
Pictou County Municipal Council Internet Initiative

Comments on the i-Valley Presentation

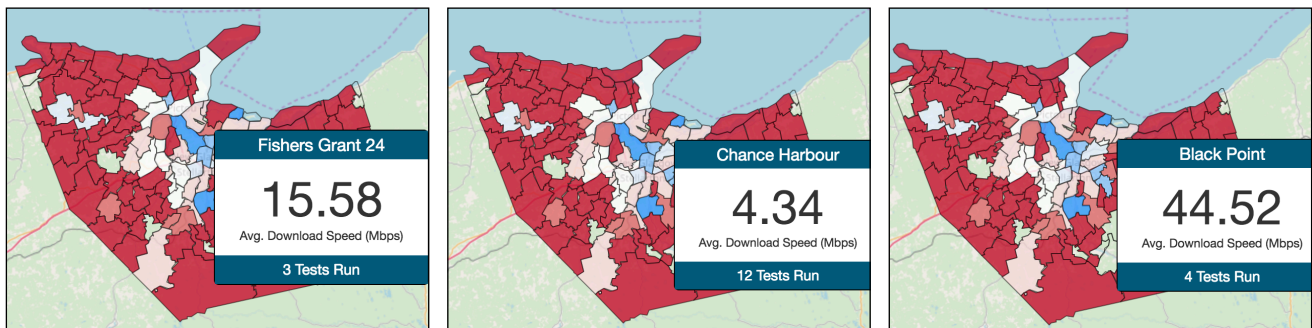
Larry M Elchuck, Ph.D. - June 26, 2018



Introduction

It was with great anticipation, that I attended the I-Valley status report of the Pictou County Municipal Council Internet Initiative. County Council needs to be applauded for the foresight in taking a proactive approach to what is an ever-increasing disparity between Internet access and bandwidth capabilities within this rural municipality.

I was both encouraged by some aspects of the i-Valley presentation and had concerns about other parts of what was presented by the i-Valley team. I hope to address some of those laudable parts of what was presented, as well as address some areas of concern in what was put forth and discussed.



Sample Internet Performance Test Results

Data Collection

The primary (and perhaps only) form of data collection as to the current state of affairs re: Internet speeds and accessibility observed during the presentation was the “Internet Performance Test” as found at <https://performance.cira.ca/pictou>. While this is a valuable tool to confirm what should be already available from other sources, as a stand alone tool, it is not a reliable indicator of what is available (and not available) to residents of various parts of the county.

Issues with relying on this test alone:

- ✱ Results in a given community could be skewed for a number of reasons:
 - ◆ Only interested parties participated (not a random sample)

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- ◆ Survey participants could participate multiple times. In particular communities, perhaps only those with higher speed access (>10 mbps) participated or those with lower speed access (<10 mbps)

- * No indication was given as to the availability (or lack there of) of various services within each community and the subscription rate of each.

- ◆ In the above graphics, disparity of Internet speeds is shown for three adjoining communities. It is apparent that most (if not all four) of the test runs in Black Point subscribe to Eastlink. It is a reasonable hypothesis that the twelve tests run in Chance Harbour were Bell, Seaside Communications or Hi-Tech subscribers, despite the fact that Eastlink is available throughout most of the Chance Harbour area. The Fisher Grant data would suggest that some of the three participants were using Eastlink or Xplorenet while others were using the <10 mbps alternatives.
- ◆ A gap analysis would have been most useful (for example in the Chance Harbour area) to determine which parts of the community (a) have no service or (b) are under serviced by having access to speeds less than 10 mbps.

A systems approach to the solving of the issue of high speed internet for all county residents must include both a gap analysis and a view to why we are seeing the results that we have as a baseline. In some cases it is personal choice, economics, or lack of desire for higher internet speeds by residents. In other cases, it is because the areas are not served or are underserved (<10 mbps bandwidth). Identifying gaps in larger not served areas is easy. Identifying and addressing gaps in underserved areas is harder to do, but these residents must also not be forgotten.



Ubiquity of Service

A lauded goal of the Communications Committee is to offer a level of service to all county residents. Amen to that! But unfortunately there will always be disparity of one form or another, as cost is always an issue. A danger exists to paint all with the same brush and to provide the lowest common denominator based on equity of services. Warden Parker addressed this issue quite well near the close of the meeting.

