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Okanagan Technology Consulting Inc

Site Survey for Internet Distribution

Wynndel, BC

Prepared for

NetWork BC
Digital Divide Project
Ministry of Management Services
Government of BC

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Prepared by

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Wyndell

Introduction

Wynndel is located approximately 10km north of Creston in the Kootenay River Valley. The community has a saw mill and a grain elevator and a community store and gas bar. There is an elementary school, a community center, a church, and a fire hall, all located in the community core close to highway 3A. Most of the dwellings in the community are larger properties spread out on the hillside on both sides of a creek running northeast from the community core.

The population is approximately 900 people. There are about 300 homes in the community. The community was originally a mining town, but is now an attractive residential community for retirees and others working in Creston.

The community accesses the internet via dialup service from Uniserve. Those with heavy internet use obtain a second phone line and pay for an unlimited use account from Uniserve at a total cost of about $50 per month. Telus has fibre running along Highway 3A but has no plans to bring ADSL to the community. There was at one time a Cable TV system operating in the community and the infrastructure is still there, but much of it is dated.

Local Distribution Options

The community has formed an informal community internet group, and has been investigating various options to take advantage of the EB-1 facility to bring broadband to the community. They have looked at options to update their CATV system, have done preliminary studies of

powerline distribution, and have obtained several high level estimates of costs for wireless distribution.

They have requested assistance in firming up their options, and for a more technical assessment of options and the associated costs, as well as discussions as to the pros and cons of various options, and about resources available to communities investigating network options. I visited the community December 1 and met with Bob van der Poel and Hans Garritsen, and performed a site assessment.

The majority of the community is well situated for a wireless distribution system. The homes on the sides of the hill are mostly in the open, and an access point higher up on either side of the valley would cover a large proportion of the community. The central "backbone" of the community, however, is a creek with fairly heavy tree density, and homes and institutions close to the creek will be more difficult to access with wireless coverage. The school is located near to the creek and is partly shielded by trees.

There is on natural hill in the southeast corner of the community that rises about 100 meters above the rest of the community and that provides close to a 360 degree view. This site would be an ideal access point location, if tenure can be obtained. The site appears to be private property and is currently unoccupied but there is new development surrounding the site. The site is also well covered in trees at the sides, so a tower located here would have to be high enough to clear trees and the shoulders of the hill on all sides – this would probably require a 100' tower. The site has a rough access road and is about 150 meters from a power line.

If this site is not available, it becomes more difficult to cover the community with a single access point because this natural hill will cast a radio shadow for any access point close to the community on the hillsides. To avoid this shadow, and access point would have to be located 400-500 meters above the community. There is a logging road to the northwest of the community that would provide access to a location at about 1000 meters elevation (the community itself is situated from 500 – 700 meters elevation. This high site would not have ready access to power, so it would have to be constructed as a self powered site with solar panels and batteries, wind generator, and backup gas generator.

A third alternative is to split the coverage between two access points, one in the southeast corner of the community, on the side of the hill, and another on the northwestern hillside. This approach could use existing home locations as access points by adding roof mount

repeater links rather than a tower, which avoids higher construction costs.

The group that is promoting broadband for the community includes several individuals who also manage the community's water system. Some of the equipment and labour (e.g. backhoes) available to the water system may be useful to assist in installing internet infrastructure which would reduce costs. For reference, the cost analysis will show the cost of procuring a "turnkey" system, professionally engineered and installed, and the cost of a volunteer labour solution using consumer grade equipment.

The internet committee is willing to form a non-profit society to operate the network, but would consider subcontracting much of the ISP operation to the wholesale division of Uniserve, which would operate the servers and handle authentication, email, and web services. Uniserve would charge a monthly per subscriber fee for these services.

If the community were to form its own ISP operation, there would be additional costs for servers and software, these costs are shown separately in the following cost analysis.

