NPISSING FIRST NATION PROJECT OVERVIEW

KIRBY KOSTER, SENIOR MANAGER
BROADBAND PROGRAMS
Northern Ontario Community that needs to extend broadband service from a part of the community that is well served in the community centre, or a more-densely populated area, to an area that is underserved in one or more out-lying lower-density residential areas greater than 5 km out, but still within the municipal boundaries of the host community.
Single tower design made possible by hybrid TVWS and 5GHz radio design and flat terrain and distributed lakeshore community.
Leepfrog Telecom

- Strong Local Support Presence in North Bay Area
- Extensive Experience in designing wireless distribution networks in Northern Ontario.
- Significant Growth over last 2 years in staffing and support
- Proven willingness to provide innovative solutions and adjust design to scale to changes in available budget
- Innovative and low-cost approaches to tower deployment and hybrid radio technology for distribution.
- Very good pricing for broadband internet POP access in community from Eastlink.
Key Innovation – Single Tower with TVWS and 5GHz LTU

Middle Km TVWS and 5GHz FWA distribution using single 100 ft non-penetrating tower instead of conventional steel self-supporting or guyed Telecommunication Towers. This approach allows fast and low-cost rollout of fixed wireless distribution with excellent tree foliage penetration.

Key Advantages of Single Tower with TVWS/5GHz

- **Minimal Environmental Impact** – no foundation excavation and no concrete foundation required.
- **Fast Installation and Service Rollout** – Radio equipment installation and tower raising only takes about 3-4 days.
- **100’ Tower is Lower Profile** – lower visual impact to the community.
- **Significantly lower cost**, use of TVWS reduces need for 1 - 2 additional towers (Up to $150,000 to $300,000 saved per tower in cost saving)
- **Significantly lower time to deploy**, single tower build saves months of permitting and build time for other towers.
Wireless Technology Used

6Harmonics
- Point to Point, Point to Multipoint or Mesh
- Support dual channel operation
- Up to 60 Mbps UDP per radio link
- Up to 23 dBm transmit power
- Low latency (< 5 ms)
- Adjacent channel blocking
- 256bit AES encryption
- IP67 enclosure

Distribution
- 700 MHz Point – Point High-Capacity Microwave Radios
- Used to distribute internet access to residents through dense foliage
- Service delivery up to 50 Mbps Down/ 10 Mbps Up
- Up to 30 km range

Distribution & Backhaul
- 5 GHz Point to Multi-point – Microwave Radios
- Used to distribute to residents with clear LOS
- Service delivery up to 200 Mbps Down/ 20 Mbps Up
- Up to 30 km Range

LTU Rocket
- LTU LR
  - 5 GHz PtMP LTU Client,
  - functions in a PtMP
  - Works with LTU-Rocket as base stn
  - 26 dBi Antenna Range: up to 30 km
- LTU Rocket
  - 500+ PtMP performance
  - Up to 256 connections per tower
Wireless Technology Overview

- No Side Lobes
- Very selective reception just to the main beam
- Facilitates spectral reuse for broadcast in different directions
  - Ideal for small towers or dense configurations

- Hybrid fixed wireless solution
- Supports 5.0 GHz Unlicensed internet access services and Licensed TVWS internet access Services
- Range of services offered
  - New 25/5 Mbps and 50/10 Mbps internet access services (TVWS)
  - New 50/10 Mbps, 100/10 Mbps, 150/10 Mbps, and 200/20 Mbps internet access services (5G Hz)
5 GHz LTU Coverage Area

- Coverage Area will reach entire Nipissing FN with greater than 50/10 performance
- All 5 areas of community could get up to 150 Mbps service
- Garden City and Jocko Point could get better than 150 Mbps service support
TVWS Coverage Area

- Coverage Area will reach entire Nipissing FN with 50/10 performance
New Service Offerings

<table>
<thead>
<tr>
<th>Service Offerings</th>
<th>Download speeds up to</th>
<th>Upload speeds up to</th>
<th>Unlimited Data</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 50/10 Unlimited</td>
<td>50 Mbps</td>
<td>10 Mbps</td>
<td>Unlimited Data</td>
<td>$80/month</td>
</tr>
<tr>
<td>- 100/10 Unlimited</td>
<td>100 Mbps</td>
<td>10 Mbps, 15 Mbps</td>
<td>Unlimited Data</td>
<td>$100/month</td>
</tr>
<tr>
<td>- 150/10 Unlimited</td>
<td>150 Mbps</td>
<td>15 Mbps</td>
<td>Unlimited Data</td>
<td>$110/month</td>
</tr>
<tr>
<td>- 200/20 Unlimited</td>
<td>200 Mbps</td>
<td>20 Mbps</td>
<td>Unlimited Data</td>
<td>$145/month</td>
</tr>
</tbody>
</table>

Home phone service could also be installed with this solution
- $19 unlimited Canada-wide calling or $22 monthly with unlimited North American calling

TV packages can be added for $40 - $95 per month
Benefits to the Community

- Significantly Better Internet Access + Low-Cost Telephone + Low-Cost Video for residents.
- Only single 100’ Non-Penetrating Tower Required for whole community.
- Fast deployment to meet needs of pandemic internet work at home, learn at home demands.
- Access to 50/10 Mbps and up to 200/20 Mbps Internet Access Service with no data caps.
- Proven cost-effective method to add new tower for expanding improved internet services if required as community grows.
- Wider 50/10 Mbps or higher service access to remote parts of the community.
- Minimal environmental impact due to non-ground penetrating tower.