The Blue Mountain scenario provided an example of a non-serviced area where a 15 mbps solution was proposed. If, due to topography and other line of sight factors, this is the best that can be provided to this non-service area, so be it. But this model ought not be extrapolated to other areas of the county where faster (>50 mbps) can be achieved today through the use of a multipoint tower and individual receiving antennae on residents' houses or personal towers.

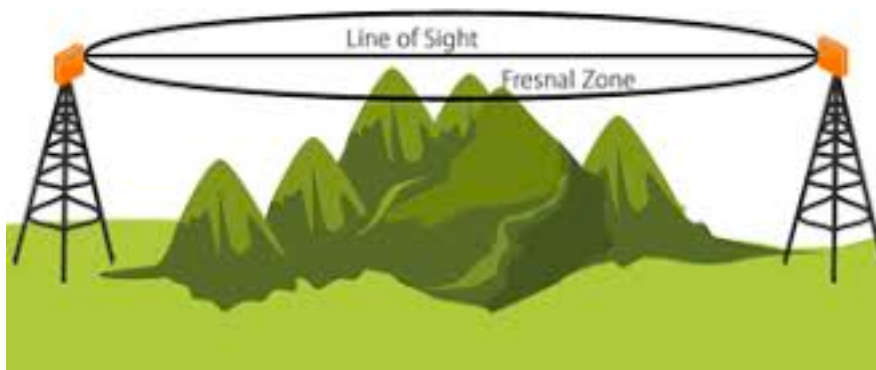
Citing the presenter's own words, the proposed TV Whitespace solution for this part of Pictou County will deliver a maximum of 15 mbps. They indicated that they plan to use a ratio of 5:1 users per POP (point of presence). That could translate into as low as 3 mbps download speeds per household if multiple households are online at the same time.... and what if there are multiple devices in each household on at the same time? This is a far cry from the 2020 recommended minimum of 50 mbps. This level of service is not capable of much more than allowing for the use of an internet browser and an email client. Building a fiber infrastructure and placing this level of available service on it is the equivalent of building a four lane highway and mandating that only bicycles are allowed to use it.

Such a solution should only be used as a last resort, where all faster alternatives have been ruled out as a possibility for that part of the county. It should not be set as the primary delivery mode for most Pictou County residents!

In reply to a question from Councilor Turner regarding the upgrading of TVWS antennae with 5 Ghz ones, a response was given that they could just be flipped out. This author disagrees with that assertion. The 5 Ghz antennae require both line of sight and a

fresnel zone — the area around the visual line-of-sight that radio waves spread out into after they leave the antenna. This area must be clear or else signal strength will weaken.

Fresnel Zone is an area of concern for 5 GHz wireless systems. Although 5 GHz signals pass rather well through walls, they have a tough time passing through trees and mountains.



If TVWS was installed initially because of mountainous or tree-covered terrain, you can not simply upgrade to a 5 GHz solution, as this frequency will not penetrate those obstacles.

Before a proliferation of this model is deployed in areas of the County where it is the perceived best solution, a test should be run in one such geographic locale to determine the initial uptake and satisfaction level with the service.

Is Fiber Needed Everywhere?

The recommended approach (by i-Valley) for the County to build and support its own fiber infrastructure is on the right track. The ability for the County and residents not to be held hostage by Internet Service Providers is highly desirable. That is not to say that areas of collaboration can not be sought where it makes little sense for the County to invest in duplicate infrastructure, if long term sharing arrangements can be achieved.

A caution. Eastlink estimated the cost of tree clearing under NS Power lines to be \$10,000 to do the distance between 7 poles (~1200 ft/ ~0.36 km). NS Power will only do line clearing if it sees a need for its purposes. If the clearing is to be done to support a utility's

purpose, the utility (who might pass the cost on to consumers) is the one responsible to pay for the line clearing. Given the size of the crew, the time it took and the equipment used (to do the author's road), the cost of this clearing is probably quite close to the actual cost estimate. The cost of line clearing to string fiber on the county roads could run close to \$30,000 per kilometre.

