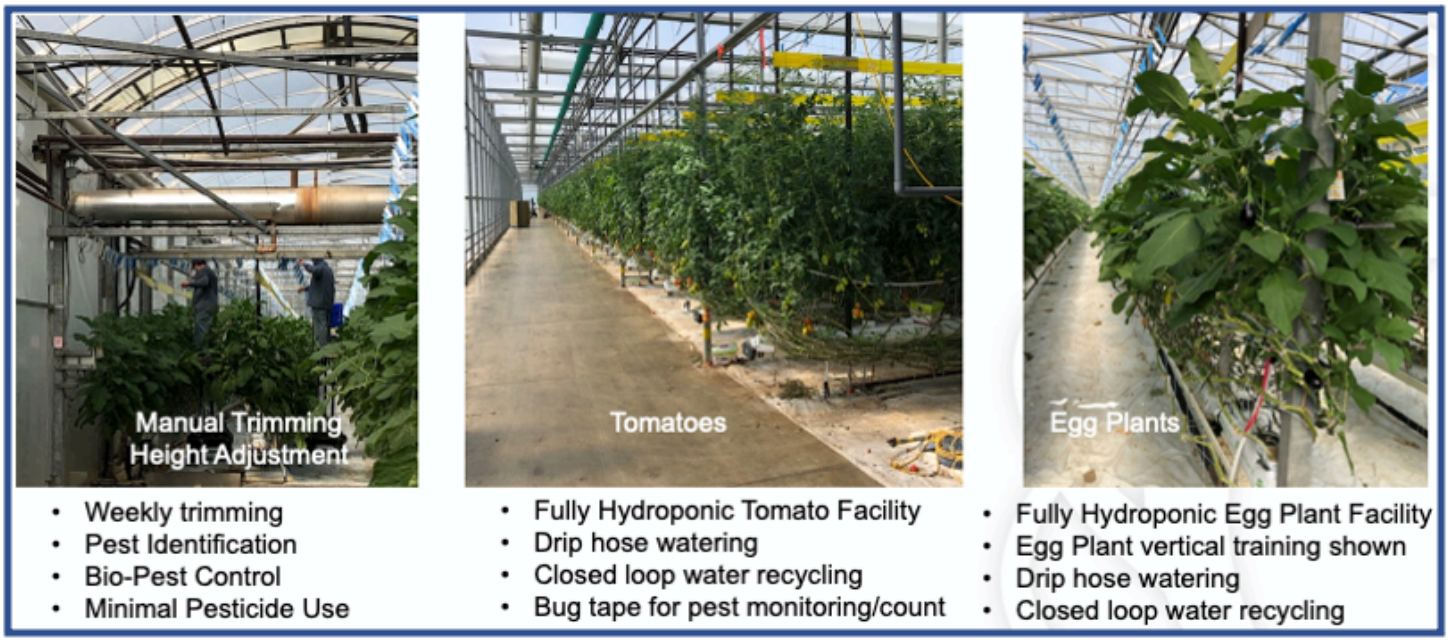

Figure 3: Inside the DC Farms Greenhouse Facility

Overview of Environmental IoT Sensors/IoT Gateways in the Greenhouse

The exising sensors used in the greenhouse utilize a cluster of wired IoT sensors that are hung by a chain from an overhead steel cable that is used to support the plants. The DC Farms facility requires only one cluster of environmental sensors per irrigation zone. These sensor clusters are hung in the centre of the middle row of each irrigation zone. Two sensor functions (pH level, and mosture level) are currently installed with probes at the base of the plant. Five sensor functions (light, temperature, are monitored at the head of the plant as the plant grows as shown in Figure 4 below:

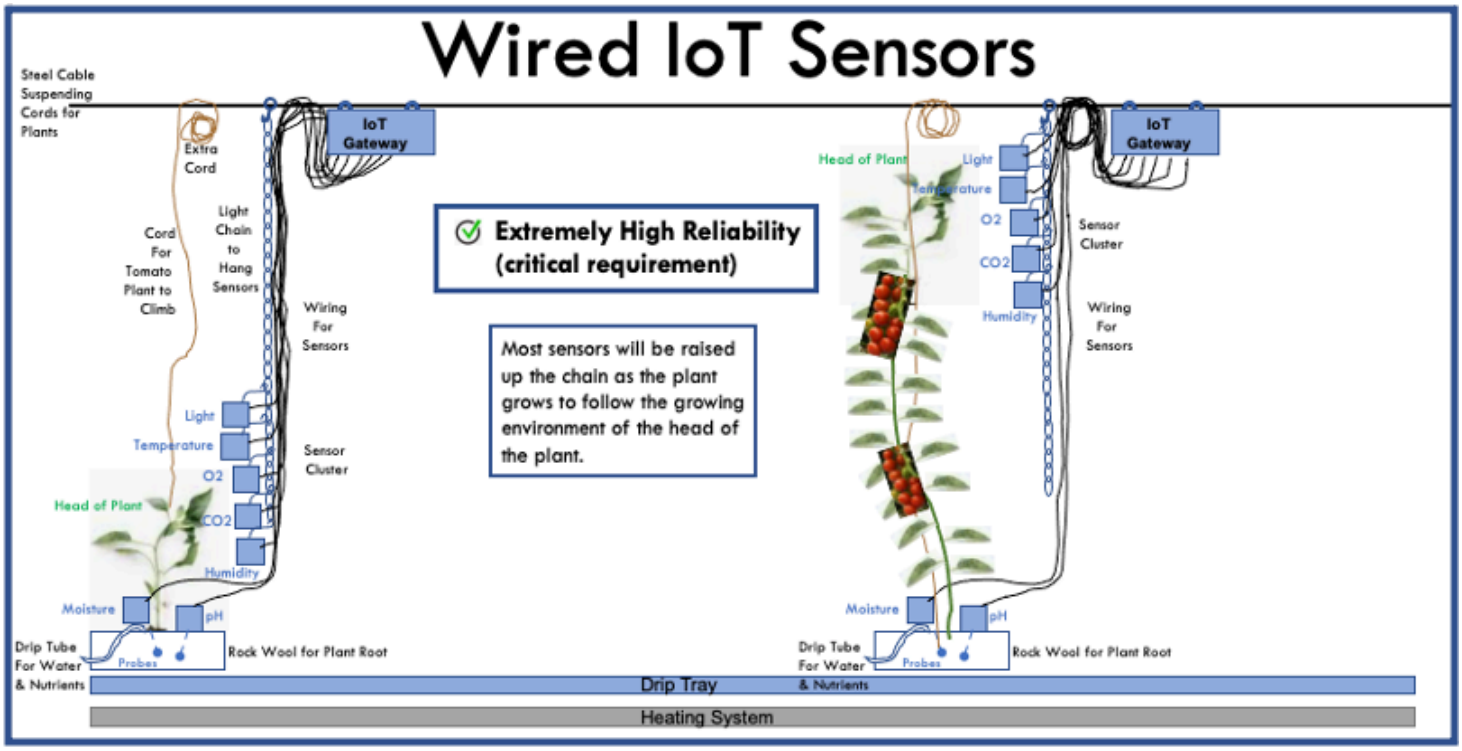

Figure 4: Existing Wired Environmental Sensor Approach

In order to ensure that the day to day operation of the DC Farms greenhouse operation can continue to operate using thier existing environmental monitoring system independently from any SME testing going on in the greenhouse, CENGN requires installation in Zone 8 of new separate sets of wireless environmental sensors supporting different wireless technologies.

These new wireless IoT sensor clusters will also use a chain or equivalent method to simplify the frequent manual height adjustments required to keep the sensors close to the head of the tomato plants as they grow taller throughout the growning season.

