



Key Partners

Anchor partners | Partenaires piliers



Founding partners | Partenaires fondateurs



Sponsor | Commanditaire



Research partners | Partenaires de recherche



Ecosystem partners
Partenaires écosystème



Building on Technology Investments

- Over \$30 million of Private and Public investment to support multiple sectors including CAV, unmanned systems/drones, public safety, defense, cyber security, mobility, smart farming
- New partners: GPS Ontario, Kongsberg Geospatial, Autonomous Stuff, Trimble, Indro Robotics, Novatel, Unifly, Transport Canada, CRC, AAFC and NRC.
- Area X.O enables and accelerates the development, testing and application of next-generation technologies across many sectors.

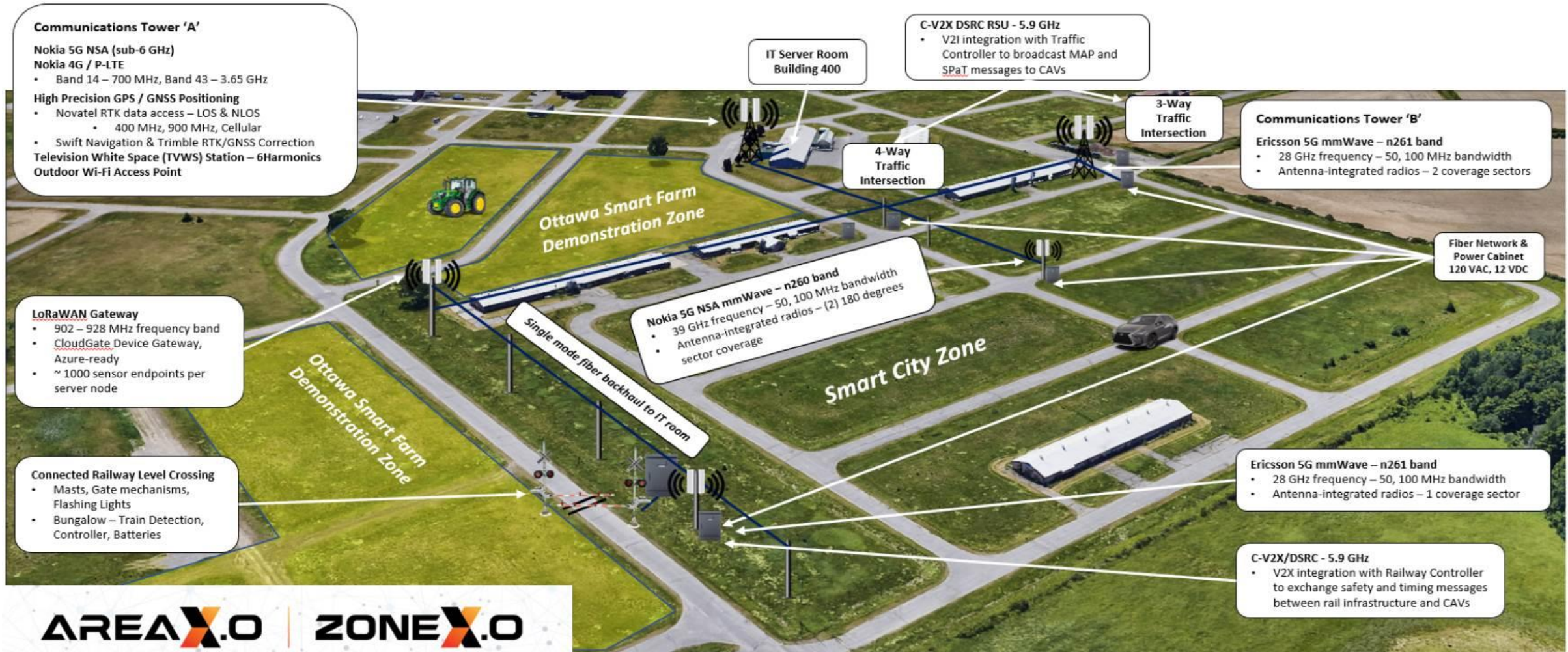


Area X.O Private Test Track

- Located within the heart of Ottawa, 12KM from Parliament Hill
- Within proximity of Federal Regulators and 2 Universities specialized in Computer Science, Communications and Engineering
- Access to 65 National Research labs
- Fully fenced and gated, secure and private facility occupying 1,866 acres of land
- 16 KM of paved roadways (9.85km of smart city test track)
- Full Situational awareness in the sky and on the ground (Kongsberg Geospatial, Nokia IOC)



