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CVRD

Cowichan Regional Internet & Cellular Connectivity Strategy

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Contents

Definitions

Backbone: is a high-capacity network connection that forms the main link between service provider points of presence and the end distribution networks.

Backhaul: is a term used in wireless networks, referring to the use of communications networks to transport (*haul*) data *back* from the towers, to the telecommunications network core. For voice services, this would be to the Public Switched Telephone Network (PSTN). For data, it would be to the internet gateway.

Cable: refers to networks provided by Cable TV providers, typically using coaxial cable at the customer end, with fibre closer to the network's core. Such networks are also referred to as hybrid fibre-coax (HFC) networks.

Digital Subscriber Loop (DSL): is a family of technologies that deliver high-speed data over traditional telecommunications copper twisted-pair cables. Speeds are limited by distance, and can range from 1-115 Mbps, but are typically limited to approximately 45-50 Mbps.

Fibre: refers to glass fibre optic cables, forming the foundation of "wired" network infrastructure, and used to transport data via pulses of light from lasers. As laser and controlling electronics technologies improve over time, the available bandwidth of fibre optic cables is able to deliver higher speeds, making them effectively "future-proof".

Fixed Wireless: is wireless broadband service from an antenna on a service provider's tower to a subscriber radio located at a fixed location – typically an antenna and radio mounted on the side of a house or building.

High-Capacity Transport: is a high-speed broadband network connection that transports data traffic to and from a community's distribution (last mile access) networks to an internet gateway point of presence.

ISP: is an Internet Service Provider.

LEO Satellite: refers to Low Earth Orbit satellites, orbiting the earth under 2,000 km from the ground, maintaining acceptable latency, which is the delay or time required online or on a network for the one-way or round-trip transfer of signals to and from the satellites. The satellites orbit earth approximately 11 times per day, and when arranged in a constellation with other LEO satellites, provide coverage to wide areas, with signals from subscribers roaming between moving satellites.

Mobile Broadband: is high-speed wireless data service from a service provider's tower(s) to a mobile device.

Mobile Wireless: is wireless broadband and/or voice service from service provider's tower(s) to a mobile device such as a smart phone.

Point of Presence (POP): is the demarcation point, or interconnection point between service provider networks. This can include interconnection points between core and distribution networks, or interconnection points between service providers, such as at an Internet Gateway.

Public-Private Partnerships (P3): are long-term arrangements between governments and private sector companies, that typically involve private-sector funding to finance, build and manage government

infrastructure projects, in return for ongoing revenues from taxpayers or users over the term of the contract.

Public Service Broadband Network (PSBN): is a wireless network being proposed and developed by the Federal Government in conjunction with first responders, Provincial and Regional government stakeholders.

Service Providers: are regulated, commercial entities that provide connectivity to voice and internet customers.

Take-Rate: is the percentage of potential subscribers who are offered the service that actually do subscribe.

WSP: is a Wireless Service Provider. Commonly considered as the online or cloud service providers that run on internet services. These could be services such as digital home security, Tele-health, or Netflix.

WISP: is a Wireless Internet Service Provider. These service providers are the organisations' that provide the user with the connection to the internet in order to be able to access the WSP's. They act as the gateway service. Often these companies are WSP's as well, with bundled offerings for the users.

Wireless Radio Spectrum: wireless radio spectrum consists of electromagnetic radiation and frequency bands. Each country has their own wireless spectra with ranges up to 300 GHz. Electromagnetic waves in this frequency range, called radio waves, are widely used in modern technology, particularly in telecommunication. To prevent interference between different users, the generation and transmission of radio waves is strictly regulated by national laws, coordinated by an international body, the International Telecommunication Union.

Executive Summary

The Cowichan Valley Regional District (CVRD) recognizes the importance of high-speed connectivity and cellular coverage for its communities. With its continued economic growth and development, the region is seeking to address its gaps in broadband and cellular services to ensure equal and competitive opportunities exist for all of its residents. IBI Group was engaged to provide a Regional Connectivity Strategy, including advisory services and recommendations to provide for the improvement of connectivity in the CVRD.

The Cowichan Regional Internet & Cellular Connectivity Strategy establishes regional connectivity goals and aspirations, outlines the current status of connectivity in the region, and identifies gaps in service and potential strategies for addressing them, while considering the CVRD's vision for connectivity. The strategy prioritizes the goals and actions to realize the vision and provides recommendations around the potential role of the CVRD in implementing those actions. The proposed technology solutions include high-level cost estimates for identified underserved communities to determine funds needed to make a business case for private investment.

This report provides analysis and recommendations on connectivity strategy. Additionally, it provides an analysis of the existing market for connectivity services, the results of a connectivity assessment, a conceptual high-level network design, and an action plan for four priority underserved communities. The Connectivity Strategy will allow the region to make decisions on the long-term deployment and support of a future broadband network.

The Community Connectivity Plans are appendices to the regional strategy, and outline specific technologies, network plans and funding models to bring improved service to four underserved communities. These plans are meant to help empower each of the priority communities to pursue connectivity improvements that meet their unique needs.

Introduction

Purpose and Intended Audience

This report's purpose is to provide options and recommendations for achieving the CVRD's vision for connectivity throughout the region. The report is intended to be used by the CVRD as a guidance document for advocacy and planning to improve both broadband and cellular connectivity throughout the Cowichan region.