The following 5 wireless IoT sensor cluster types will be required to be hung in 'Irrigation Zone 8' for monitoring environmental growing conditions at the head of the plant:

- LTE wireless sensors (Light, Temperature, Humidity, O2, CO2)
- LTE-M wireless sensors (Light, Temperature, Humidity, O2, CO2)
- BLE wireless Sensors (Light, Temperature, Humidity, O2, CO2)
- LoRaWAN Senors (Light, Temperature, Humidity, O2, CO2)
- WIFI Senors (Light, Temperature, Humidity, O2, CO2)

The following 5 wireless IoT sensor cluster types will be required in 'Irrigation Zone 8' for monitoring environmental growing conditions at the base of the plant using probes inserted into the rockwool medium:

- LTE wireless sensors (pH, electrical conductivity (EC) or moisture)
- LTE-M wireless sensors (pH, electrical conductivity (EC) or moisture)
- BLE wireless Sensors (pH, electrical conductivity (EC) or moisture)
- LoRaWAN Senors (pH, electrical conductivity (EC) or moisture)
- WIFI Senors (pH, electrical conductivity (EC) or moisture)

The new sensor function clusters will be located in 5 locations along the middle row (Row 30) of Irrigation Zone as shown in Figure 5 below:

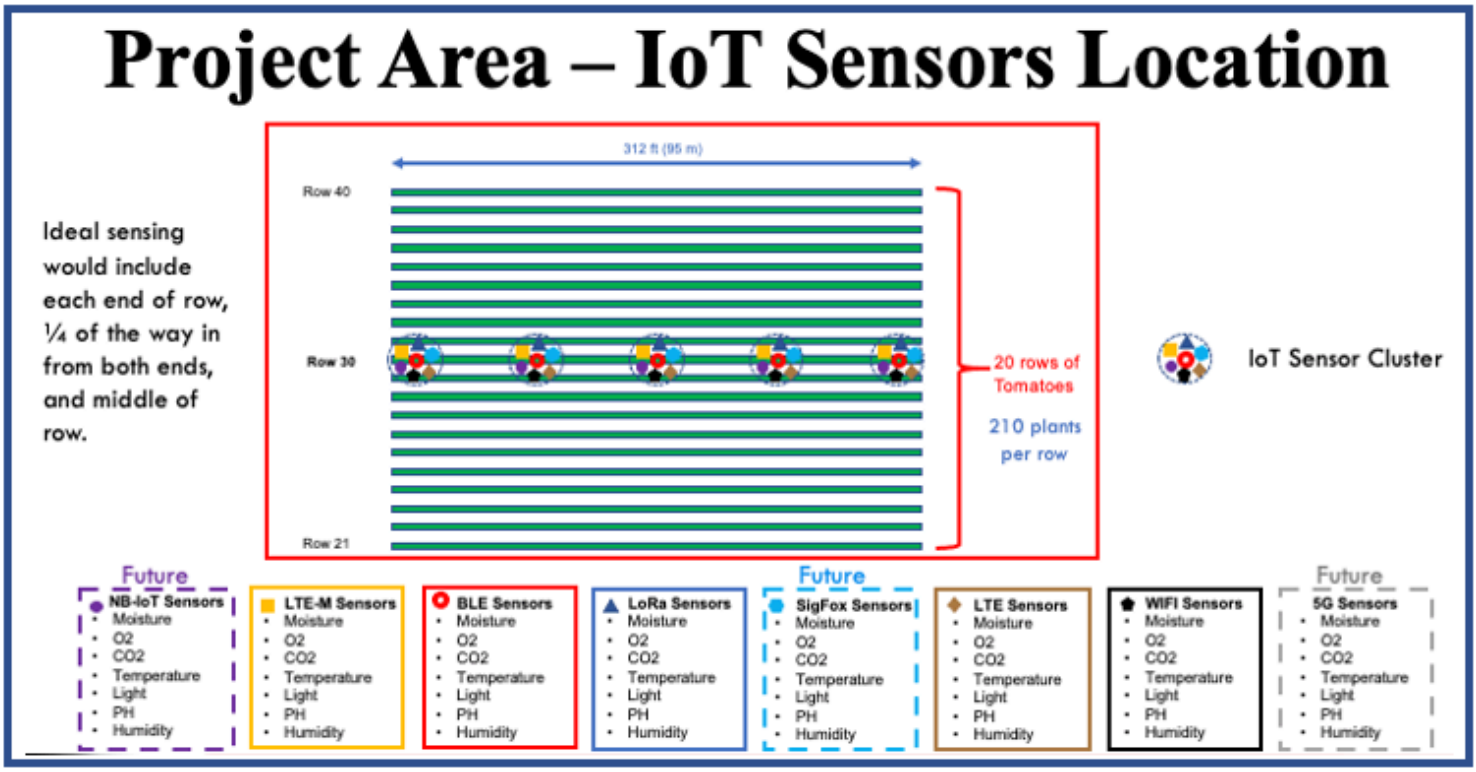

Figure 5: Proposed Locations for New Wireless IoT Environmental Sensor Clusters

The outer most sensor clusters at the ends of row 30 will provide data for the ends of the row. The left end of the row will correspond to the 30 end plants that will get the direct sunlight through both the side and top of the greenhouse from the southerly direction and get reflected heat from the cement corridor at that end of the greenhouse. The right end sensor cluster will record data for the 30 plants impacted by the north greenhouse wall that typically will be cooler due to less direct sunlight. The middle 3 sensor clusters will verify the relatively constant growing environment of the 150 middle row plants.

The wireless IoT sensor clusters will be hung as shown in Figure 6 below:

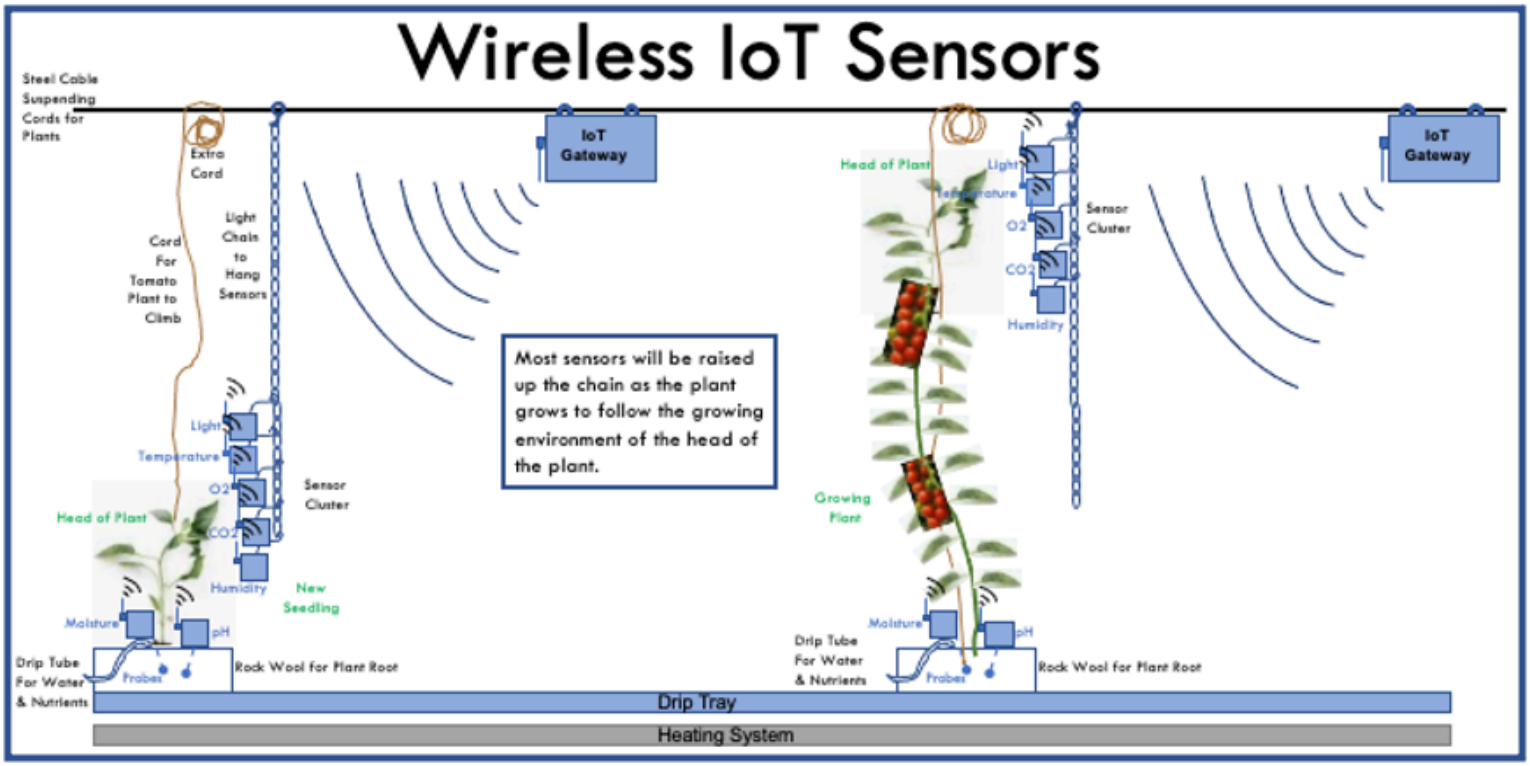

Figure 6: Proposed Approach for Hanging New Wireless IoT Environmental Sensor Clusters

The corresponding wireless IoT gateways positioned either directly above each sensor cluster or if possible all IoT Gateways would ideally be located in the centre of Irrigation Zone 8 as shown in Figure 7.