Smart City Zone



AREA X.O

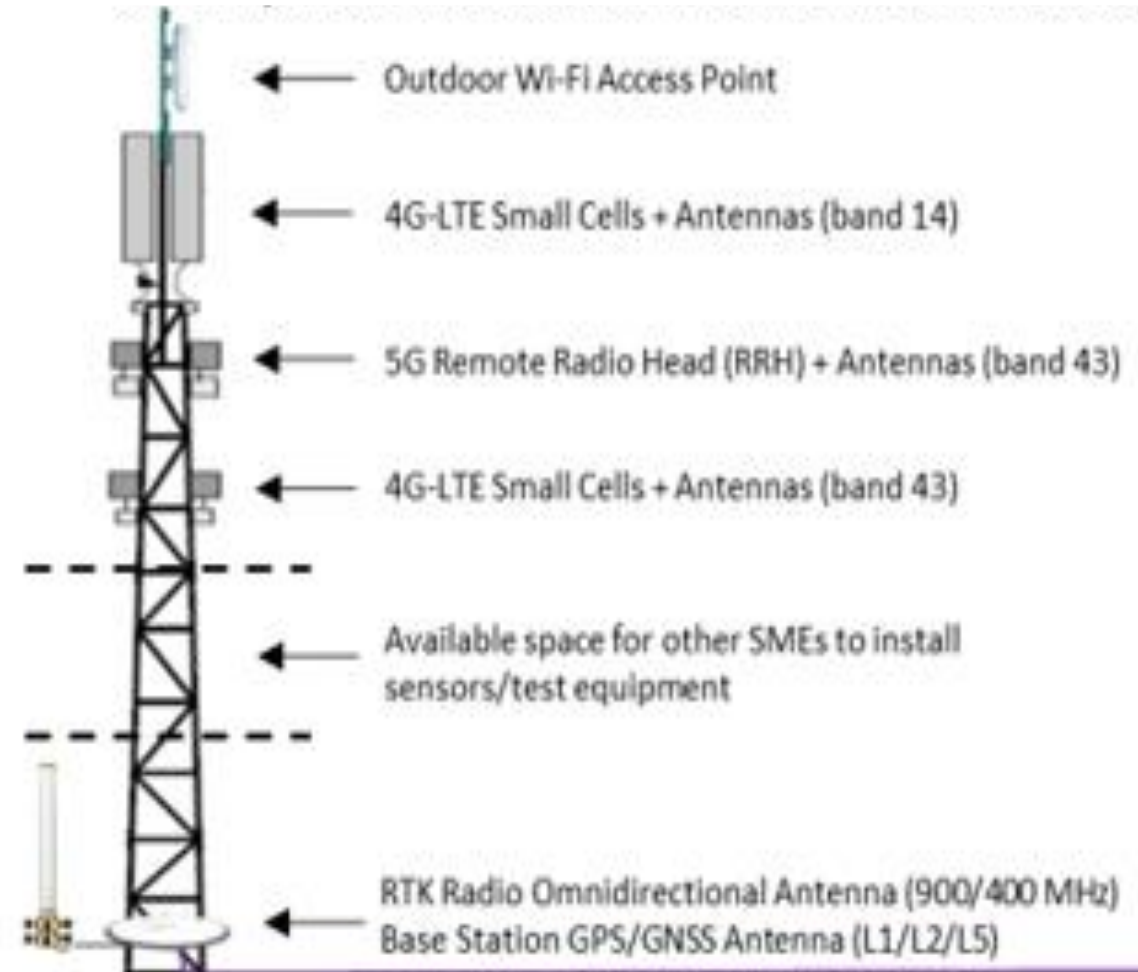
ZONE X.O

AREA X.O

ZONE X.O

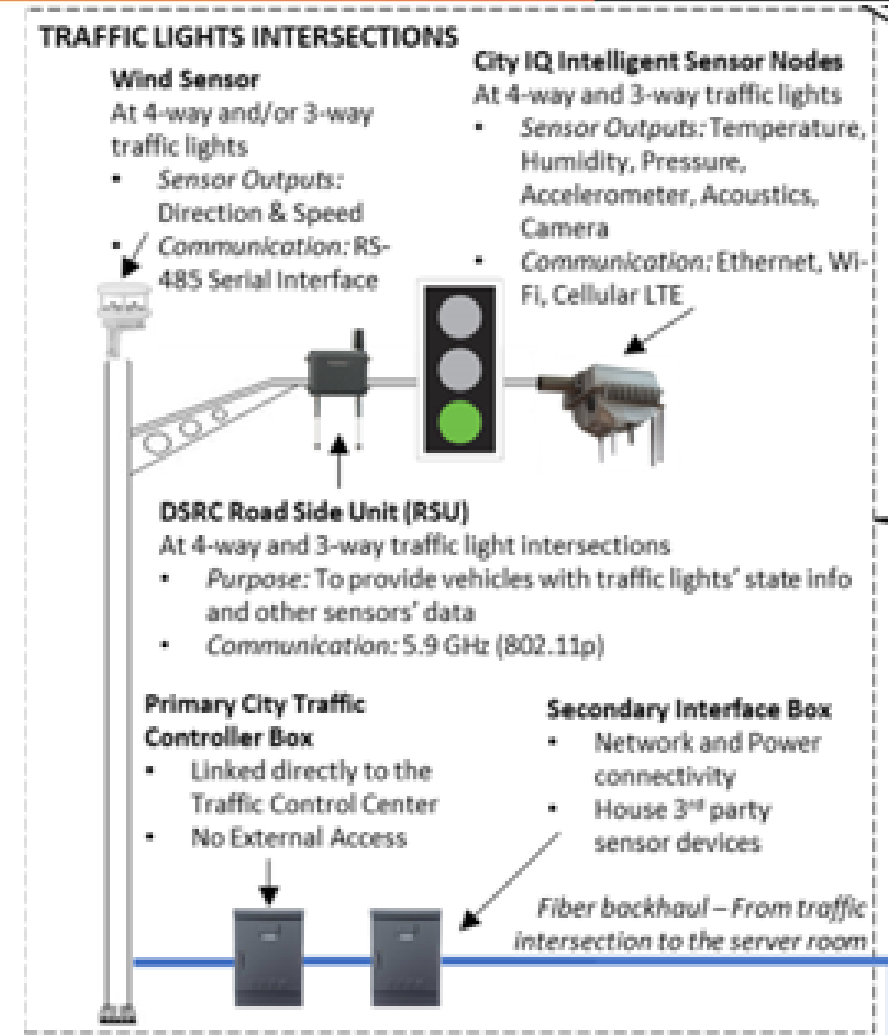
Connectivity – The IoT Environment

- Dedicated Services – Private Network
 - 4G/LTE access (B43, 3.65GHz)*
 - 5G access (n78/3.5GHz)*
 - 5G Highspeed (n260/39GHz & N257/28GHz)*
 - NB-IoT/ CAT-M1 (B14/700MHz)* for low data-rate IoT devices (sensors)
- GPS/GNSS with accuracy to 2cm
- Conventional cellular coverage
 - Your cellphone works here through major carriers
- Internet/ WiFi
 - Password controlled access to secure Invest Ottawa network and internet
- LoRa WAN for sensors