Digital Connectivity and Its Importance to Society

Digital connectivity is a significant factor in the personal and professional evolution of individuals, businesses, and society in general, touching all aspects of our lives, including:

- research and education,
- emergency response,
- healthcare,
- entertainment and gaming,
- socialization, belonging, and community growth,
- political debate and activism,
- information dissemination,
- commerce, and
- employment.

While the COVID-19 pandemic has had negative impacts related to the isolation of citizens, it has also proven the value of technology and highlighted the importance of digital connectivity in supplementing physical with virtual presence. Acceptance of virtual presence was forced into many avenues where physical presence was previously required, including court appearances and depositions, remote work and meeting attendance, medical services, interviews, education, commerce and more.

As the pandemic evolved, the digital divide became undeniably evident, significantly disadvantaging those less digitally connected, especially those living in areas with limited access to connectivity technology. Without access to modern communications technologies, people cannot fully function in today's society and experience many challenges in gaining an education, earning a living, and otherwise participating as full citizens in our society.

Technology Considerations

Wireless radio spectrum is a finite resource, and as such, is typically managed centrally in each country. In Canada, access to spectrum is licensed and managed by Innovation, Science and Economic Development Canada (ISED), a department of the Government of Canada. As bandwidth requirements and the number of concurrent users increase, available bandwidth per user, and therefore channel speed, becomes limited.

This is true for mobile voice and data technologies, as well as fixed wireless and LEO satellite services. While adoption rates are low, service performance is good, but as adoption increases, service levels naturally decrease as more users attempt to share the same available spectrum.

Wireless technologies are comprised of one-to-many (one tower to many customers) configurations from fibre-connected towers to mobile or fixed subscriber radios that can include cell phones or fixed antennas/radios on customer premises. (See following diagram.)

Wireless technology services provide a great foundation for additional service providers to provision their services and offer competitive solutions for the region. Extending fibre optic backbone into an underserved area to backhaul traffic from a new tower enables the service provider to quickly reach multiple customers, thereby providing some service and early revenue streams.

Building of backbone fibre infrastructure to extend connectivity services from served areas to underserved areas should be planned and designed to maximize benefit to both wired and wireless networks. Following the most heavily travelled arterial highways and roadways, wherever possible, enables delivery of fibre connectivity to new potential tower sites along the way, thereby extending cellular coverage along routes that benefit most travelers in the area.

Normal design and engineering practice is to ensure there are sufficient fibre strands to enable foreseeable network expansion. These excess fibre strands within the extended backbone cable can then be used as a high-capacity transport from which "wired" fibre optic distribution networks can be built to neighboring homes and businesses over time.

Fibre-based technologies focus light down a strand of glass, rather than relying on radio waves through the air, and as such, can achieve much greater speeds than wireless technologies. When the speed reaches the capacity of the electronics at each end of the fibre, additional colours of light can be added (multiplexed) to the system, effectively extending its capacity. Fibre-based technologies are therefore considered the most "future-proofed" solution that the industry can offer. Fibre technologies currently provide capacities orders of magnitude greater than wireless technologies, and as it continues to improve, current speeds of 1 Gbps to homes, and 10 Gbps to 40 Gbps speeds available to businesses, will continue to increase, making this medium the best available option at this time. In support of this standard, many infrastructure investors now look at fibre networks as 20 to 30-year utility-grade investments.

Mobile Wireless

Fixed Wireless

Internet

Internet Exchange

Backhaul

Establish tower in underserved area to extend cellular coverage and provide quick initial fixed service.

Distribution Fibre

Distribution Fibre

Public Switched Telephone Network (PSTN)

Backhaul

Extended Fibre Optic Backbone — Fibre Optic Backbone — Fibre Optic Backbone

Establish New Point of Presence

Point of Presence Interconnection Site

Point of Presence Interconnection Site

Service Provider Switching Site

Build fibre to homes to deliver higher speeds over future-proofed infrastructure

The above diagram depicts typical wireless and fibre network topologies. While wireless bandwidth is limited, due to a finite availability of spectrum, fibre provides a future-proofed solution as it can provide increasing speeds as the end electronics evolve over time.

Summary of Supporting Research

The IBI Group Regional Infrastructure and Service Availability Report, dated May 13, 2022[1] reviewed all available information and datasets[2] to confirm connectivity across the Regional District. The summary of this data identified:

- Approximately 4% of households underserved
- Gap of 574 km of underserved road segments
- Identified and ranked underserved communities

Additional methods of data collection included:

- Outreach to service providers to confirm available backbone and planned near-term projects
- List of key CVRD sites across the Regional District
- Community engagement to educate the public and gain a better understanding of needs and wants of the community

Summary of Methodologies Employed

Supporting data for this strategy was collected using the following methodologies:

- Collection and visualization of available Federal ISED data
- Verification of data, leveraging a variety of sources of information
- Outreach to known service providers
- Public "road show" and "online" public engagements to validate our understanding of the current state
- Assessment of broadband penetration by community, through the lenses of premises and road lengths served

Project Scope and Assumptions

The Cowichan Regional Internet & Cellular Connectivity Strategy assesses current conditions, identifies the gaps, integrates feedback from public engagement, documents CVRD broadband and cellular vision and objectives, and identifies short, medium and long-term strategies to address gaps and assist the Regional District in realizing its vision for regional connectivity.