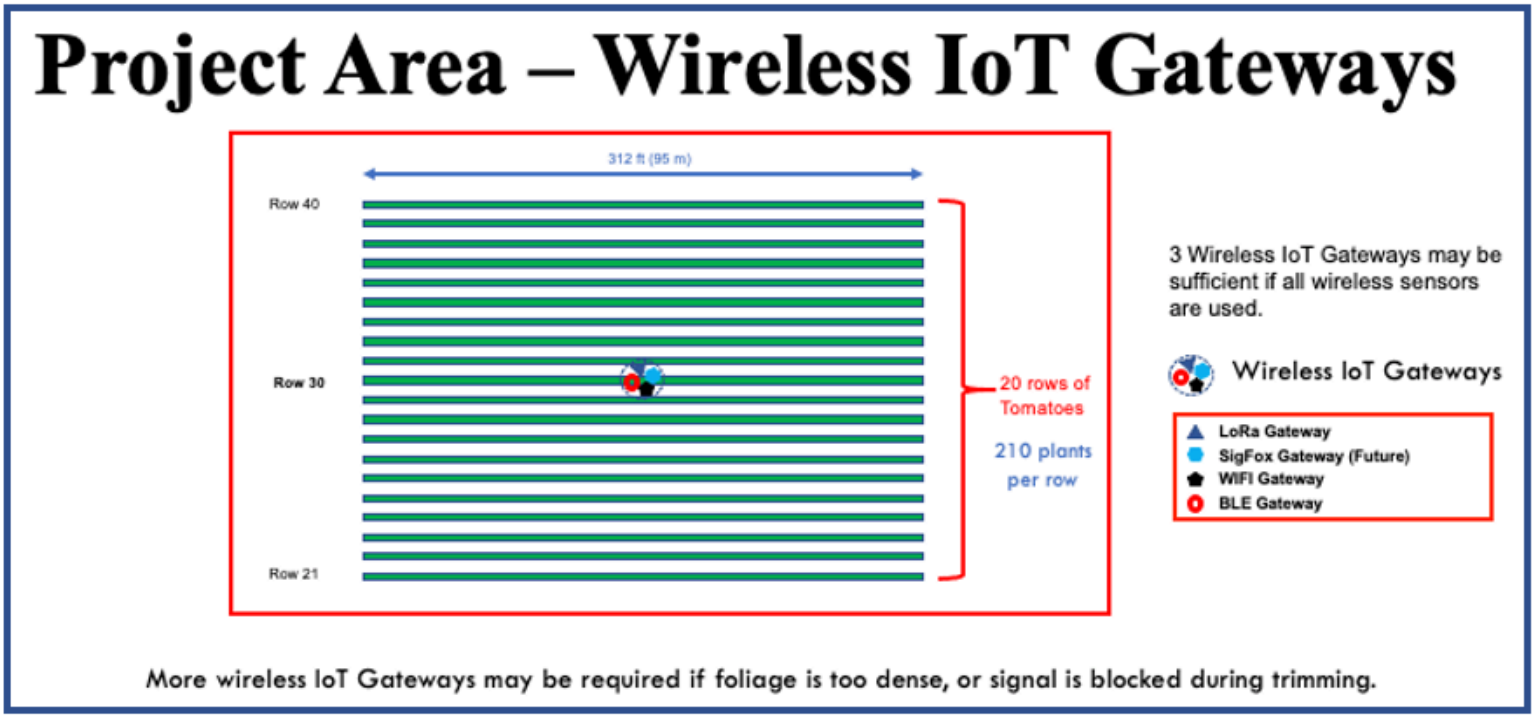

Figure 7: Proposed Centralized Location of New IoT Gateways for Optimal Performance

The IoT gateways gateways will be expected to have support for the CENGN sensor clusters but also any SME client supplied IoT sensors that are compatible with the wireless technology supported by the correspondingIoT gateway.

Overview of Device and Data Management System Requirements

The IoT environmental clusters will require device and data management systems that CENGN engineering can use to monitor location of the IoT devices in the greenhouse, verify operational state of the devices, display the devices and status on a greenhouse map, offer remote demos, and plot or display data trends from each sensor cluster and device.

Ideally one system could manage multiple clusters of devices and different wireless technology device clusters.

The device and management system should allow a variety of data access options including export of data in different standard file formats like comma delimited data or other formats like directly into micro-soft excel file formats. API access directly to the raw data collected from the environmental sensors is also important.

Overview of Private Narrowband IoT Network Requirements

The CENGN Smart Ag Greenhouse Living Lab will need to support a number of narrowband IoT Networks to support not only environmental IoT sensors, but also any SME device choosing to use LoRaWAN, BLE, or WIFI wireless technology to communicate with IoT gateways or transfer recorded or measured data as shown in Figure 8 below:

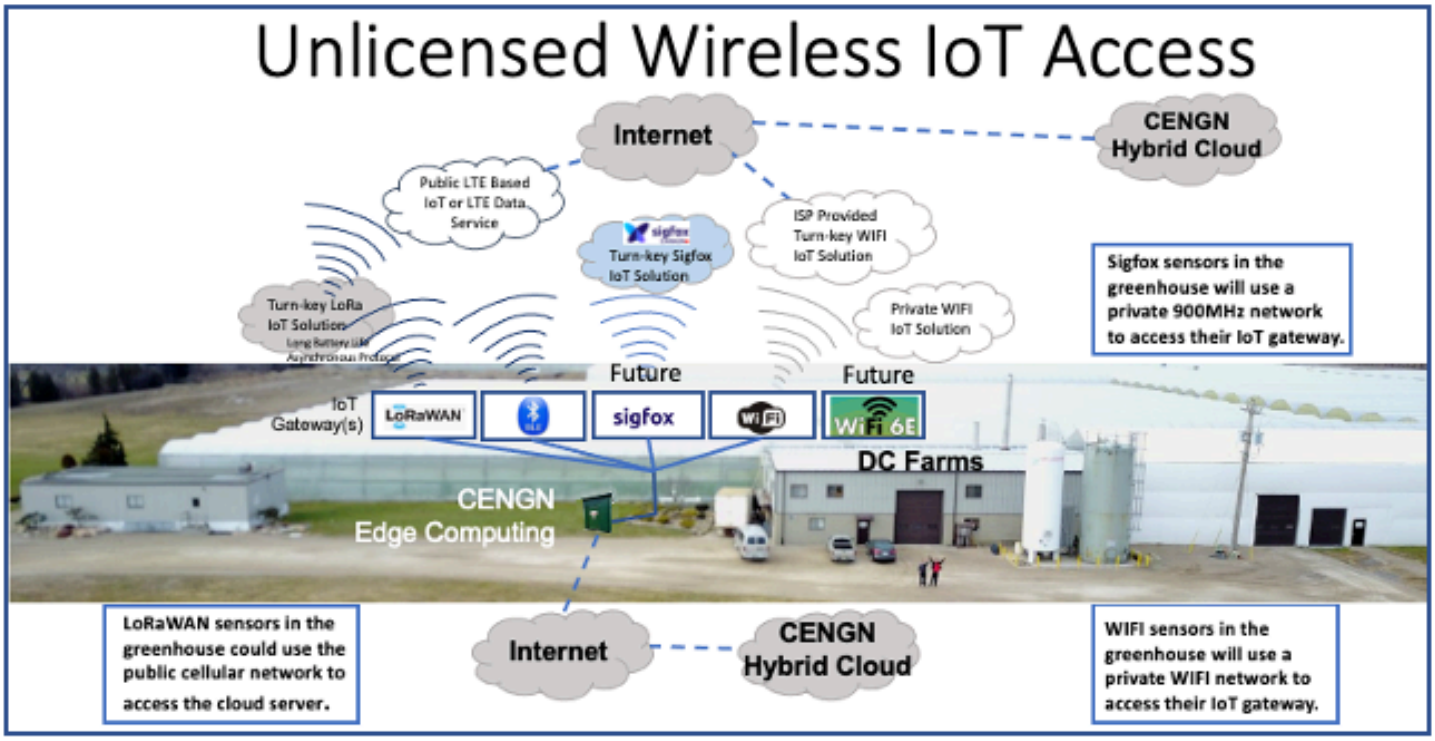

Figure 8: Private Narrowband Network Supported in the Living Lab

In the future Sigfox, Wifi 6E, and Wifi HALOW systems may be considered for inclusion in the greenhouse.

LoRaWAN Support

In addition to supporting access to environmental IoT devices or sensors that use LoRa or LoRaWAN technology to transfer data to the LoRaWAN IoT gateway, a private LoRaWAN narrowband network will be needed in the greenhouse to support transfer of low volume/low frequency data to the on-site edge computing site that CENGN will be installing outside the greenhouse, or back to the internet for post-processing at one or more CENGN data centres, the SME's lab, or other destinations.

This private LoRaWAN network will only need to support less than 100 sensors with low kilobytes per day per sensor to support low data projects such as environmental monitoring, or agribusiness apps, analysis and production boosting apps using AI systems.

CENGN is looking for a turn-key solution for the supply, installation, commissioning, management, and support of the LoRaWAN system in the Living Lab including all required sensors, IoT Gateways, device management, and associated data management systems.

BLE Support

In addition to supporting access to environmental IoT devices or sensors that use Bluetooth or Bluetooth Low Energy (BLE) technology to transfer data to the BLE IoT gateway, a private BLE narrowband network will be needed in the greenhouse to support transfer of low volume/low frequency data to the on-site edge computing site that CENGN will be installing outside the greenhouse, or back to the internet for post-processing at one or more CENGN data centres, the SME's lab, or other destinations.

This private BLE network will only need to support less than 100 sensors with low kilobytes per day per sensor to support low data projects such as environmental monitoring, or agribusiness apps, analysis and production boosting apps using AI systems.

CENGN is looking for a turn-key solution for the supply, installation, commissioning, management, and support of the BLE system in the Living Lab including all required sensors, IoT Gateways, device management, and associated data management systems.

WIFI Narrowband Support

In addition to supporting access to environmental IoT devices or sensors that use WIFI technology to transfer data to the WIFI IoT gateway, a private WIFI broadband network will be needed in the greenhouse to support transfer of low quantities and high quantities of data to the on-site edge computing site that CENGN will be installing outside the greenhouse, or back to the internet for post-processing at one or more CENGN data centres, the SME's lab, or other destinations.

This private WIFI network will need to support low data rate/low frequency sensor or device support for projects such as environmental data monitoring, security monitoring, or power monitoring systems.

A common WIFI network could be used to offer both narrowband and broadband support in the greenhouse.

Overview of Private Broadband IoT Network Requirements

WIFI Broadband Support

In addition to supporting access to environmental IoT devices or sensors that use WIFI technology to transfer data to the WIFI IoT gateway, a private WIFI broadband network will be needed in the greenhouse to support transfer of high quantities of data to the on-site edge computing site that CENGN will be installing outside the greenhouse, or back to the internet for post-processing at one or more CENGN data centres, the SME's lab, or other destinations.

This private WIFI network will need to support data rates exceeding 50Mbps down and 10Mbps up (ideally much higher), to support high data projects such as autonomous harvesting equipment, or automatic pest or disease recognition systems using video capture and image analysis systems.

In the future, WIFI 6E, WIFI HALOW, and private LTE systems may also be considered for broadband applications in the greenhouse.

Overview of Commercial Cellular-Based IoT Service Requirements

The CENGN Smart Ag Greenhouse Living Lab will also need to support sensors and devices that utilize commercial cellular wireless services like standard LTE, and LTE-M services to allow environmental and other IoT data to be transferred from greenhouse to the cloud, the internet, to CENGN data centres, SME labs or other destinations as shown in Figure 9 below:

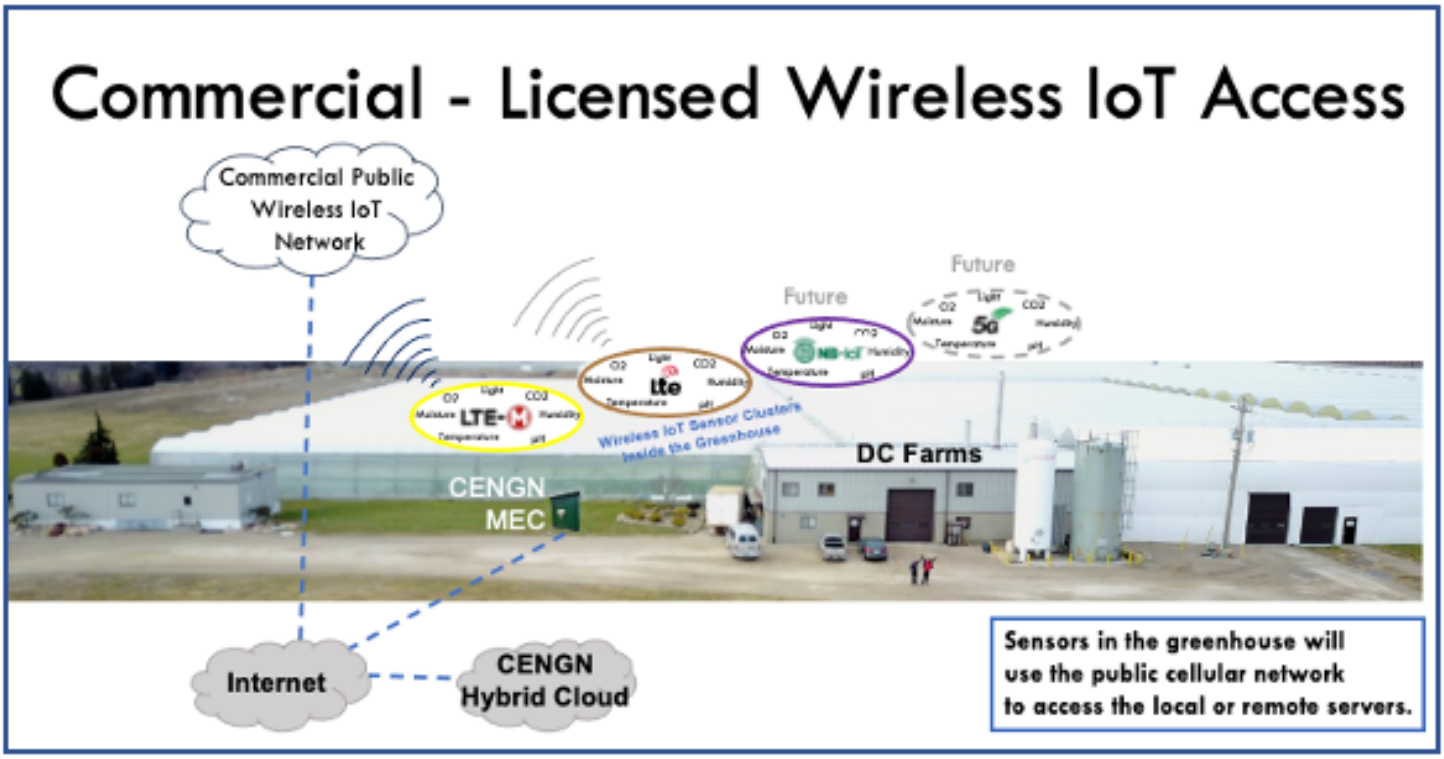

Figure 9: Commercial Licensed Wireless IoT Access Service Support

Narrowband Applications

The commercial cellular-based LTE and LTE-M networks will be used to support low data rate/low frequency applications to support low data projects such as environmental sensing, simple security door montoring, or occasional power monitoring systems.