The cost of tree clearing alone will be in the millions of dollars, without laying a single strand of fiber. It makes sense to minimize the stringing of fiber where possible if its primary purpose is to support 15 mbps speed lines.

Cedar Lake Example

The initiative undertaken at Cedar Lake in Yarmouth County may prove to be a better approach to meet the needs of rural residents who live in medium to high density areas. Details on their model can be found at <http://cedarlakewireless.com/CLWC/Welcome.html>



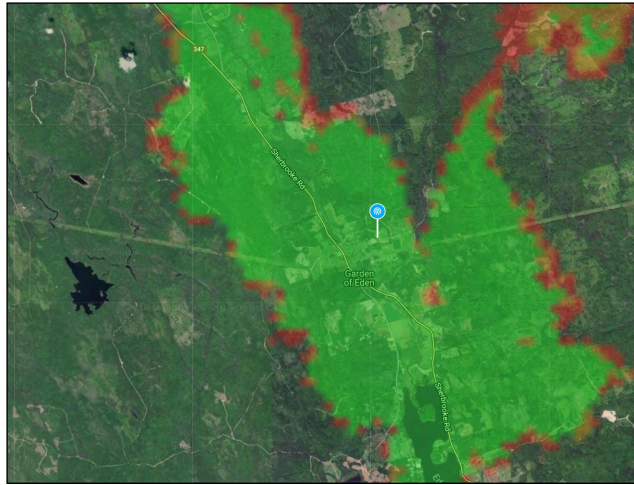
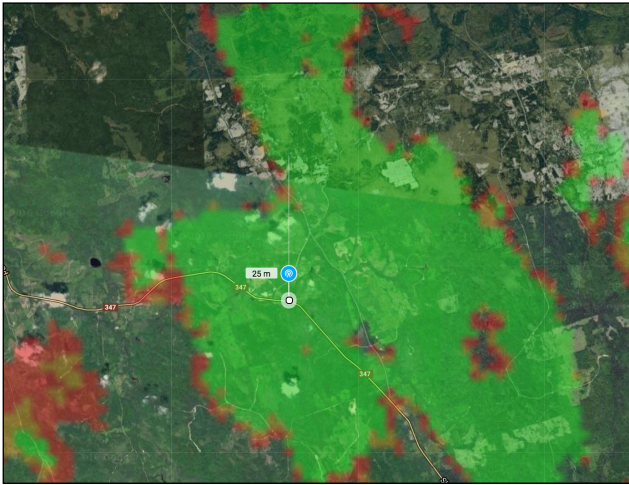
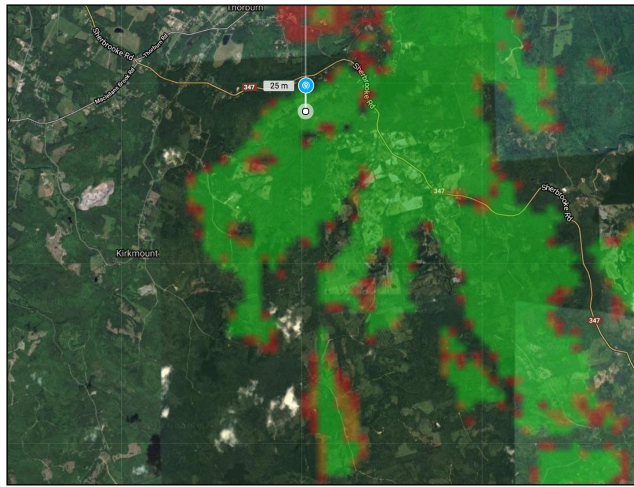
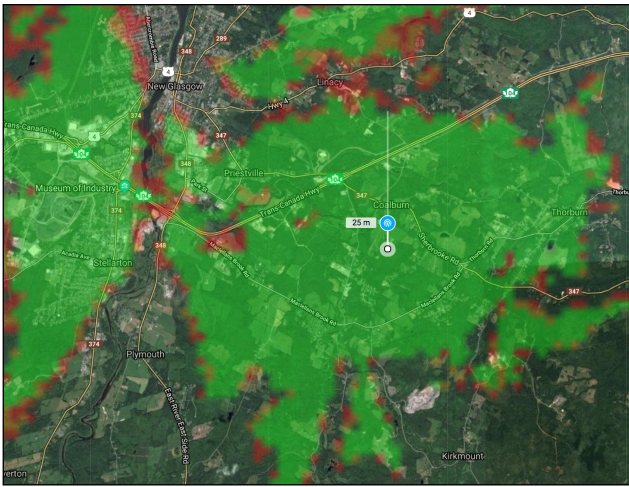
“The network originates at an Eastlink commercial fibre optic drop on Highway one in Beaver River, Digby County, Nova Scotia, on Canada’s Southwest coast. The signal is converted to Ethernet and fed to a router to isolate their network. It is then sent to a Ubiquiti AirFiber X wireless radio located on a 56 foot tower. The signal is transmitted inland, 4.3km to an 80 foot tower. From there the signal is retransmitted via 4 sector antennas to homes around Cedar Lake that are within sight of the tower. The signal is also sent to a relay station at the Southwest end of the lake, where it is also retransmitted to homes unable to see the main tower. Another pair of antennas relay the signal to a second 80 foot tower, in Springdale, located another 2.5km inland, where it is retransmitted again to homes in that area.

