BTV Ignite

Wireless Cities Workshop

February 3, 2016

Community Overview

Unique and distinguishing characteristics

- Municipally built fiber network with gigabit available to the home
- Fiber throughout the City and technical expertise to deploy wireless infrastructure
- Vermont's largest city and home to core anchor institutions including:
  - University of Vermont, UVM College of Medicin, UVM Medical Center
  - Champlain College, Chamber of Commerce, Dealer.com, etc.
  - Electric utility partner willing to use infrastructure to deploy next gen wireless technology.
- A City scaled perfectly to enable testbed technology to be widely distributed among a host of accessible partners in government, institutions, business, and non-profit sectors.

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Wireless Vision Concepts

Wireless vision for your community, with a focus on what community services are likely to be provided wirelessly and what community challenges are likely to be addressed by those wireless services.

Burlington has yet to develop a wireless vision, but amongst those areas impacted will be the following challenges & opportunities

- Emerging multi-model traffic flow & parking challenges requiring optimization with new development in the inner City core
- Public safety challenges including increasing call volumes, the need to find innovative ways to engage community, and an ongoing opiate epidemic
- Desire to find innovative strategies to collect and analyze data from a variety of sources to embrace data driven problem solving strategies
- Deploying new healthcare delivery approach that focuses on preventive care and treatment in the home across a wide spectrum of demographics and health challenges
- Improved and cost effective mobile connectivity in public places downtown and throughout Burlington

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Wireless Network Infrastructure to Meet the Vision

- Burlington has yet to develop a clear and deep enough understanding “next generation” capabilities to create a wireless vision for the future. It will require a completely new wireless infrastructure to support a host of new opportunities and initiatives.

- Burlington has near ubiquitous coverage from two top national 4G wireless carriers, but this will not meet the likely demand of these new services, both on performance and scalability. Based on current pricing models cost also likely to be an inhibitor to everyday ubiquitous adoption.

- Timeline, capabilities and underlying economics of 5G currently unclear

- Ubiquitous deployment of WiFi in the age of the IOT that we are entering will require multiple approaches to current challenges and limitations, including additional availability of spectrum of differing frequencies, a new infrastructure, and an understanding of evolving cost economics of deployment, and new pricing models

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Wireless Network Infrastructure to Meet the Vision (continued)

- Some of new initiatives would likely require low latency, low jitter, ultra high bandwidth wireless performance while a host of others would not, such as low bitrate sensors and telemetry gear.
- Unlicensed wireless spectrum usage in urban settings may result in unreliable delivery of services.
- Licensed wireless spectrum, in both the low and high frequency range, will be required to satisfy the variety of applications and the scale at which they will be deployed.
- With massive quantities of fiber optics assets available through Burlington Telecom, this new wireless infrastructure could be deployed in thousands of locations inside of Burlington's geography. This would remove the typical requirement for highly strategic transmitter/receiver placement. Units could be very small, very low power and still have fiber backhaul.
- A robust spectrum and device management platform will also be required. The system will likely need to operate in a largely autonomous nature due the volume of "managed" devices entering and leaving the network(s)

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Other "wish-list technologies"

- Burlington is keen to become better informed concerning the current research, potential capabilities, economics and deployment options

- Technologies exist today for coupling or drawing power from street lights to power communication devices. To gain the density of outdoor devices required, it would be beneficial to consider this in the design of new transmitters/receivers. It would be additionally beneficial for these devices to use broadband over power line (BPL) as a backhaul for short distances until a fiber backhaul can be picked up.

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Existing City Assets to Assist in Deployment

- City-wide fiberoptic network for wireless backhaul
- GENI rack installation (forthcoming)
- City-owned electric utility to provide deployment infrastructure
- Robust partnership of core institution allied to embrace and support the project including:
- - The City of Burlington
- - Burlington Telecom (fiber infrastructure and telecom service provider)
- - Burlington Electric
- - University of Vermont / UVM College of Medicine
- - University of Vermont Medical Center (healthcare delivery)
- - Champlain College
- - Lake Champlain Regional Chamber of Commerce
- “Can Do” city approach to opportunities and resolving problems
- Quick and uncomplicated decision making ability relative to many other cities

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