In the future NB-IoT and 5G commercial cellular-based IoT services will be considered for the greenhouse.

Broadband Applications

This commercial cellular-based LTE network will need to support higher data rates of at least 25 Mbps down and 5 Mbps up (ideally higher), to support high data projects such as autonomous harvesting equipment, or automatic pest or disease recognition systems using video capture and image analysis systems.

These commercial services should offer reasonable levels of fixed monthly rates with allowances for additional usage based data rates if higher data usage is required for one or more concurrent SME projects.

Ideally these services would be offered as turn-key fully managed services providing LTE and LTE-M compatible sensors, installation, commissioning, monitoring, and support services.

In the future 5G commercial cellular-based broadband services could be considered for the greenhouse.

Submission Details

CENGN is soliciting a Call for RFS responses from those technology companies interested in participating in a Smart Ag Greenhouse Living Lab Project, which will provide a cost-effective, high resilience set of wireless IoT solutions for a working greenhouse operation at DC Farms in Ruthven, Ontario.

The RFS responses are due on, or before **5:00pm EST Wednesday March 17, 2021**. Submissions are to be provided by email to **kirby.koster@cengn.ca** in the form of a written proposal not to exceed fifty (50) pages. Reference letters from vegetable greenhouse growers or partners can be added in appendices, beyond the 50 pages that answer the questions of the formal RFS response.

The RFS response must describe in detail the technical advantages, cost advantages, and/or unique features being offered by the technology solution. Due to the unique nature of the installation of the equipment in the selected greenhouse operation, it is important the applicant addresses the plan for supporting a project intended to be operational within 3 months, as well as the benefits to both the technology applicant and other parties, of the potential deployment of the solution in a range of greenhouse vegetable operations across Ontario and Canada.

Eligibility

- Technology vendors, system integrators, service providers, or ISPs are eligible, that are able and willing to provide wireless technology, system integration services, and offer themselves or through partners, commercial long term service offerings for IoT device access services within Ontario and Canada.

- Technology applicants must also have a company presence in Canada.

Next Steps

All eligible technology applicants are invited to submit their written RFS response as detailed under submission details above.

All applicants will be informed about the final status of their RFS submissions by **Friday Apr. 16, 2021**.

Please direct any questions with respect to the Call for RFS to:

Kirby Koster
Senior Manager, Broadband Programs
kirby.koster@cengn.ca
1-613-291-0707

Preference will be given to RFS submissions that:

1) Demonstrate an economic benefit to Ontario.
2) Have broad vegetable greenhouse grower applicability and impact (economically and/or environmentally).
3) Demonstrate the ability and willingness of the technology applicant to work directly with the selected host greenhouse operation (DC Farms) and CENGN to propose a focused solution that solves the specific data backhaul and internet access issues for the CENGN Smart Ag Living Lab.
4) Demonstrate a willingness to work on a post-project plan with the selected host greenhouse operation following completion of a successful project. Proposals on how to scale or expand the IoT data access and internet access project configuration/installation as data needs evolve to meet the on-going needs of the greenhouse operator and the SME clients would be key requirements of the response.

RFS Written Response Format

The RFS response must be a written response in a labeled Microsoft Word or PDF document.

For reference letters of support, data sheets, or other supporting documentation, appendices can be added beyond the formal RFS response of 50 pages, if necessary, however the RFS will primarily be evaluated based on the answers to the RFS questions within the first 50 pages of the response.

To be considered as an eligible RFS submission, **all the following RFS questions MUST be answered under the same organizational headings shown on this and following pages, and with the same question and corresponding answer numbering**, as defined in this call for a Request for Solution (RFS) document.

Note: All answers are scored and detailed answers are expected. Single word or short sentence answers will score poorly. Ensure all questions are answered. Remember this is a competitive process so the level of detail and how well you answer each question is important.

All submissions must include anwers to the mandatory questions under following "Company" section and complete sets of questions from one or more of the other sections.

Please ensure that that you **specify in your submission which specific section(s) of the RFS Questions you plan on answering** in your Call for RFS submission. Only answer section 1.0 and then any other sections where you have a solution to offer.

Each section will be separately evaluated and rated so that those applicants specialize in a specific IoT area could still score well and be considered even if for example they could only supply a specific set of wireless sensors (for example only WIFI environmental sensors) or only can supply a wireless IoT gateway solution or can only support a commercial LTE-M service.

RFS Questions

1.0 Company (Manditory)

1.1 Briefly provide an overview of your company with respect to size, structure, and presence/operations within the province of Ontario or Canada.

1.2 Describe your company's involvement to date in providing IoT solutions, wireless narrowband, or broadband solutions for greenhouse operators. Provide reference customer installations or case studies if possible.

1.3 Describe the resources that your company will dedicate to the installation and commissioning of the solution.

1.4 Describe how your company plans to provide ongoing support to the technology solution through the term of the project (i.e. local or remote support, dedicated personnel etc.).

1.5 Detail what role your company could play in providing one or more wireless IoT turnkey solutions or work with partners to do so.

2.0 IoT Sensors

Five different wireless sensor clusters types will be needed for the greenhouse. Each cluster type will need to support 7 environmental sensors (Sunlight, Temperature, Humidity, O2, CO2, pH, EC or moisture). Submissions will be evaluated for each wireless sensor type separately. If you cannot supply IoT sensors skip to Section 3 - IoT Gateways.

2.1 LoRaWAN Environmental Sensors

2.1.1 Describe your proposed LoRaWAN narrow-band data access solution options for this greenhouse operation.

2.1.2 Describe in detail which of the 7 requested environmental sensor types are supported in your LoRaWAN solution for this greenhouse operation. Detail options for multi-function sensors if applicable (eg. temperature and humidity in one sensor).

2.1.3 Detail an application example of your proposed LoRaWAN solution that has been installed in a physical greenhouse environment similar to that of the DC Farms greenhouse operation for this project?

2.1.4 What is the competitive advantage(s) of your proposed LoRaWAN sensor solution over other LoRaWAN IoT sensor solutions for vegetable greenhouse operators? What are the key innovations proposed?

2.1.5 Provide detailed pricing on each revelevant LoRaWAN environmental sensor proposed for the solution.

2.1.6 Detail installation and commissioning costs for the 5 sets of required LoRaWAN sensor clusters.

2.1.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your LoRaWAN sensor technology solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date.

2.1.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones.

2.1.9 Detail what revelevent hardened specifications your LoRaWAN sensors comply to that would apply for the high temperature and high humidity conditions in a greenhouse.

2.1.10 Provide details on recommended or unique installation requirements for each of your LoRaWAN environmental sensors proposed in your solution.

2.2 BLE Environmental Sensors

2.2.1 Describe your proposed BLE narrow-band data access solution options for this greenhouse operation.

2.2.2 Describe in detail which of the 7 requested environmental sensor types are supported in your BLE solution for this greenhouse operation. Detail options for multi-function sensors if applicable (eg. temperature and humidity in one sensor).

2.2.3 Detail an application example of your proposed BLE solution that has been installed in a physical greenhouse environment similar to that of the DC Farms greenhouse operation for this project?

2.2.4 What is the competitive advantage(s) of your proposed BLE sensor solution over other BLE IoT sensor solutions for vegetable greenhouse operators? What are the key innovations proposed?

2.2.5 Provide detailed pricing on each revelevant BLE environmental sensor proposed for the solution.

2.2.6 Detail installation and commissioning costs for the 5 sets of required BLE sensor clusters.

2.2.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your BLE sensor technology solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date.

2.2.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones.

