Urbanization, 5G, IoT, The Knowledge Economy and Big Data in a Municipal Environment

Stay in control

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1.0 INTRODUCTION

The telecommunication industry is developing rapidly, and a pattern of convergence is occurring which will affect municipal infrastructure usage and maintenance, as well as participation and wealth generation in the knowledge economy.

1.   Urbanization is not expected to slow down. Worldwide, cities are growing which can strain the capacity of existing infrastructure.

2.   Major wireless providers are upgrading their wireless networks to "5G" over the next few years, resulting in higher speed on phones and more antennae in streets.

3.   The Internet of Things is expected to grow 24% between 2017 and 2022. The increase of sensors throughout cities will impact their infrastructure and create management opportunities.

4.   The Knowledge Economy is expanding quickly, more and more businesses and citizens are working online, collaborating and competing with other businesses worldwide.

5.   Data is collected from sensors, cameras and other devices, stored and analyzed to observe trends.

Telecommunication growth is converging into opportunities for cities to act upon and to benefit from:

- Increased revenues by leasing City assets
- Attraction of business from neighbouring districts
- Increased control of city infrastructure
- Retain businesses and residents in the community
- Compete in the world-wide knowledge economy
- Increased incentives for companies to settle in your municipality
- Access to data trends to reduce municipal operating costs

2.0 THE FIVE PILLARS OF THE CONVERGENCE

2.1   URBANIZATION

Throughout history, cities have been the main centers of learning, culture and innovation. It is not surprising that the world's most urban countries tend to be the richest and have the highest human development.

This trend is increasing at a faster pace in Asia and Africa than Europe and North America; multiple sources are claiming that 2/3 of the world population will live in cities by 2050.

This development will put more strain on municipal infrastructure including roads, bridges, sewer and water which costs are already showing an uptrend.

Water, air and noise pollution will put stress on the health and wellbeing of the citizens.

As cities are built up, more ground surface is covered by roads and sidewalks which makes it more difficult for water to drain, causing damage and flooding. This trend is becoming more apparent in cities worldwide.

Statistics show that crime increases in more populated areas, requiring more surveillance and police intervention.

Traffic congestion becomes worse causing costly gridlocks.

2.2   5G WIRELESS NETWORKS

The next generation of wireless networks has two main noticeable features: higher data rates for mobile devices and more antennae in the streets, the logical location for antennas is to mount them on street light poles, buildings and dedicated poles. And, the higher data rate requires fibre optic cables to be installed in the streets to backhaul the data.

2.3   INTERNET OF THINGS

Sensors and cameras are installed to measure light intensity, pollution, water levels, car and pedestrian traffic etc.; the data is sent wirelessly to gateways, located at strategic points on streetlights and buildings. Fibre optic cables are required to backhaul all the data.

2.4   THE KNOWLEDGE ECONOMY

The knowledge economy has three main components:

1.   People working together (or competing) worldwide via their computers
2.   Symmetrical high-speed internet
3.   Affordable Internet

The knowledge economy generates 20% of the GDP of developed countries. Canada ranks 20th for speed worldwide, and the 4th most expensive country for internet access.

Canadian Telecom Incumbents have been slow in implementing high-speed internet compared to other countries worldwide, and the cost remains high. The main reasons are:

- Vastness of Canada
- Lack of competition - the three largest incumbents, have 85% of the Canadian market
- The large incumbents own the cables connected to houses and buildings; competitive providers have only access to wholesale (buying services from the incumbent and reselling)

The best way to promote competition (lower the price and increase speed) is to provide access to fibre optic cables on equal terms to all telecommunication providers.

It is called Fibre as a Service. (FaaS)

2.5   BIG DATA

The data collected from sensors and other devices is stored in datacentres (cloud) and is analyzed with algorithms.

Real-time integration feedback from the data to actuators. e.g. opening water gates in response to h high water levels or managing traffic flow based on count or pollution level.

Data analysis is used for City management to make decisions based on historical and actual data.

Example, data from sensors imbedded along roads and on bridges could indicate a deteriorating trend, which would trigger a maintenance schedule to maximize the life of the asset. It saves costly repairs and extends the life of infrastructure.

Example, cameras along a street with emotion recognition software could detect angry or stressed people which would initiate a proactive police response.