Connectivity – Smart City Infrastructure

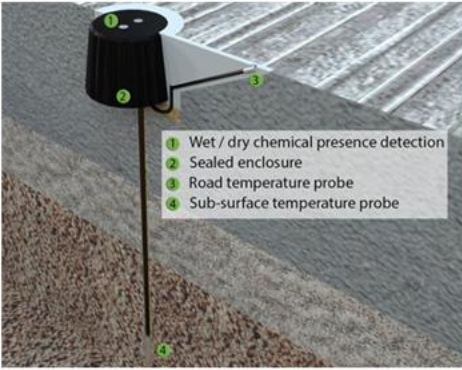
- Sensor enabled traffic signals
 - DSRC and cellular V2X communications
 - Integrated wind, humidity, pressure, camera and other sensors for aggregation
- Traffic signals integrated with City of Ottawa traffic management controller
- Curbside box with power and cabled Ethernet access for roadside devices
- Road surface sensor at 915MHz
 - Temperature and ice monitor
- Level Train crossing – fully instrumented



ROAD PAVEMENT

Road Surface Monitoring Sensors

- Near 4-way and/or 3-way traffic light intersections
- *Sensor Outputs:* Road Surface & Sub-Surface Temperature to detect and forecast ice or sleet formation on the pavement.



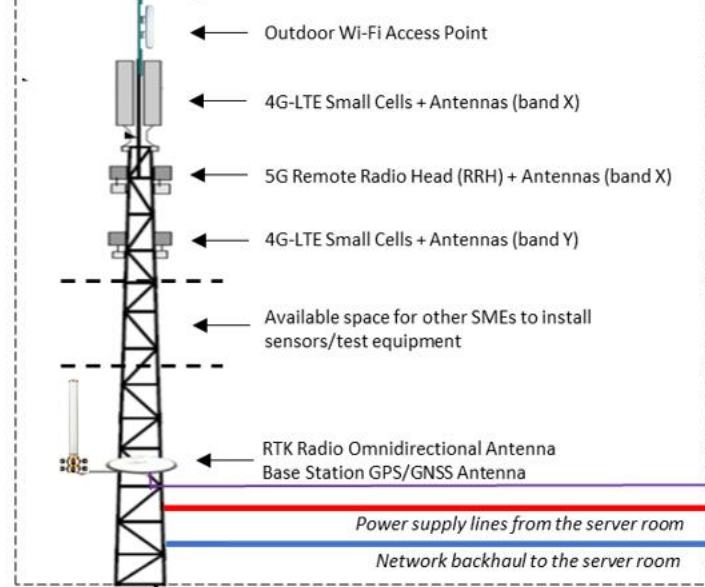
Completely fenced, gated private facility with 1,866-acre of land | 16 KM of paved road | Available HD map (Baidu Apollo) for the entire site

LIVING LAB: SME TECHNOLOGY VALIDATION

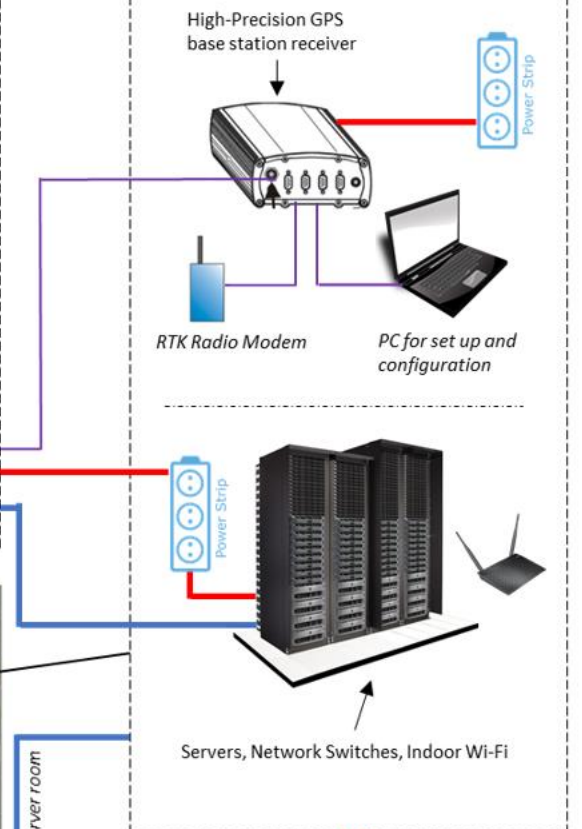
Objective: To support SME technology development projects by providing a robust testbed infrastructure, to be used as a proving ground for safe and rapid pre-commercial development and advancement of CAV technologies.