The scope further called for detailed plans and cost estimates for four prioritized communities. Four underserved communities were selected and more detailed community-level strategies are appended hereto in Appendices B, C, D, and E.

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[1] See Appendix A
[2] ISED road segment and CIRA speed test data

CVRD Summary

Regional Overview and Demographics

The Cowichan Valley Regional District (CVRD) on southern Vancouver Island is bordered by the Nanaimo and Alberni-Clayoquot Regional Districts to the north and northwest and by the Capital Regional District to the south and east. It is one of 27 regional districts in British Columbia. It is comprised of nine electoral areas and four incorporated member municipalities and is home to ten Indigenous communities.

The CVRD covers the area between Stuart Channel and Saanich Inlet on the east coast of Vancouver Island and the southern part of the West Coast Trail on the Island's west coast, with Cowichan Lake located in its central region. It also includes a number of Southern Gulf Islands, including Thetis, Penelakut and Valdes. The total land area is 3,473 km². The region is home to over 89,000 people, most of whom live along the eastern edge of Vancouver Island, clustered around a number of communities.

CVRD Regional Snapshot (2021)
Size of region: 3,473 km²
Population: 89,013; 45% in electoral areas (39,661); 55% in municipalities (49,352)
Population change from 2016: +6.3%
Population density per km²: 25.6
Average age: 47
Number of households: 37,290
Median total household income: $79,500 (2020 data)

Economic Development
The Cowichan Valley Regional District is a growing and vibrant region. It is attracting new residents and more businesses at unprecedented rates. The top five attractive considerations listed by Economic Development Cowichan are:

1. Central location that is easy to access, connected by air and sea.
2. Growing population that is pushing demand for new services and products.
3. Diversified workforce with access to skills development programs.
4. Competitive property options for industrial and commercial land.
5. The warmest year-round climate in Canada.

Leading Industries by employment:
- Healthcare and social assistance
- Retail
- Construction
- Educational services
- Public administration
- Manufacturing
- Accommodation and food services
- Professional, scientific and technical services
- Agriculture, forestry, fishing and hunting

Objectives and Overview of the Future State

Vision

Through several workshops and visioning exercises, the CVRD has developed and adopted the following vision, related to the importance of connectivity within its boundaries.

The Cowichan Valley Regional District is a connected community, with an appropriate and efficient mix of technologies deployed throughout the region that provides affordable access to connectivity services for all homes and businesses. Connectivity enhances the livability of our communities by enabling business, employment, health care, education, security, and social and family connections for residents of all backgrounds and income levels.

Affordability Perspective

As the CVRD aims to bring connectivity to every resident and business in the region, it will be important to monitor the affordability of these services. If the infrastructure and services are in place, but residents cannot afford the services, then those residents should still be considered underserved.

The deployment of broadband infrastructure is a capital-intensive undertaking, with initial costs in the vicinity of between $60 and $100 per meter, depending on aerial or underground fibre deployment construction methodologies. It is typically undertaken by the private sector, who are in business to drive profits to their shareholders. Due to the high capital cost to connect homes and businesses, when coupled with pent up demand, there is a significant advantage for the first service provider in each community. In this industry, construction projects are therefore prioritized based on density of population and available revenues, to maximize early return on investment. As penetration of infrastructure expands, and cashflows improve, expansion to less profitable areas becomes possible.

Located just north of Canada's 7th most densely populated community (Victoria), the CVRD has a median total family income of $79,500, compared to that of Victoria at $106,900, British Columbia at $96,270, and Canada as a whole at $96,220 in 2020.

Furthermore, the CVRD is predominantly a rural area, with several remote communities. With a population density of 25.6/km^2, compared to over 4000/km^2 in Victoria, the majority of the Regional District's area is comprised of rugged forestry terrain. This makes the cost of extending services to all residents more expensive.

High construction costs, coupled with lower household incomes results in an environment that stretches the affordability of services, thus lowering take-rates and further slowing deployment to the more rural and remote communities. Results of the regional survey of Cowichan residents and businesses and anecdotal evidence from public engagements showed that many people are concerned with the cost of broadband services. Some are even forced to choose between internet and cellular services due to the combined cost.

In some communities, especially lower-income neighbourhoods, access to equipment (cellphones, computers), as well as the knowledge of how to use connectivity to its fullest

potential, were also noted as barriers. In these cases, simply providing high-speed internet and mobile phone services is not enough; additional measures are needed.

2021 census data of median after-tax income of households, shows all of Canada at $73,000, compared to that of British Columbia at $76,000. The following map shows a broad range of median after-tax household income across the CVRD.