Other examples, air and water sensors which measure pollution and flooding and would trigger warnings to the public, and/or prompt a clean up response.

All the sensor data is valuable information and large analytics companies such as Amazon, Microsoft Google and Nokia are eager to participate.

3.0   STAYING IN CONTROL OF THE INFRASTRUCTURE

3.1   MAXIMIZING THE KNOWLEDGE ECONOMY POTENTIAL

Industry participants are aware of the ongoing efforts of telecommunication companies to secure the rights to the infrastructure to support their business demands and shareholder needs. However, this means the City loses control of an asset that plays a direct part of the value creation from the knowledge economy perspective and losing out on playing an active role in shaping the knowledge economy. Thereby we recommend maximizing value for municipalities to:

- Lease out existing municipal fibre capacity and co-location space on equal terms to telecom providers.
- Connect business parks and multi-dwelling units at service providers request
- Create competition in Telecom Services
- Enable business and residents to compete worldwide
- Partner with a company that will take care of all the technical, business and operations aspects on behalf of the city.

3.2   5G ANTENNAE AND IOT SENSORS

- Lease existing City assets (streetlights, fibre, ducts and buildings) to all players at equal terms.
- Build and co-build fibre routes with wireless service providers.
- Review wireless providers' fibre route design to ensure the path best suits the future needs of the City.
- Negotiate a deal for a dedicated connection to the Vancouver Internet Exchange.
- Install smart streetlights to save electrical power.
- Interconnect Intelligent traffic systems to take advantage of the feedback from analytics.
- Install city sensors to help combat urbanization effects.
- Partner with a company that will take care of all the technical, business and operations aspects on behalf of the City.

3.3 IOT

Partner with an IoT company. Create a plan using the Internet of Things and the data to reduce infrastructure operating and capital cost, and to increase the well being of the citizens. Create a plan and study how strategically installed sensors can help deal with urbanization challenges.

3.4 DATA ANALYTICS

Partner with an Analytics company. Work with a data analytics company for real-time integration of sensors and system, sell the IoT data and obtain trends to make informed decisions. The analytics company will feedback the patterns of the data and real-time integration to actuators.