- Sample test applications include, but not limited to:
- Traffic flow analysis and prediction using advanced RF signature detection sensors.
 - High-tech detection and early warning system for on-road conditions, using a modular sensor platform with edge data processing capabilities.

GPS-RTK, 4G-LTE & 5G ADVANCED COMMUNICATIONS TOWER



SERVER ROOM



TRAFFIC LIGHTS/INTERSECTIONS

Wind Sensor

- At 4-way and/or 3-way traffic lights
- *Sensor Outputs:* Direction & Speed

City IQ Intelligent Sensor Nodes

- At 4-way and 3-way traffic lights
- *Sensor Outputs:* Temperature, Humidity, Pressure, Accelerometer, Acoustics, Camera

DSRC Road Side Unit (RSU)

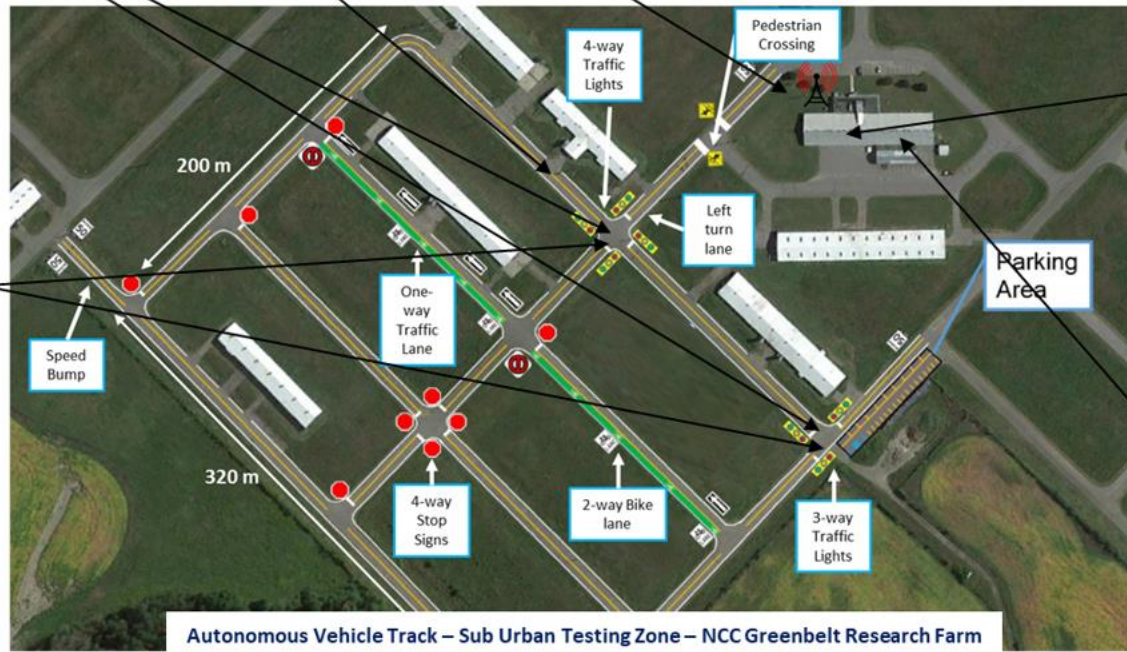
- At 4-way and 3-way traffic light intersections
- *Purpose:* To provide vehicles with traffic lights' state info and other sensors' data

Primary City Traffic Controller Box

- Linked directly to the Traffic Control Center
- No External Access

- Secondary Interface Box**
- Network and Power connectivity
 - House 3rd party sensor devices

Fiber backhaul - From traffic intersection to the server room



OPERATIONS ROOM



Fiber backhaul - From traffic intersection to the server room

Network and Power from the Server Room

Cloud Connectivity – backhaul & analysis

• Microsoft Azure

- Cloud Data Management and Analytics Platform (DMAP)
 - Azure IoT Edge server/ pre-processing engine
 - Data lakes/ repository in Azure cloud
 - Accenture automated process from IoT device, through IoT Edge to Azure cloud
 - Open data sets for general use
 - Access to stream analytics, cloud computing and storage