Cost Analysis

Wynndel Local Distribution Costs - Case 1: Using "Hump", Turnkey

Item	Equipment Cost	Labour Costs	Total
Engineering and Proj Mgmt		$5,000.00	
Site preparation - Clear brush, level site		$1,000.00	
Dig and pour concrete pad (5' deep)	$2,000.00	$1,000.00	
Fencing and Climb Shields	$1,500.00	$500.00	
Install 96 ft self supporting tower	$4,500.00	$1,500.00	
Install Equipment Box on tower	$1,500.00	$500.00	
Install UPS at Tower location	$500.00	$200.00	
Install Remote Monitor Board	$600.00	$200.00	
Bring Power to equipment box - 3 poles	$3,000.00	$1,000.00	
Install 5.8 GHZ P-P link at tower	$1,250.00	$250.00	
Install 15db omni antenna at tower	$500.00	$300.00	
Install 2.4 GHz Access Point at tower	$1,350.00	$250.00	
Install ethernet switch at tower	$500.00	$100.00	
Install roof mount at school	$200.00	$250.00	
Install 5.8 GHz P-P link at school	$1,350.00	$250.00	
Run ethernet cable to router at school, connect POE	$50.00	$250.00	
Setup, configuration, and system tests	$100.00	$1,500.00	
Misc and Contingency	$2,000.00	$1,500.00	
Subtotal - Local distribution	$20,900.00	$15,550.00	
Shipping Costs	$2,000.00		
Travel, Crew Room & Board		$3,000.00	
Total infrastructure	$22,900.00	$18,550.00	$41,450.00
Residential Coverage			
Subscriber Units - Residences - qty 50	$17,500.00	$5,000.00	$22,500.00
ISP Setup (if required)			
DHCP, Mail Server, Firewall	$5,000.00	$1,000.00	
Billing, Access and Monitoring Software	$3,000.00	$500.00	
Training		$4,000.00	
ISP Setup	$8,000.00	$5,500.00	$13,500.00

System Total	**$48,400.00**	**$29,050.00**	**$77,450.00**

Wynndel Local Distribution Costs - Case 2: Using "Hump", Volunteer Build, Consumer Grade electronics

Item	Equipment Cost	Labour Costs	Total
Engineering and Proj Mgmt		$1,000.00	
Site preparation - Clear brush, level site		$250.00	
Dig and pour concrete pad (5' deep)	$1,000.00	$250.00	
Climb Shields	$300.00	$50.00	
Install 96 ft self supporting tower (need a crane)	$4,500.00	$1,000.00	
Install Equipment Box on tower	$500.00	$50.00	
Install UPS at Tower location	$200.00	$50.00	
Install Remote Monitor Board	$600.00	$50.00	
Bring Power to equipment box - 3 poles (Fortis help?)	$1,500.00	$200.00	
Install 5.8 GHZ P-P link at tower	$1,250.00	$50.00	
Install 15db omni antenna at tower	$500.00	$50.00	
Install 2.4 GHz Access Point at tower	$1,350.00	$50.00	
Install ethernet switch at tower	$100.00	$50.00	
Install roof mount at school	$200.00	$100.00	
Install 5.8 GHz P-P link at school	$1,350.00	$50.00	
Run ethernet cable to router at school, connect POE	$50.00	$50.00	
Setup, configuration, and system tests	$100.00	$100.00	
Misc and Contingency	$1,500.00	$1,000.00	
Subtotal - Local distribution	$15,000.00	$4,400.00	
Shipping Costs	$2,000.00		
Travel, Crew Room & Board		$250.00	
Total infrastructure	$17,000.00	$4,650.00	$21,650.00
Residential Coverage			
Subscriber Units - Residences - qty 50	$17,500.00	$0.00	$17,500.00
ISP Setup (if required)			
DHCP, Mail Server, Firewall (Consumer PC, Linux)	$2,000.00	$100.00	
Billing, Access and Monitoring Software (Open Source)	$250.00	$100.00	
Training		$200.00	
ISP Setup	$2,250.00	$400.00	$2,650.00

System Total	**$36,750.00**	**$5,050.00**	**$41,800.00**

Wynndel Local Distribution Costs - Case 3: Using "Logging Road Site", Volunteer Build

Item	Equipment Cost	Labour Costs	Total
Engineering and Proj Mgmt		$1,000.00	
Obtain BC lands Permit	$1,500.00	$0.00	
Clear site and level	$200.00	$200.00	
Build concrete pad for Shed and tower	$1,000.00	$500.00	
Install 30 ft tower	$1,000.00	$200.00	
Install 8x8 shed	$1,000.00	$200.00	
Install 20 6V RV batteries	$2,000.00	$100.00	
Install 2 140W Solar Panels	$1,200.00	$100.00	
Install Air 403 Wind Generator	$1,400.00	$100.00	
Install Remote Start Gas Generator	$2,500.00	$200.00	
Install Charging controller, inverter	$1,000.00	$200.00	
Install 5.8 GHZ P-P link at tower	$1,250.00	$100.00	
Install 15db omni antenna at tower	$500.00	$50.00	
Install 2.4 GHz Access Point at tower	$1,350.00	$100.00	
Install ethernet switch at tower	$100.00	$50.00	
Install roof mount at school	$200.00	$100.00	
Install 5.8 GHz P-P link at school	$1,250.00	$50.00	
Run ethernet cables to router at school, connect POE	$100.00	$50.00	
Setup, configuration, and system tests	$100.00	$100.00	
Misc and Contingency	$2,000.00	$1,000.00	
Subtotal - Local distribution	$19,650.00	$4,400.00	
Shipping Costs	$1,000.00		
Travel, Crew Room & Board		$250.00	
Total infrastructure	$20,650.00	$4,650.00	$25,300.00
Residential Coverage			
Subscriber Units - Residences - qty 50	$17,500.00	$0.00	$17,500.00
ISP Setup (if required)			