3.5 VENN/TIME DIAGRAM OF PROPOSED IMPLEMENTATION:
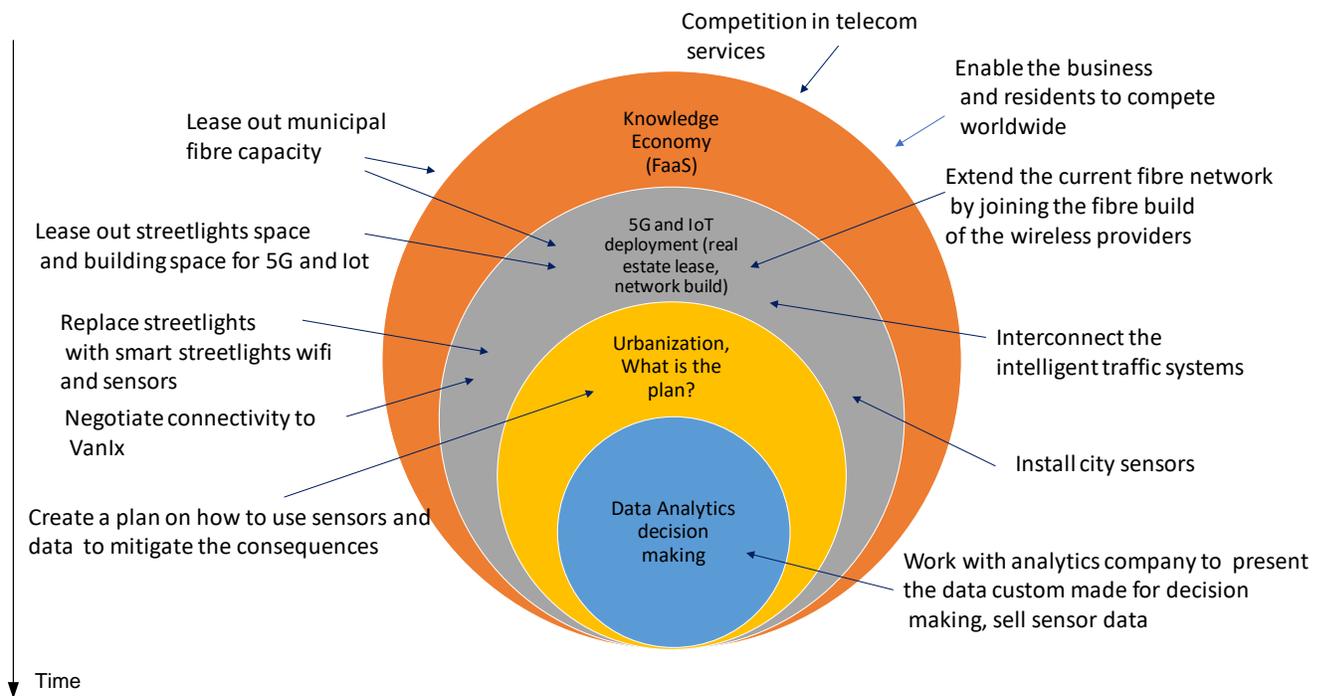
4.0   GNEC SERVICES

4.1   BUSINESS DEVELOPMENT

GNEC can help take advantage of these developments so you are not left behind in the new knowledge led economy. We apply our experience, knowledge and core competencies to achieve the following results and measurable benefits:

GNEC formulates with the City the strategy on which a business plan and a project plan will be developed.

GNEC creates with the City a business plan identifying the revenues from the fibre leases from the ISP, the wireless providers and IoT operators, the operating cost as well as the required capital to extend the fibre network. Typically, such a business plan is over 30 years, cash flow positive in year 6 with a payback time of the investment in 20-25 years.

GNEC establishes partnerships between service providers and the City for the use of the City infrastructure, processes the requests, including contracts, revenue and cost shares, as well as billing and collecting.

GNEC sets up the business processes between the City and the above service providers.

GNEC facilitates the integration of IoT sensor and gateway providers, with the Big Data Analytics companies to achieve the execution of a long-term plan for:

- saving operating cost
- saving cost through preventive asset management
- water and air pollution warning and control
- flood warnings
- improve traffic flow
- crime reduction

4.2   DESIGN-BUILD

The GNEC project plan defines the steps in time, the required deliverables and resources. The budget is related to the identified expenditures from the business case.

GNEC manages the design-build of the fibre network including civil design, fibre design permitting, RFP, contract, project management and commissioning.

GNEC takes care of the design-build of the co-location space to host the equipment from ISP's.

GNEC will design-build the smart street light replacements.

GNEC will design-build the interconnection of the Intelligent Traffic Controllers.

GNEC will validate the wireless provider's connectivity requests against the open access network planning and will provide route suggestions.

GNEC will integrate the smart streetlights (with sensors) and intelligent traffic controllers in one network.

4.3   OPERATIONS

GNEC manages the day to day operations on behalf of the City:

- Fibre network
    - Construction request evaluation
    - Civil design
    - Fibre design and administration
    - Corrective maintenance
    - Preventive maintenance
    - ISP contract management
    - Billing and collecting process

- Co-location
    - Co-location request
    - Change requests
    - Corrective maintenance
    - Preventive maintenance
    - ISP contract management
    - Billing and collecting process

The municipality will obtain the following reports:
- ISP request for infrastructure access
    - Fibre Construction cost/revenues
- Quarterly and yearly projections
- Reconciliation with the business case

4.4   RELEVANT EXPERIENCE

All the above services have been successfully implemented in three municipalities in British Columbia:
- Coquitlam (Qnet)
- New Westminster (BridgeNet)
- Campbell River (CR Advantage)

5.0   BENEFITS FOR YOUR MUNICIPALITY

- The City has a blue print identifying short- and long-term goals and the steps to achieve them
- The City approves each proposed strategic and tactical step
- GNEC leverages service providers business relationships for the City
- All commercial and operational contracts are vetted by lawyers and made available to the City
- One stop shopping for co-location and network design and implementation
- GNEC coordinates all work with affected City departments
- Minimum involvement required by the City for day to day operations

6.0   NEXT STEP

Contact Roel Coert at GNEC, 1 604 767 7498 or roel.coert@gnec.ca to discuss how to stay in control of the infrastructure in your City.