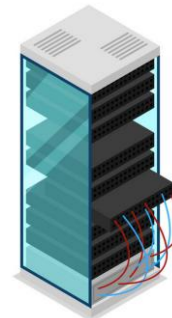
Azure IoT Edge



Azure IoT Central

• Nokia Integrated Operations Centre (IOC)

- Delivers IoT services for smart cities, including sensing-as-a-service and mission-critical broadband services for urban safety
- Integrates a group of sensors to be single device with specific attributes, e.g. drone
- Able to create and process rules based on actions and interactions with other devices



Nokia IOC Server Cluster

Physical Assets - Vehicles

Aurrigo Pod (LSAS)

- Fully autonomous first/ last mile shuttle
 - No steering wheel or controls
- Customizable to incorporate additional sensors
- Product demonstration vehicle



Lexus RX450 – By Autonomous Stuff

- Supports up to Level 5 testing
- Street legal
- Customizable to incorporate additional sensors
- Product development vehicle



Test mannequins/ dummies

- Test interaction between ADAS and pedestrians

Physical Assets – Technology & Devices

- Connectivity Devices
- Roadside Units (RSU)
 - DSRC (integrated w traffic controllers)
 - 802.11p compliant
 - CityIQ (by GE) Intelligent sensor node
 - Cellular V2X
- On-board Units (OBU)
 - DSRC
 - Mobile devices (with SIM cards)
- User Connectivity
 - Cell phones & SIM cards
 - GPS base station receiver
 - RTK Radio modem
 - Baseband units (LTE to WiFi)
- Edge Compute (local servers)
 - HP, Nokia, Microsoft
- Network switches/ routers

Mobile Command Center

- Cargo Van fully equipped as stand-alone 5G Command Unit (C4i)
- Fully standalone and secure 5G and 4G network that can be deployed anywhere
- Includes 3.5GHz & 39GHz antenna and edge computing for low-latency and ultra-high bandwidth
- Tethered drone to extend cellular coverage
- Supports hundreds of drones for surveillance
 - Includes Nokia drones
- Realtime video and sensor streaming with analysis
- Nokia Integrated Operations Centre (IOC) built-in



Mobile Command and Communications Centre IOC, 4G/5G End to End Wireless Network



- Telescoping tower
- 4G/5G (B14, B43, n78, n260)
 - MOCN support
- Server (video storage and analytics)
- PTT/PTV, handsets, modems, etc.
- Power/charger/generator
- Tethered drone
- Kongsberg asset tracking and airspace monitoring
- Satellite backhaul
- WiFi, Ethernet switching
- Smartcones (x6) – perimeter/tracking/Monitoring
- Heads up glasses for drone tracking
- Drone accessories:
 - Camera / thermal
 - Loudspeaker, dropper device
 - AED dummy mannequin
 - Defibrillator, multicarry bag, emergency bag (flares, medicine, epipen, bandages, water)
 - spares (batteries, rotors, motors)