ID	NAME	ID	NAME
1	Diamond, Ladysmith Area	26	Mill Bay Area
2	Chemainus Area	27	South Shawnigan Area
3	Mesachie Lake Area	28	Malahat Drive Area
4	Youbou Area	29	Cherry Point Area
5	Honeymoon Bay Area	30	Cobble Hill Area
6	Caycuse Area	31	Cowichan Station Area
7	Cowichan Tribes	32	Shawnigan Lake Area
8	Town of Ladysmith	33	Glenora Area
9	Koksilah Area	34	Eagle Heights Area
10	Saltair Area	35	Genoa Bay Area
11	Penelakut Tribe	36	Cowichan Bay Area
12	Lyackson First Nation	37	Duncan Area
13	Pauquachin First Nation	38	Lake Cowichan Area
14	Halalt First Nation	39	Mayo Rd Area
15	Pacheedaht First Nation	40	Sahtlam, Paldi, Riverbottom Area
16	Ditidaht First Nation	41	Maple Mountain Area
17	Malahat First Nation	42	Maple Bay Area
18	Ts'uubaa-asatx Nation	43	Quamichan Lake Area
19	Thetis Island	44	Stoney Hill Area
20	Penelakut Island	45	Mt Sicker Area
21	Valdes Island	46	Westholme Area
22	Stz'uminus First Nation	47	Crofton Area
23	Ruxton Island	48	Somenos Area
24	Reid Island	49	Arbutus Ridge Area
25	Pylades Island	50	Yellow Point, Cedar Area

StatCan Median After-tax Household Income
- $0 - $49,600
- $49,601 - $64,000
- $64,001 - $72,500
- $72,501 - $81,000
- $81,001 - $88,000
- No Data Available

Map labels: Oyster Bay 12, Cowichan Valley H, Cowichan Valley G, Cowichan Valley I, Malachan 11, Lake Cowichan, Cowichan Valley F, Penelakut Island 7, North Cowichan, Cowichan Valley D, Cowichan, Cowichan Valley C, Cowichan Valley B, Cowichan Valley A, Malahat 11
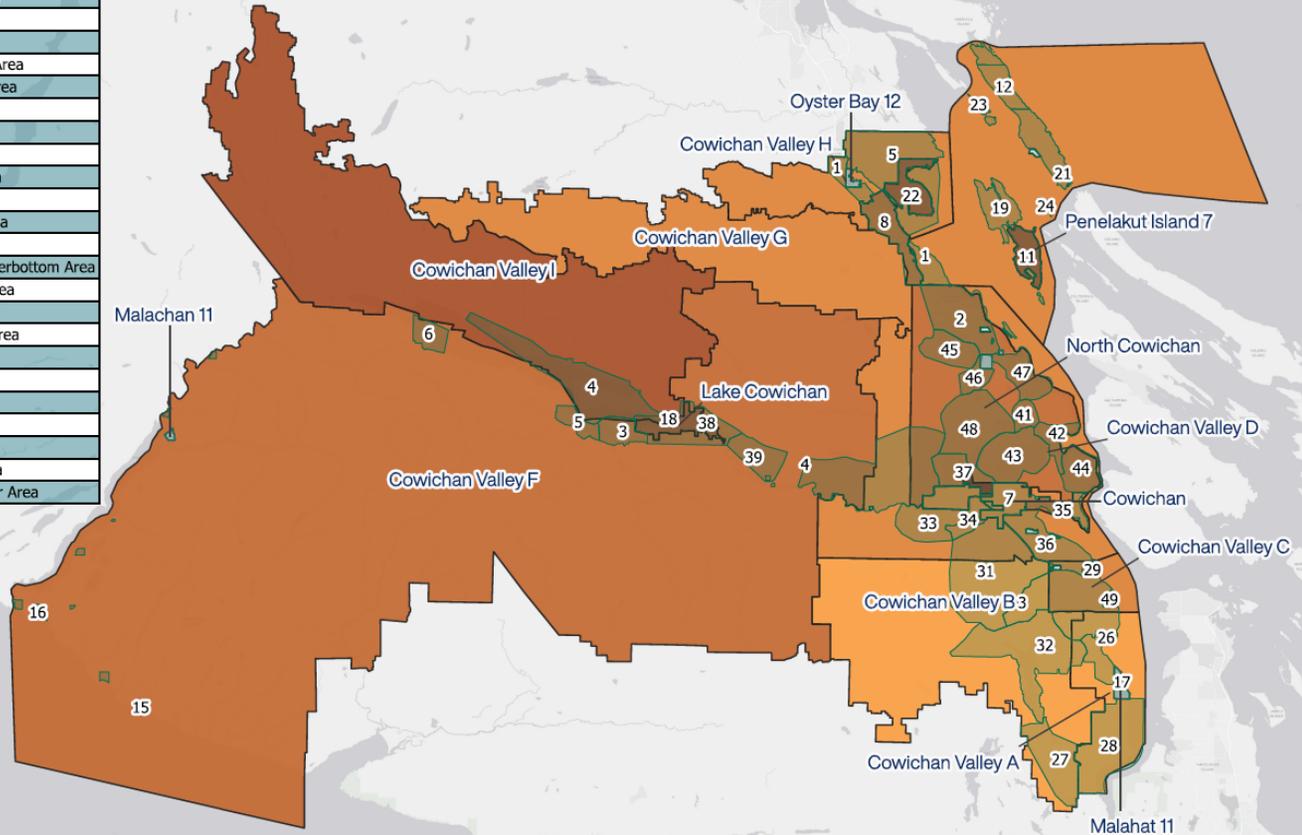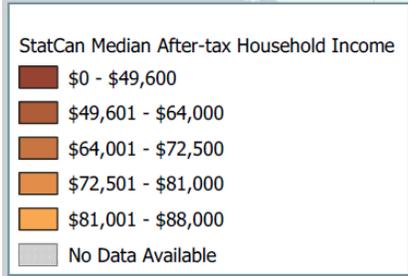
In an effort to accelerate deployment of broadband networks to less profitable areas (typically remote, rural communities and areas), federal and provincial governments have established several grant programs. Additional influence from regional and local community governments may be required to further address affordability. These efforts may include raising awareness of service packages for low-income individuals, or the provision of community WiFi services with reduced-rate subscriptions for the most vulnerable citizens.