2.2.9 Detail what revelevent hardened specifications your BLE sensors comply to that would apply for the high temperature and high humidity conditions in a greenhouse.

2.2.10 Provide details on recommended or unique installation requirements for each of your BLE environmental sensors proposed in your solution.

2.3 WIFI Environmental Sensors

2.3.1 Describe your proposed WIFI narrow-band and/or broadband data access solution options for this greenhouse operation.

2.3.2 Describe in detail which of the 7 requested environmental sensor types are supported in your WIFI solution for this greenhouse operation. Detail options for multi-function sensors if applicable (eg. temperature and humidity in one sensor).

2.3.3 Detail an application example of your proposed WIFI solution that has been installed in a physical greenhouse environment similar to that of the DC Farms greenhouse operation for this project?

2.3.4 What is the competitive advantage(s) of your proposed WIFI sensor solution over other WIFI IoT sensor solutions for vegetable greenhouse operators? What are the key innovations proposed?

2.3.5 Provide detailed pricing on each revelevant WIFI environmental sensor proposed for the solution.

2.3.6 Detail installation and commissioning costs for the 5 sets of required WIFI sensor clusters.

2.3.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your WIFI sensor technology solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date

2.3.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones.

2.3.9 Detail what revelevent hardened specifications your WIFI sensors comply to that would apply for the high temperature and high humidity conditions in a greenhouse.

2.3.10 Provide details on recommended or unique installation requirements for each of your WIFI environmental sensors proposed in your solution.

2.4 LTE Environmental Sensors

2.4.1 Describe your proposed LTE narrow-band and/or broadband data access solution options for this greenhouse operation.

2.4.2 Describe in detail which of the 7 requested environmental sensor types are supported in your LTE solution for this greenhouse operation. Detail options for multi-function sensors if applicable (eg. temperature and humidity in one sensor).

2.4.3 Detail an application example of your proposed LTE solution that has been installed in a physical greenhouse environment similar to that of the DC Farms greenhouse operation for this project?

2.4.4 What is the competitive advantage(s) of your proposed LTE sensor solution over other LTE IoT sensor solutions for vegetable greenhouse operators? What are the key innovations proposed?

2.4.5 Provide detailed pricing on each revelevant LTE environmental sensor proposed for the solution.

2.4.6 Detail installation and commissioning costs for the 5 sets of required LTE sensor clusters.

2.4.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your LTE sensor technology solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date.

2.4.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones.

2.4.9 Detail what revelevent hardened specifications your LTE sensors comply to that would apply for the high temperature and high humidity conditions in a greenhouse.

2.4.10 Provide details on recommended or unique installation requirements for each of your LTE environmental sensors proposed in your solution.

2.5 LTE-M Environmental Sensors

2.5.1 Describe your proposed LTE-M narrow-band data access solution options for this greenhouse operation.

2.5.2 Describe in detail which of the 7 requested environmental sensor types are supported in your LTE-M solution for this greenhouse operation. Detail options for multi-function sensors if applicable (eg. temperature and humidity in one sensor).

2.5.3 Detail an application example of your proposed LTE-M solution that has been installed in a physical greenhouse environment similar to that of the DC Farms greenhouse operation for this project?

2.5.4 What is the competitive advantage(s) of your proposed LTE-M sensor solution over other LTE-M IoT sensor solutions for vegetable greenhouse operators? What are the key innovations proposed?

2.5.5 Provide detailed pricing on each revelevant LTE-M environmental sensor proposed for the solution.

2.5.6 Detail installation and commissioning costs for the 5 sets of required LTE-M sensor clusters.

2.5.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your LTE-M sensor technology solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date.

2.5.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones.

2.5.9 Detail what revelevent hardened specifications your LTE-M sensors comply to that would apply for the high temperature and high humidity conditions in a greenhouse.

2.5.10 Provide details on recommended or unique installation requirements for each of your LTE-M environmental sensors proposed in your solution.

3.0 IoT or IIoT Gateways

Three different wireless IoT Gateway types (LoRaWAN, BLE, and WIFI) will be needed for the greenhouse. Submissions will be evaluated for each wireless IoT Gateway type separately. If you cannot supply IoT Gateways skip to Section 4 - Device and Data Management Platforms.

3.1 LoRaWAN IoT Gateways

3.1.1 Describe your proposed LoRaWAN IoT Gateway solution options for this greenhouse operation.

3.1.2 Describe in detail which of the 7 requested environmental sensor types are supported by your LoRaWAN Gateway solution for this greenhouse operation. Detail options for multi-function IoT Gateways if applicable (eg. LoRaWan and WIFI concurrent support in one wireless IoT Gateway).

3.1.3 Detail an application example of your proposed LoRaWAN Gateway solution that has been installed in a physical greenhouse environment similar to that of the DC Farms greenhouse operation for this project?

3.1.4 What is the competitive advantage(s) of your proposed LoRaWAN Gateway solution over other LoRaWAN IoT Gateway solutions for vegetable greenhouse operators? What are the key innovations proposed?

3.1.5 Provide detailed pricing on each revelevant LoRaWAN Gateway type proposed for the solution.

3.1.6 Detail installation and commissioning costs for each required LoRaWAN gateway.

3.1.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your LoRaWAN Gateway technology solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date.

3.1.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones.

3.1.9 Detail what revelevent hardened specifications your LoRaWAN Gateway comply to that would apply for the high temperature and high humidity conditions in a greenhouse.

3.1.10 Provide details on recommended or unique installation requirements for each of your LoRaWAN Gateways proposed in your solution.

3.1.11 Explain how other suppliers of LoRaWAN sensors or devices can be supported by your LoRaWAN gateway or forward data to your gateway. Identify any certification costs or procedures required to interoperate with third party LoRaWAN devices or sensors.

3.1.12 Identify internet connectivity options supported by your LoRaWAN Gateway eg. LTE, ethernet ports, SFP optical ports, etc.

3.1.13 Detail power options for your LoRaWAN Gateway eg. POE, 120VAC, -48VDC, battery power, solar power etc.

3.1.14 Are hardened or IIoT variants of your LoRaWAN Gateway available? If so provide detailed pricing.

3.1.15 Are published or open API interfaces available for third party management or data retrieval into your LoRaWAN Gateway?

3.1.16 Do you have a corresponding device and data management system that supports your LoRaWAN Gateway?

3.1.17 What data storage/capacity options are available for your LoRaWAN Gateway?

3.2 BLE IoT Gateways

3.2.1 Describe your proposed BLE IoT Gateway solution options for this greenhouse operation.

3.2.2 Describe in detail which of the 7 requested environmental sensor types are supported by your BLE Gateway solution for this greenhouse operation. Detail options for multi-function IoT Gateways if applicable (eg. BLE and WIFI concurrent support in one wireless IoT Gateway).

3.2.3 Detail an application example of your proposed BLE Gateway solution that has been installed in a physical greenhouse environment similar to that of the DC Farms greenhouse operation for this project?

3.2.4 What is the competitive advantage(s) of your proposed BLE Gateway solution over other BLE IoT Gateway solutions for vegetable greenhouse operators? What are the key innovations proposed?

3.2.5 Provide detailed pricing on each revelevant BLE Gateway type proposed for the solution.

3.2.6 Detail installation and commissioning costs for each required BLE gateway.

3.2.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your BLE Gateway technology solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date.

3.2.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones.

3.2.9 Detail what revelevent hardened specifications your BLE Gateway comply to that would apply for the high temperature and high humidity conditions in a greenhouse.

3.2.10 Provide details on recommended or unique installation requirements for each of your BLE Gateways proposed in your solution.

3.2.11 Explain how other suppliers of BLE sensors or devices can be supported by your BLE gateway or forward data to your gateway. Identify any certification costs or procedures required to interoperate with third party BLE devices or sensors.

3.2.12 Identify internet connectivity options supported by your BLE Gateway eg. LTE, ethernet ports, SFP optical ports, etc.

3.2.13 Detail power options for your BLE Gateway eg. POE, 120VAC, -48VDC, battery power, solar power etc.

3.2.14 Are hardened or IIoT variants of your BLE Gateway available? If so provide detailed pricing.

3.2.15 Are published or open API interfaces available for third party management or data retrieval into your BLE Gateway?