Nokia's Integrated Operations Center



360
Situational
Awareness

Improved
decision
making

Increased
operational
efficiency

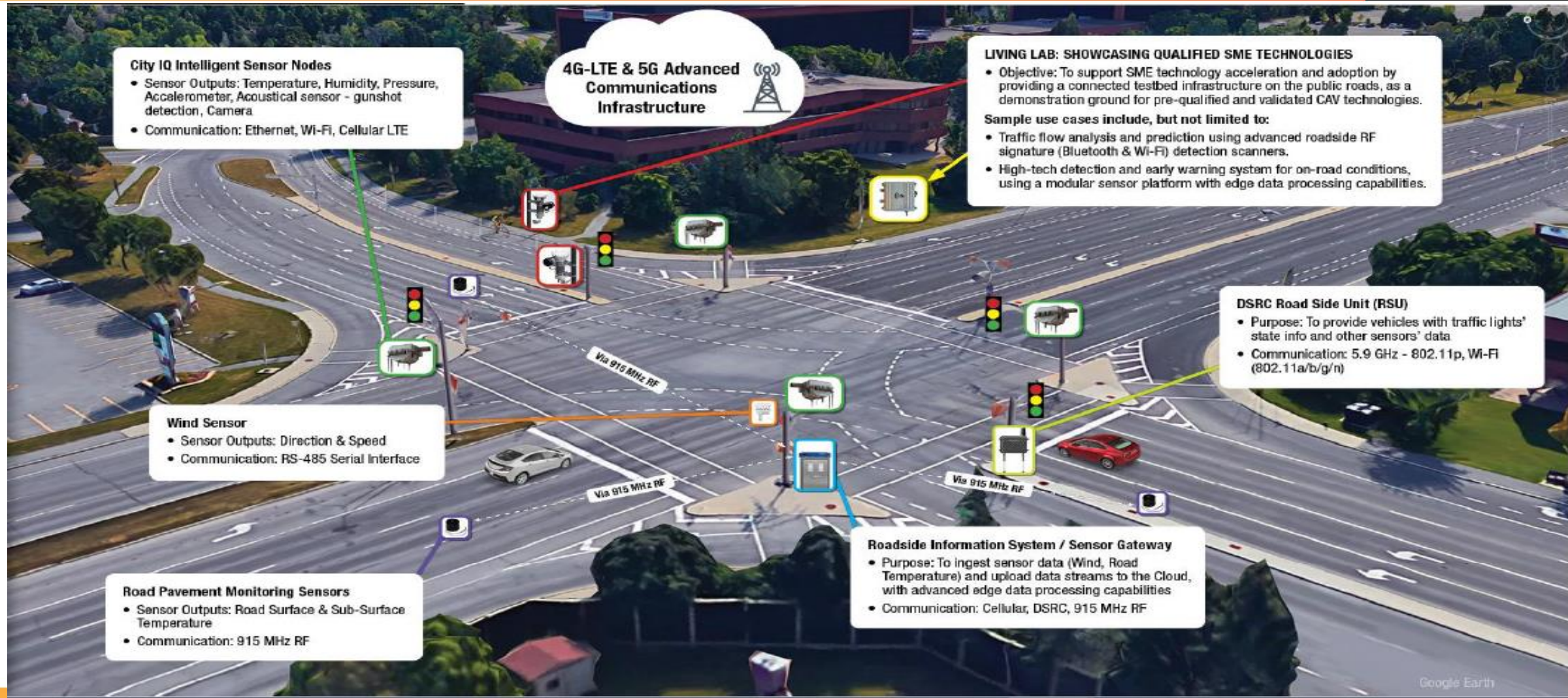
Enhanced
multi-
authority
cooperation

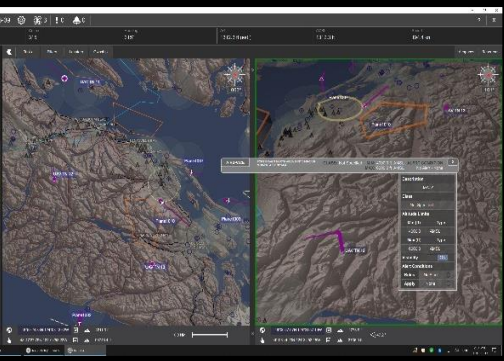
Cybersecurity – Trusted V2X Communications

Security Credential Management System (SCMS)

Access to services for securing vehicle-to-vehicle and vehicle-to-infrastructure, or V2X, communication are based on industry technology standards and trust service principles. Our SCMS platform is built to IEEE 1609.2 and CAMP specifications and offers trusted security credentials to vehicle OEMs, Tier 1s, road operators and specialty service vehicles from secure BlackBerry infrastructure. As the early innovator in the deployment of ECC-based PKIs for resource-constrained devices, BlackBerry Certicom invented the core concept of ECQV certificates which now underpins message authentication in IEEE 1609.2 based V2X communications.

Public Smart Intersection





Questions?