Economic Impact

A recent study of the economic impact of connectivity funding in rural British Columbia[3] showed that connectivity funding to support the expansion of high-speed internet to underserved rural areas can have positive short and long-term impacts on Gross Domestic Product (GDP) for both the region and the province.

It identified that broadband improvement projects contribute to the local economy in the short-term by creating demand for products and services required to deliver the project and operate the infrastructure on an ongoing basis. These infrastructure projects also contribute over the long-term by creating new economic opportunities for local businesses, workers, and residents.

For the Kootenay Economic Region, the study showed that for a total investment of $105 million (federal, provincial, local and industry) to deliver broadband to approximately 10,500 households, the short and long-term benefits were estimated at $281 million, or $14,800 per connected person.

Connectivity Objectives

The Canadian government's primary objectives from a connectivity perspective are two-fold. First, as related to broadband services, the primary objective is to extend at least 50 Mbps download and 10 Mbps upload service to all underserved areas, with an eye on future required speeds and services. Second, as related to cellular services, the primary objective is to extend cellular coverage along roadways and to premises in underserved communities across the country.

The CVRD's objective with regards to connectivity is to create healthy, liveable, and efficiently-serviced communities for residents of all backgrounds and income levels.

As the long-term vision of the CVRD is to see affordable access to connectivity services for all households and businesses, and the objectives of private sector service providers are to maximize return on investment as soon as possible, the challenge will be to find ways to help improve service provider business cases to help prioritize the build of initial infrastructure to underserved communities across the Regional District – especially those that are in remote locations and/or comprised of lower-income families. To assist service providers to deliver more affordable services in these remote locations, a key focus will be on access to capital grant programs, wherever possible. Closing the digital divide helps to drive economic development and improve the lives of all CVRD residents.

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[3] "Kootenay Connectivity Benefits Study", BC Ministry of Citizens' Services, Fall 2022, https://www2.gov.bc.ca/assets/gov/british-columbians-our-governments/services-policies-for-government/initiatives-plans-strategies/internet-in-bc/pdfs/kootenay_connectivity_report_final1.pdf

CVRD Current State

General Infrastructure

Innovation, Science and Economic Development Canada (ISED) data shows that approximately 96% of Cowichan Valley Regional District premises have access to the federal speed target of 50 Mbps download and 10 Mbps upload. However, the ISED data is challenged in some areas by the results of internet speed tests completed by community members, indicating that further investigation may be needed.

The Regional Infrastructure and Service Availability Report (Appendix A), provides a detailed review of the current state of broadband and cellular connectivity throughout the Regional District. It compared ISED data with other datasets, and identified underserved premises and road segments for each CVRD-provided community. Key metrics for the Regional District were identified as follows:

Broadband Service Status	Premises		Road Network (m)	
Served	34,054	96%	1,162,016	67%
Underserved	1,243	4%	574,107	33%
Total:	**35,297**	**100%**	**1,736,123**	**100%**

Service Provider Overview

The Regional District is served by 8 primary service providers, leveraging their associated technologies, as identified in the table below:

ISP Name	Technology
Beacon	Fixed Wireless
Bell	Mobile Wireless, High-Capacity Transport
Freedom Mobile	Mobile Wireless
Rogers	Mobile Wireless
Shaw	Cable, Mobile Wireless, High-Capacity Transport
Telus	DSL, Fibre, Fixed Wireless, Mobile Wireless, High-Capacity Transport
Xplornet & Starlink	Satellite

More details can be found in the Regional Infrastructure and Service Availability Report in Appendix A.

These service providers leverage their own national networks to provide connectivity to voice and internet gateways.