3.2.16 Do you have a corresponding device and data management system that supports your BLE Gateway?

3.2.17 What data storage/capacity options are available for your BLE Gateway?

3.3 WIFI IoT Gateways

3.3.1 Describe your proposed WIFI IoT Gateway solution options for this greenhouse operation.

3.3.2 Describe in detail which of the 7 requested environmental sensor types are supported by your WIFI Gateway solution for this greenhouse operation. Detail options for multi-function IoT Gateways if applicable (eg. BLE and WIFI concurrent support in one wireless IoT Gateway).

3.3.3 Detail an application example of your proposed WIFI Gateway solution that has been installed in a physical greenhouse environment similar to that of the DC Farms greenhouse operation for this project?

3.3.4 What is the competitive advantage(s) of your proposed WIFI Gateway solution over other WIFI IoT Gateway solutions for vegetable greenhouse operators? What are the key innovations proposed?

3.3.5 Provide detailed pricing on each revelevant WIFI Gateway type proposed for the solution.

3.3.6 Detail installation and commissioning costs for each required WIFI gateway.

3.3.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your WIFI Gateway technology solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date.

3.3.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones.

3.3.9 Detail what revelevent hardened specifications your WIFI Gateway comply to that would apply for the high temperature and high humidity conditions in a greenhouse.

3.3.10 Provide details on recommended or unique installation requirements for each of your WIFI Gateways proposed in your solution.

3.3.11 Explain how other suppliers of WIFI sensors or devices can be supported by your WIFI gateway or forward data to your gateway. Identify any certification costs or procedures required to interoperate with third party WIFI devices or sensors.

3.3.12 Identify internet connectivity options supported by your WIFI Gateway eg. WIFI, LTE, ethernet ports, SFP optical ports, etc.

3.3.13 Detail power options for your WIFI Gateway eg. POE, 120VAC, -48VDC, battery power, solar power etc.

3.3.14 Are hardened or IIoT variants of your WIFI Gateway available? If so provide detailed pricing.

3.3.15 Are published or open API interfaces available for third party management or data retrieval into your WIFI Gateway?

3.3.16 Do you have a corresponding device and data management system that supports your WIFI Gateway?

3.3.17 What data storage/capacity options are available for your WIFI Gateway?

3.3.18 What WIFI standards does your WIFI Gateway support? Can multiple standards or radio frequencies by used concurrently (eg. 2.4GHz WIFI and 5.0GHz WIFI)?

3.3.19 What are your plans to support WIFI 6 and WIFI 6E on your WIFI IoT Gateway?

3.3.20 What are your plans to support WIFI HALOW on your WIFI IoT Gateway?

4.0 Device and Data Management Platforms

Three different device and data management platform types (LoRaWAN, BLE, and WIFI) will be needed for the greenhouse. Submissions will be evaluated for each device and data management platform separately. If you cannot supply Device and Data Management Platforms skip to Section 5 - Private Wireless Networks Solutios.

4.1 LoRaWAN Device and Data Management Platform

4.1.1 Describe your proposed LoRaWAN device and data management solution options for this greenhouse operation.

4.1.2 Describe in detail all the current environmental and other IoT sensor types supported by your device and data management solution for this greenhouse operation. Detail options for multi-function device and data management systems if applicable (eg. LoRaWAN and WIFI concurrent support in device and management system).

4.1.3 Detail an application example of your proposed device and data management solution that has been installed in a physical greenhouse environment similar to that of the DC Farms greenhouse operation?

4.1.4 What is the competitive advantage(s) of your proposed LoRaWAN device and data management solution over other LoRaWAN device and data management solutions for vegetable greenhouse operators? What are the key innovations proposed?

4.1.5 Provide detailed pricing on each revelevant device and data management system proposed for the solution.

4.1.6 Detail installation and commissioning costs for each required device and data management system. Include server, monitor, keyboard or other required hardware/software costs to fully support on-site use and deployment of the system.

4.1.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your device and data management solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date.

4.1.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones.

4.1.9 Detail what display and reporting functions are featured in the data management system and what formats of data are stored.

4.1.10 Provide details on recommended or unique installation requirements for each of your device and data management systems proposed in your solution.

4.1.11 Explain how other suppliers of LoRaWAN IoT gateways, LoRaWAN sensors, or other LoRaWAN devices can be supported by your device and data management system or can forward data to your system. Identify any certification costs or procedures required to interoperate with third party LoRaWAN IoT gateways, devices or sensors.

4.1.12 Identify internet connectivity options supported by your device and data management system eg. WIFI, LTE, ethernet ports, SFP optical ports, etc.

4.1.13 Detail power options for your device and data management system eg. POE, 120VAC, -48VDC, battery power, solar power etc.

4.1.14 Are published or open API interfaces available for third party management or data retrieval from your device and data management system?

4.1.15 What data storage/capacity options are available for your LoRaWAN device and data management platform?

4.1.16 What LoRaWAN standards does your device and data management support?

4.1.17 Describe in detail with pricing how your company can provide a full BLE turnkey solution for the greenhouse, including all the required environmental BLE sensors or equivalent devices, BLE gateways, device and data management system, installation, and ongoing support services.

4.2 BLE Device and Data Management Platform

4.2.1 Describe your proposed BLE device and data management solution options for this greenhouse operation.

4.2.2 Describe in detail all the current environmental and other IoT sensor types supported by your device and data management solution for this greenhouse operation. Detail options for multi-function device and data management systems if applicable (eg. BLE and WIFI concurrent support in device and management system).

4.2.3 Detail an application example of your proposed device and data management solution that has been installed in a physical greenhouse environment similar to that of the DC Farms greenhouse operation?

4.2.4 What is the competitive advantage(s) of your proposed BLE device and data management solution over other BLE device and data management solutions for vegetable greenhouse operators? What are the key innovations proposed?

4.2.5 Provide detailed pricing on each revelevant device and data management system proposed for the solution.

4.2.6 Detail installation and commissioning costs for each required device and data management system. Include server, monitor, keyboard or other required hardware/software costs to fully support on-site use and deployment of the system.

4.2.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your device and data management solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date.

4.2.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones.

4.2.9 Detail what display and reporting functions are featured in the data management system and what formats of data are stored.

4.2.10 Provide details on recommended or unique installation requirements for each of your device and data management systems proposed in your solution.

4.2.11 Explain how other suppliers of BLE IoT gateways, BLE sensors, or other BLE devices can be supported by your device and data management system or can forward data to your system. Identify any certification costs or procedures required to interoperate with third party BLE IoT gateways, devices or sensors.

4.2.12 Identify internet connectivity options supported by your device and data management system eg. WIFI, LTE, ethernet ports, SFP optical ports, etc.

4.2.13 Detail power options for your device and data management system eg. POE, 120VAC, -48VDC, battery power, solar power etc.

4.2.14 Are published or open API interfaces available for third party management or data retrieval into your device and data management system?

4.2.15 What data storage/capacity options are available for your BLE device and data management platform?

4.2.16 What BLE standards does your device and data management support?

4.2.17 Describe in detail with pricing how your company can provide a full BLE turnkey solution for the greenhouse, including all the required environmental BLE sensors or equivalent devices, BLE gateways, device and data management system, installation, and ongoing support services.

4.3 WIFI Device and Data Management Platform

4.3.1 Describe your proposed WIFI device and data management solution options for this greenhouse operation.

4.3.2 Describe in detail all the current environmental and other IoT sensor types supported by your device and data management solution for this greenhouse operation. Detail options for multi-function device and data management systems if applicable (eg. BLE and WIFI concurrent support in device and management system).

4.3.3 Detail an application example of your proposed device and data management solution that has been installed in a physical greenhouse environment similar to that of the DC Farms greenhouse operation?

4.3.4 What is the competitive advantage(s) of your proposed WIFI device and data management platform over other WIFI device and data management solutions for vegetable greenhouse operators? What are the key innovations proposed?