Wireless Internet service demands line of sight between radios/antennas to get the best performance. Although this is a coastal area, there is just enough change in elevation, along with considerable vegetation, mostly in the form of evergreen trees, to significantly reduce sight lines. The only answers are towers and chainsaws, both of which are used to get signals to homes.”

This solution reduces the need for fiber everywhere ... a huge cost saving in tree trimming alone. Users are experiencing data rates in the range of 100 mbps ... far in excess of the 15 mbps that is currently planned for much of the county.

Using 25m (75 ft) towers connected by radio waves (not fiber), most of the Sherbrooke Road area could be covered with a 5 Ghz signal. It does require commitment on the part of the residents who want access, as cited in the Cedar Lake example. Individuals most likely will need to erect an antenna and acquire a 5 Ghz antenna. The cost of these antennae are approximately \$110 plus tax *not \$500 (plus tax ?) as cited at the meeting.* It may cost residents a few hundred dollars if they are serious about wanting a level of high speed internet that meets or exceeds the 50 mbps threshold. The cost of the 25m municipal towers should not exceed \$10,000 *(as opposed to the \$100,000 amount articulated by the consultants).*

The images below show what potential coverage could be. the (green) hot zone could be maximized by better placement of the towers using optimum elevations. These hot zones were quickly generated without any in-depth look at the topography.



Summary

Given the sources of funding that are becoming available, Pictou County is in a great position to provide high speed internet infrastructure that can ensure that its citizenry will not be left behind in the digital age. Vision and knowledge are assets that can build the 2020 architecture to service the needs and wants of most of the county residents.

Part of this visioning and knowledge base requires the exploration of alternate approaches to providing the optimum Internet capacity for the major of the end users in the county.

Recommendations based on what was presented at the recent Communications Committee meeting and personal knowledge:

1. Conduct a more thorough needs assessment that takes into account what ISPs currently provide and where there are gaps in service (to the street level) that is less than 50 mbps.
2. Conduct an analysis of tower infrastructure topography that could meet the needs of as many non-served and underserved Pictou County households as possible.
3. Invite representatives of the Cedar Lake Wireless Cooperative to provide a presentation to a closed meeting of the Communications Committee on the design, development and implementation of their solution and their recommendations for Pictou County based upon their experiences.
4. Perform a cost-benefit analysis on the tower-based 5 Ghz solution and the fiber-based TVWS solution, including all installation and infrastructure costs to the County as well as the resulting high speed bandwidths.
5. Make an informed decision as to the best path forward based upon the information acquired during this planning process.
6. Apply and acquire funding and action the plan.

About the Author

Dr. Larry M Elchuck is a retired senior manager of the former Chignecto-Central Regional School Board, where he held the positions of Assistant-Director of Education Services and the Director of Planning, Research and Technology. He was responsible for all aspects of technology within CCRSB including technology infrastructure, instructional use of technology and professional development. He also served as the Board's lead person in the strategic planning process while he was a member of the Board's senior management team. Semi-retired, he currently provided backend support to the Nova Scotia Department of Education's online learning presence (including the Nova Scotia Virtual School) and to the Canadian College of Massage and Hydrotherapy (Halifax and BC) campuses.