Cellular services are available across most of the populated region along the eastern coastline from Telus, Rogers, Shaw, Bell, and Freedom Mobile, but rugged terrain to the west inhibits radio frequency propagation, limiting the coverage of commercially available service providers. This is evidenced by published coverage maps from the major cellular providers. The Telus publicly available coverage map below was extracted from the Regional Infrastructure and Service Availability Report (Appendix A) and is indicative of all cellular providers in the Cowichan region.
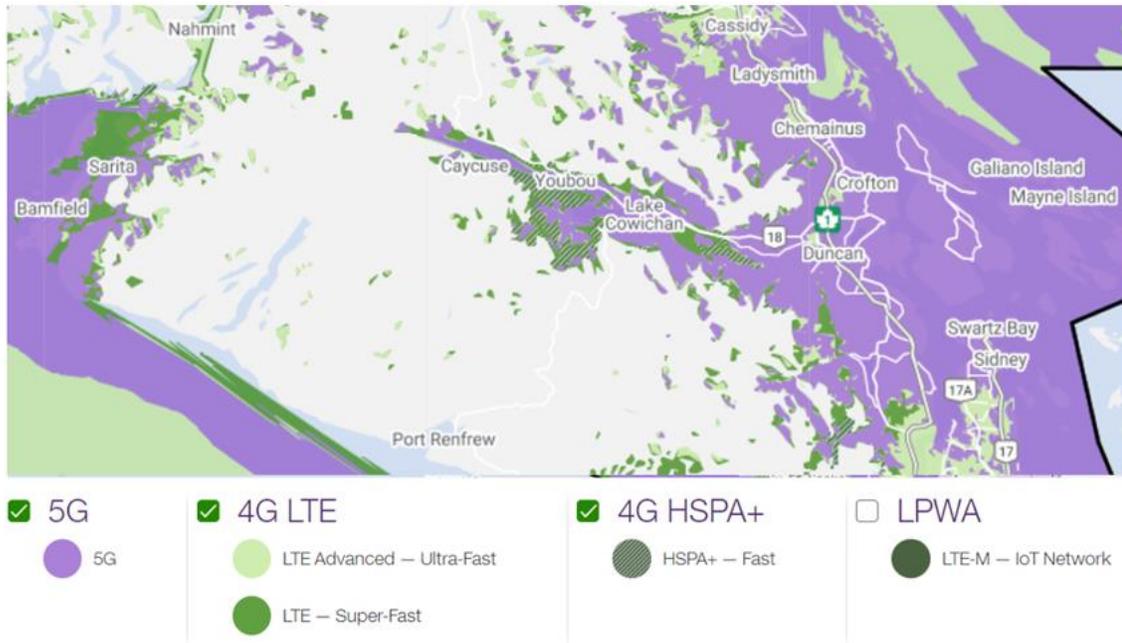
These high-level coverage maps are often contradicted by ground truthing. For example, on Penelakut Island, public consultation identified a lack of coverage along the eastern coast of the island, in contrast to the indication from the Telus map below, purporting 5G and LTE Advanced coverage.
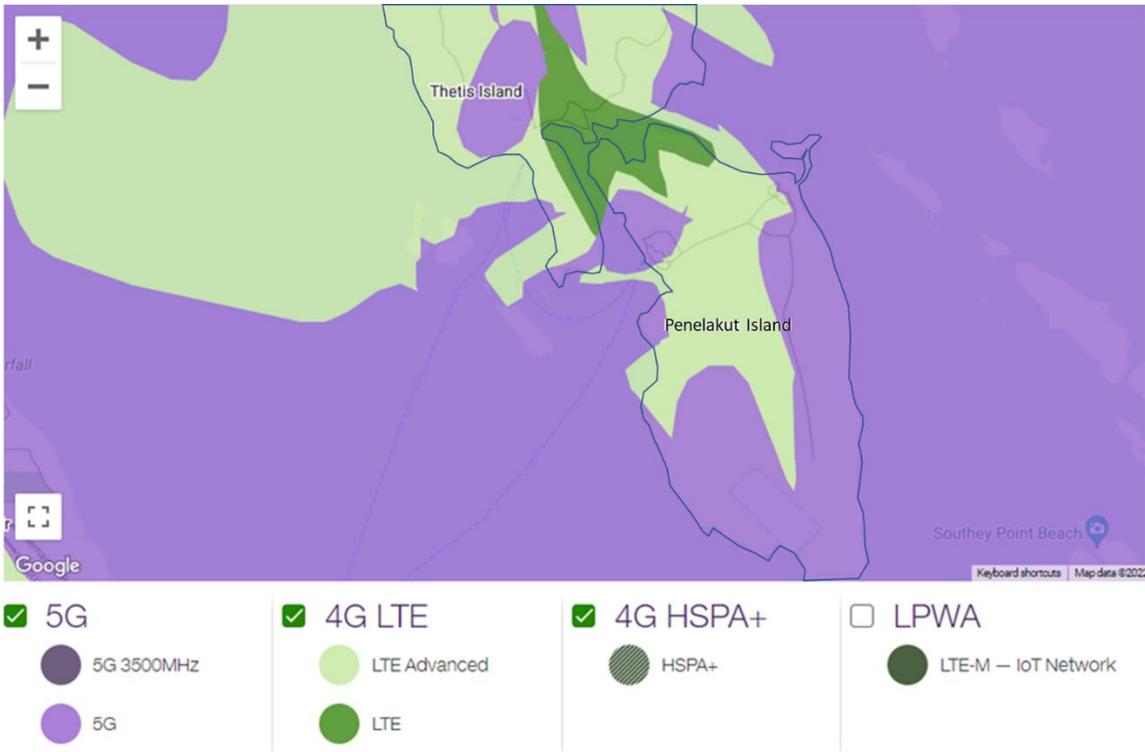
Cellular data (mobile wireless) within coverage areas provides a valuable step towards bringing broadband speeds to subscribers. These networks typically deploy fibre to their towers to backhaul voice and data to the service providers' core networks, but initial steps may leverage point-to-point microwave, until traffic and subscription levels increase.

Once fibre backhaul is deployed, fixed wireless and other services can be more easily deployed to serve demand.