4.3.5 Provide detailed pricing on each revelevant device and data management system proposed for the solution.

4.3.6 Detail installation and commissioning costs for each required device and data management system. Include server, monitor, keyboard or other required hardware/software costs to fully support on-site use and deployment of the system.

4.3.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your device and data management solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date.

4.3.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones.

4.3.9 Detail what display and reporting functions are featured in the data management system and what formats of data are stored.

4.3.10 Provide details on recommended or unique installation requirements for each of your device and data management systems proposed in your solution.

4.3.11 Explain how other suppliers of WIFI device and data management systems, WIFI IoT gateways, WIFI sensors, or other WIFI devices can be supported by your device and data management system or can forward data to your system. Identify any certification costs or procedures required to interoperate with third party WIFI device and data management systems, IoT gateways, devices or sensors.

4.3.12 Identify internet connectivity options supported by your device and data management system eg. WIFI, LTE, ethernet ports, SFP optical ports, etc.

4.3.13 Detail power options for your device and data management system eg. POE, 120VAC, -48VDC, battery power, solar power etc.

4.3.14 Are published or open API interfaces available for third party management or data retrieval from your device and data management system?

4.3.15 What data storage/capacity options are available for your WIFI device and data management platform?

4.3.16 What WIFI standards does your device and data management support? Can multiple standards or radio frequencies by used concurrently (eg. 2.4GHz WIFI and 5.0GHz WIFI)?

4.3.17 Describe in detail with pricing how your company can provide a full WIFI turnkey solution for the greenhouse, including all the required environmental WIFI sensors or equivalent devices, WIFI gateways, device and data management system, installation, and ongoing support services.

5.0 Private Wireless IoT Network Solutions/Support

A private fixed wireless WIFI high-speed network will be needed for the greenhouse. Submissions will be evaluated for each WIFI private network solution separately. If you cannot supply a private Wireless Network Solution skip to Section 6 - Commercial Wireless IoT Networks Solutions.

5.1 Describe your proposed WIFI network solution that could support the entire greenhouse.

5.2 Describe in detail the WIFI standards and data throughput options up and down supported by your private WIFI network for this greenhouse operation.

5.3 Detail an application example of your proposed private WIFI solution that has been installed in a physical greenhouse environment similar to that of the DC Farms greenhouse operation?

5.4 What is the competitive advantage(s) of your proposed private WIFI network over other WIFI device and data management solutions for vegetable greenhouse operators? What are the key innovations proposed?

5.5 Provide detailed pricing on each revelevant WIFI access point and network management system proposed for the solution.

5.6 Detail installation and commissioning costs for private WIFI network. Include server, monitor, keyboard or other required hardware/software costs to fully support on-site use and deployment of the system.

5.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your private WIFI network solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date.

5.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones.

5.9 Detail what display and reporting functions are featured in the network management system and what formats of data are stored.

5.10 Provide details on recommended or unique installation requirements for your private WIFI network proposed in your solution.

5.11 Explain how other suppliers of WIFI devices or equipment can be supported by your private WIFI network. Identify any certification costs or procedures required to interoperate with third party WIFI device and data management systems, IoT gateways, devices or sensors.

5.12 Identify internet connectivity options supported by your private WIFI netwwork and network management system eg. WIFI, LTE, ethernet ports, SFP optical ports, etc.

5.13 Detail power options for your private WIFI network eg. POE, 120VAC, -48VDC, battery power, solar power etc.

5.14 Are published or open API interfaces available for your private WIFI network or correspond network management system?

5.15 What data storage/capacity options are available for your WIFI network management platform?

5.16 What WIFI standards does your private WIFI network support? Can multiple standards or radio frequencies by used concurrently (eg. 2.4GHz WIFI and 5.0GHz WIFI)?

5.17 What are your plans to support WIFI 6, WIFI 6e, and WIFI HALOW?

5.18 Describe in detail with pricing how your company can provide a full WIFI turnkey solution for the greenhouse, including all the required environmental WIFI sensors or equivalent devices, WIFI gateways, device and data management system, installation, and ongoing support services.

6.0 Commercial Wireless IoT Network Solutions/Support

Two commercial wireless IoT network solutions (LTE and LTE-M) will be needed for the greenhouse. Submissions will be evaluated for each commercial wireless IoT network solution separately.

6.1 LTE Commercial Wireless IoT Network Solution/Support

6.1.1 Describe your proposed commercial LTE wireless IoT network solution that could support LTE devices or sensors within the greenhouse.

6.1.2 Describe in detail the LTE standards and data throughput options up and down supported by your public commercial LTE network for this greenhouse operation.

6.1.3 Detail an application example of your proposed commercial LTE solution that would support devices in a greenhouse environment similar to that of the DC Farms greenhouse operation?

6.1.4 What is the competitive advantage(s) of your proposed commercial LTE network over other commercial LTE network solutions for vegetable greenhouse operators? What are the key innovations proposed?

6.1.5 Provide monthly and/or device based detailed pricing on each LTE network option and network management system proposed for the solution.

6.1.6 Detail installation and commissioning costs for the LTE commercial network.

6.1.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your commercial LTE network solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date.

6.1.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones to turnup the commercial service for the greenhouse location.

6.1.9 Detail what display and reporting functions are featured in your customer facing device and data management or network management system and what formats of data are stored.

6.1.10 Provide details on recommended or unique installation requirements for your commercial LTE network proposed in your solution.

6.1.11 Explain how other suppliers of LTE devices or equipment can be supported by your commercial LTE network. Identify any certification costs or procedures required to interoperate with third party LTE device and data management systems, or LTE devices or sensors.

6.1.12 Are published or open API interfaces available for your commercial LTE network or correspond network management system?

6.1.13 What LTE standards does your commercial LTE network support?

6.1.14 What are the plans for commercial 5G IoT network support in the greenhouse area?

6.1.15 Describe in detail, with pricing how your company, can provide a full LTE turnkey solution for the greenhouse, including all the required environmental LTE sensors or equivalent devices, LTE device and data management system access, commercial LTE service, installation, and ongoing support services.

6.2 LTE-M Commercial Wireless IoT Network Solution/Support

6.2.1 Describe your proposed commercial LTE-M wireless IoT network solution that could support LTE-M devices or sensors within the greenhouse.

6.2.2 Describe in detail the LTE-M standards and data throughput options up and down supported by your public commercial LTE-M network for this greenhouse operation.

6.2.3 Detail an application example of your proposed commercial LTE-M solution that would support LTE-M devices in a greenhouse environment similar to that of the DC Farms greenhouse operation?

6.2.4 What is the competitive advantage(s) of your proposed commercial LTE-M network over other commercial LTE-M network solutions for vegetable greenhouse operators? What are the key innovations proposed?

6.2.5 Provide monthly and/or device based detailed pricing on each LTE-M network option and network management system proposed for the solution.

6.2.6 Detail installation and commissioning costs for the LTE-M commercial network.

6.2.7 The proposed start of installation and implementation of the funded solution is April 2021. Describe the present state of your commercial LTE-M network solution and any development or system integration that must be completed in order to meet Canadian regulatory compliance and the installation date.

6.2.8 Describe in detail your project plan, scope, key activities, deliverables, and milestones to turnup the commercial service for the greenhouse location.

6.2.9 Detail what display and reporting functions are featured in your customer facing device and data management or network management system and what formats of data are stored.

6.2.10 Provide details on recommended or unique installation requirements for your commercial LTE-M network proposed in your solution.

6.2.11 Explain how other suppliers of LTE-M devices or equipment can be supported by your commercial LTE-M network. Identify any certification costs or procedures required to interoperate with third party LTE-M device and data management systems, or LTE-M devices or sensors.

6.2.12 Are published or open API interfaces available for your commercial LTE-M network or correspond network management system?

6.2.13 What LTE-M standards does your commercial LTE-M network support?

6.2.14 What are the plans for commercial 5G IoT network support in the greenhouse area?

6.2.15 Describe in detail, with pricing how your company, can provide a full LTE-M turnkey solution for the greenhouse, including all the required environmental LTE-M sensors or equivalent devices, LTE-M device and data management system access, commercial LTE-M service, installation, and ongoing support services.