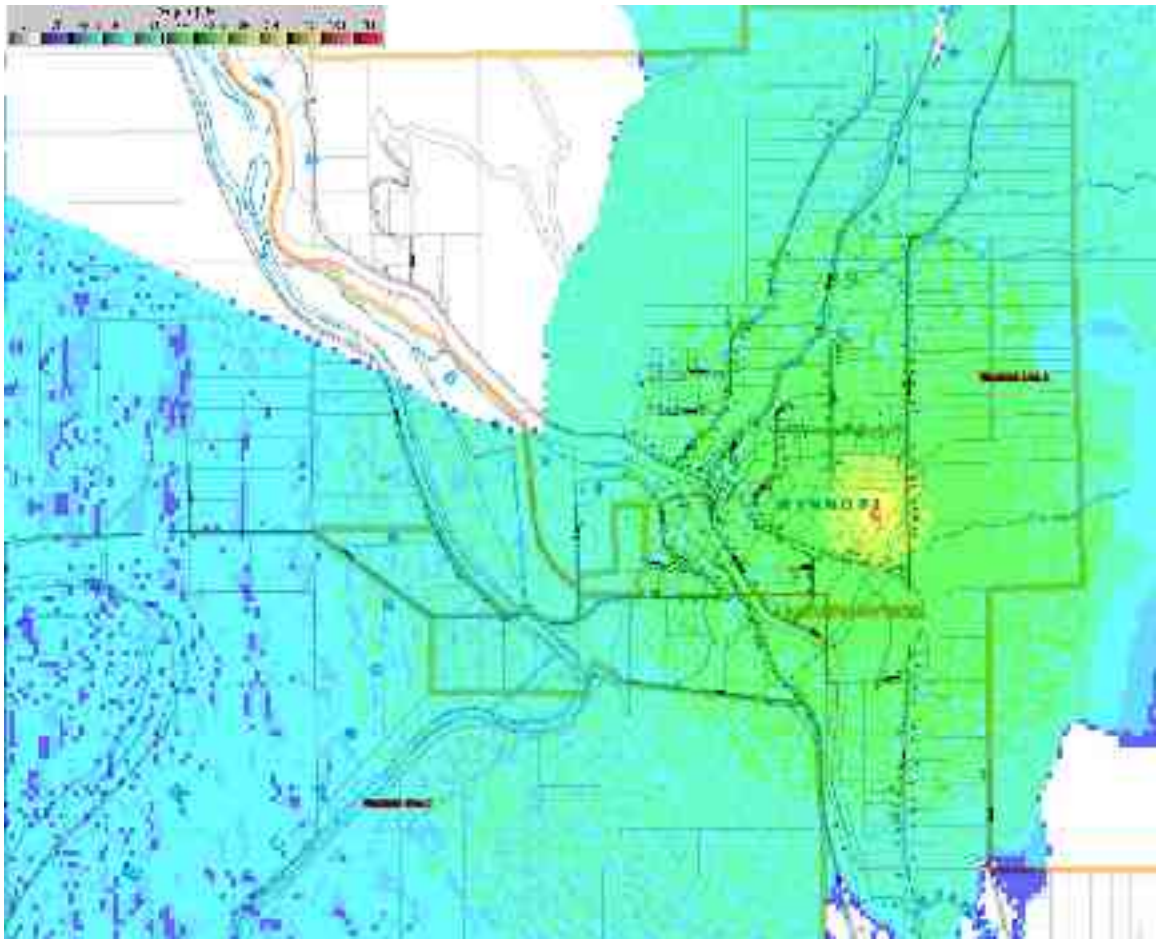
DHCP, Mail Server, Firewall	$2,000.00	$100.00	
Billing, Access and Monitoring Software	$250.00	$100.00	
Training		$200.00	
ISP Setup	$2,250.00	$400.00	$2,650.00
System Total	**$40,400.00**	**$5,050.00**	**$45,450.00**