Announced Projects

Connected Coast

The Connected Coast partnership, comprised of CityWest and Strathcona Regional District, is a project funded by the Government of Canada's Connect to Innovate (CTI) program, Indigenous Services Canada, and the Province of BC through the Connecting British Columbia program. The project plans to interconnect coastal landing sites from Northern BC and around Vancouver Island with the internet exchange in Vancouver through the placement of approximately 3,500 km of marine fibre optic infrastructure.

Excerpts from the Connected Coast website (http://connectedcoast.ca) below, show planned landing points as of November 2, 2022, as well as the build status, as of February 8, 2023. It should be noted that these landing sites may change as project planning and construction progresses.
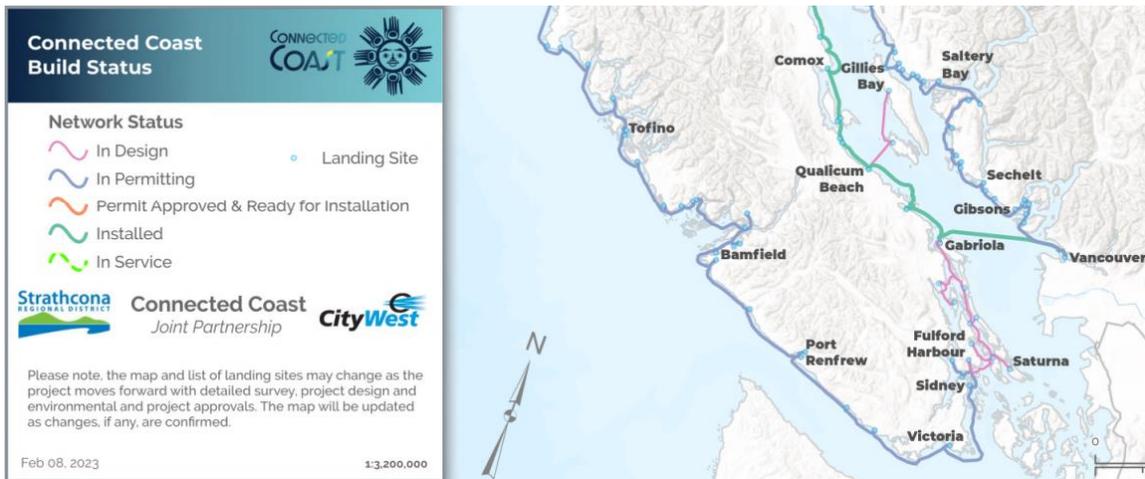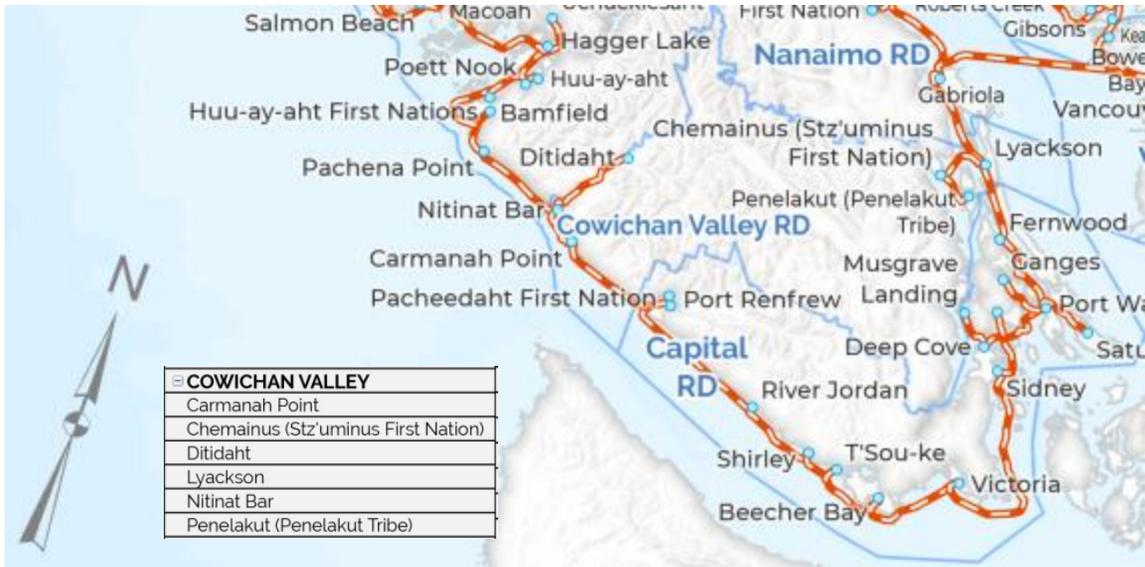
Underserved Communities

The Regional Infrastructure and Service Availability Report (Appendix A) reviewed available data for each of the local communities identified within the CVRD and validated the data by comparing it with data from alternate sources.

From that data, prioritization factors were developed, ranking the communities based on the number of underserved premises, percentage of underserved premises, and proximity to existing backbone. The communities were then grouped, based on proximity to each other.