Wynndel Local Distribution Costs - Case 4: Using "2 Residences", Volunteer Build

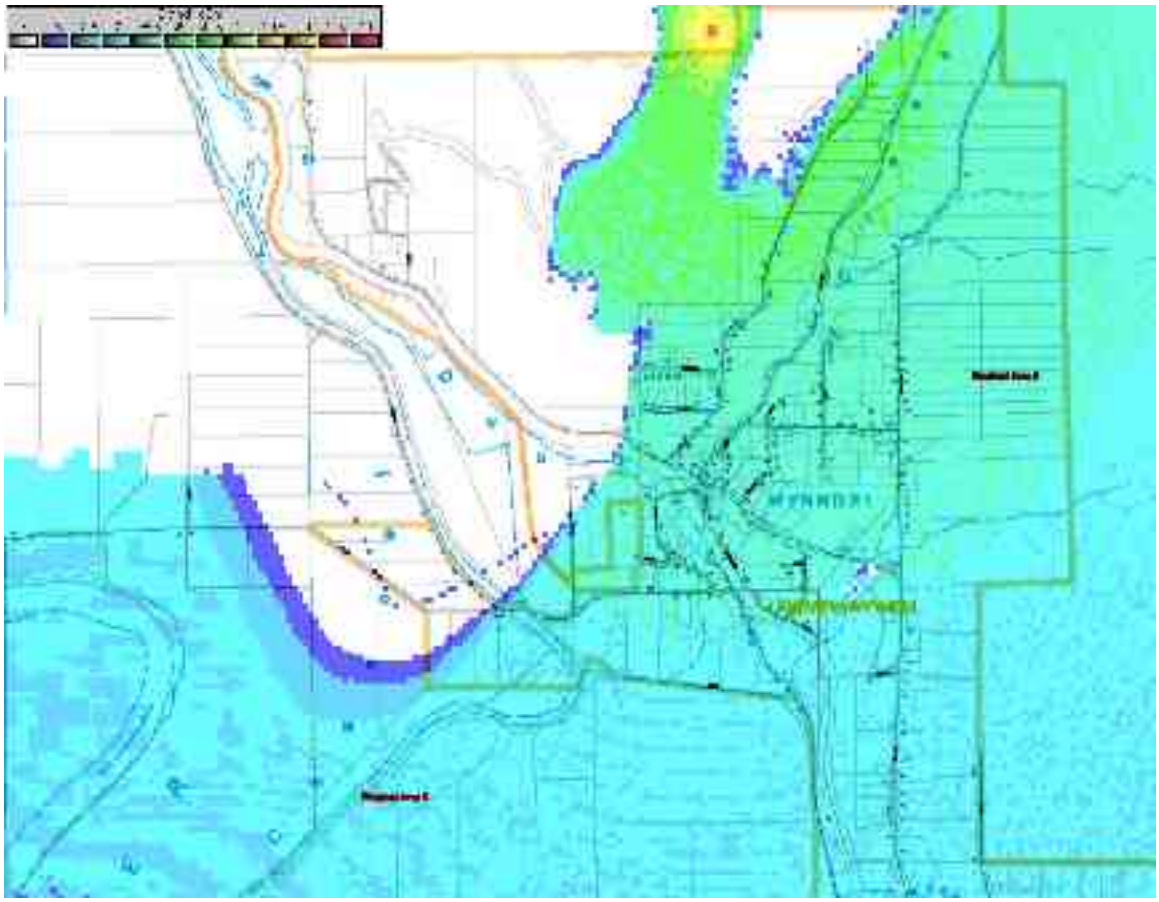
Item	Equipment Cost	Labour Costs	Total
Engineering and Proj Mgmt		$1,000.00	
Install 2 meter roof mast on 2 homes	$1,000.00	$100.00	
Install Equipment box at 2 homes	$1,000.00	$100.00	
Bring AC Power to 2 equipment boxes	$1,000.00	$100.00	
Install 5.8 GHZ P-P link at 2 homes	$2,500.00	$100.00	
Install 15db omni antenna at 2 homes	$1,000.00	$100.00	
Install 2.4 GHz Access Point at 2 homes	$2,700.00	$200.00	
Install ethernet switch at 2 homes	$200.00	$100.00	
Install roof mount at school	$200.00	$100.00	
Install 2 - 5.8 GHz P-P links at school	$2,500.00	$100.00	
Run ethernet cables to router at school, connect POE	$100.00	$100.00	
Setup, configuration, and system tests	$100.00	$100.00	
Misc and Contingency	$1,500.00	$1,000.00	
Subtotal - Local distribution	$13,800.00	$3,200.00	
Shipping Costs	$1,000.00		
Travel, Crew Room & Board		$250.00	
Total infrastructure	$14,800.00	$3,450.00	$18,250.00
Residential Coverage			
Subscriber Units - Residences - qty 50	$17,500.00	$0.00	$17,500.00
ISP Setup (if required)			
DHCP, Mail Server, Firewall	$2,000.00	$100.00	

Billing, Access and Monitoring Software	$250.00	$100.00	
Training		$200.00	
ISP Setup	$2,250.00	$400.00	$2,650.00
System Total	**$34,550.00**	**$3,850.00**	**$38,400.00**

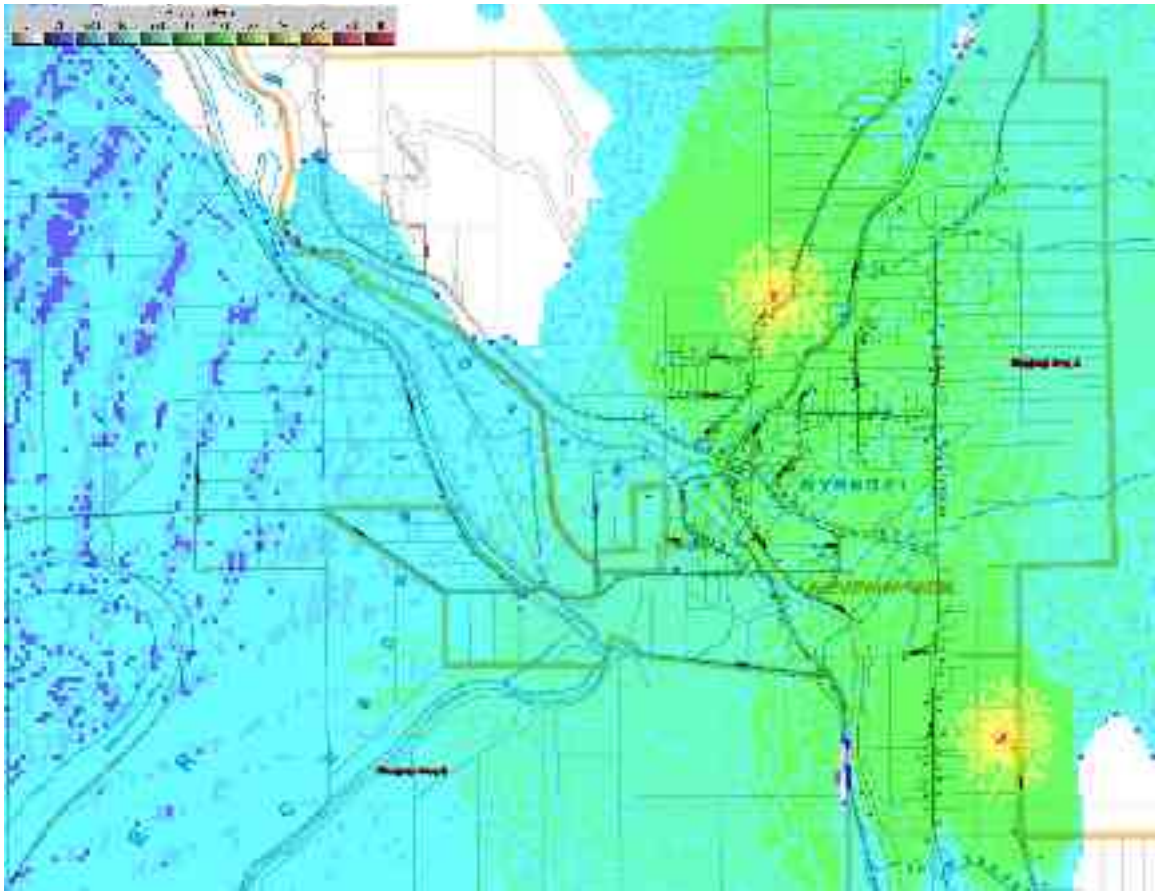
Coverage Maps



Case 1 and 2 – Coverage from “Hump”



Case 3 Coverage from Logging Road Site



Case 4 – coverage from homes on Cory Road and Robson Road

Community Photographs

Approaching Wynndel from Creston

Wynndel Panorama

"Hump" access point location

Wynndel Elementary showing tree cover