Community	Number of Underserved Premises Factor (PremFail/ Max PremFails)	% Premises Underserved Factor (% underserved Prems/ Max % Underserved Prems)	Proximity to Backbone Factor	Priority (max score=4.00) (sum of 3 factors, double-weighted to Underserved Prem Factor)
Thetis and Penelakut Islands	1.000	0.540	0.25	**2.79**
Cowichan Lake Area (Youbou, Lake Cowichan Area, Caycuse, Honeymoon Bay, Mesachie Lake Area)	1.000	0.080	0.00	**2.08**
Ditidaht First Nation*	0.291	1.000	0.25	**1.83**
Cowichan Station Area	0.694	0.290	0.14	**1.82**
Stoney Hill Area	0.219	0.753	0.24	**1.43**
Lyackson First Nation*	0.060	1.000	0.25	**1.37**
Mt Sicker Area	0.132	0.455	0.15	**0.87**
South Shawnigan Area	0.196	0.187	0.25	**0.83**
Sahtlam, Paldi, Riverbottom Area	0.249	0.063	0.25	**0.81**
Chemainus Area	0.257	0.029	0.25	**0.79**
UNCLASSIFIED**	0.094	0.301	0.25	**0.74**
Cowichan Tribes	0.189	0.066	0.25	**0.69**
Stz'uminus First Nation	0.106	0.118	0.25	**0.58**
Eagle Heights Area	0.117	0.057	0.25	**0.54**
Shawnigan Lake Area	0.098	0.008	0.25	**0.45**
Cowichan Bay Area	0.087	0.015	0.25	**0.44**
Westholme Area	0.072	0.216	0.05	**0.41**
Malahat Drive Area	0.038	0.062	0.25	**0.39**
Somenos Area	0.026	0.009	0.25	**0.31**
Yellow Point, Cedar Area	0.023	0.007	0.25	**0.30**
Mayo Rd Area	0.011	0.028	0.25	**0.30**
Town of Ladysmith	0.023	0.002	0.25	**0.30**
Diamond, Ladysmith Area	0.015	0.013	0.25	**0.29**
Crofton Area	0.004	0.001	0.25	**0.26**
Cobble Hill Area	0.004	0.001	0.25	**0.26**
Arbutus Ridge Area	0.000	0.000	0.25	**0.25**
Ts'uubaa-asatx Nation	0.000	0.000	0.25	**0.25**
Mill Bay Area	0.000	0.000	0.25	**0.25**
Duncan Area	0.000	0.000	0.25	**0.25**

Community	Number of Underserved Premises Factor (PremFail/ Max PremFails)	% Premises Underserved Factor (% underserved Prems/ Max % Underserved Prems)	Proximity to Backbone Factor	Priority (max score=4.00) (sum of 3 factors, double-weighted to Underserved Prem Factor)
Malahat First Nation	0.000	0.000	0.25	**0.25**
Maple Bay Area	0.000	0.000	0.25	**0.25**
Maple Mountain Area	0.000	0.000	0.25	**0.25**
Koksilah Area	0.000	0.000	0.25	**0.25**
Cherry Point Area	0.000	0.000	0.25	**0.25**
Quamichan Lake Area	0.000	0.000	0.25	**0.25**
Glenora Area	0.015	0.013	0.10	**0.14**
Halalt First Nation*	0.000	0.000	0.13	**0.13**
Saltair Area	0.023	0.007	0.03	**0.08**
Genoa Bay Area	0.000	0.000	0.07	**0.07**
Ruxton Island	0.000		0.02	**0.02**

Notes:
* Premises count for Lyackson, Ditidaht, and Halalt First Nations were taken from 2021 Census. Assumption that 100% of premises were underserved, based on anecdotal evidence from public engagement.
**UNCLASSIFIED area contains all CVRD areas not included within community boundaries.

The top four prioritized areas were identified for further planning, as follows:

1. Thetis Island & Penelakut Island
2. Ditidaht First Nation
3. Cowichan Station
4. Cowichan Lake Area

Based on the findings of the Regional Infrastructure and Service Availability Report (Appendix A), coupled with local insights or "ground truths" gathered through the various public engagements, and high-level cost estimates based on the number of underserved premises and underserved meters of road segments, specific strategies to close the gaps for each of the four prioritized areas are presented in Appendices B-D. These Community Connectivity Plans provide a roadmap for community-led connectivity improvements, with the support of CVRD staff.

Emergency Preparedness

The federal government is leading a national program with first responders and other stakeholders working towards the goal of a reliable, modern, nationwide and interoperable public safety broadband network (PSBN).

A PSBN is a network that can be used by emergency responders and public safety personnel to communicate with each other, share and access information during day-to-day operations, weather-related incidents and natural disasters, emergencies and major events. Initial plans are to leverage an allocated 20 MHz of spectrum in the 700 MHz public safety broadband spectrum.

A report has been published that identifies "Those functions which are not accounted for at the centralized level but are considered as necessary for the building, deployment and/or operations of the network would become distributed governance functions. These roles and responsibilities are best delivered on a regional or distributed basis to reflect and respond to regional needs and operational requirements. These functions could include (but are not limited to):

- Seeking and promoting investment for local network expansion and/or improvement
- Determining eligibility for priority and pre-emption (if applicable)
- Identifying and enhancing regional coverage within their jurisdiction, including to rural and remote communities, through the development of coverage requirements and strategies
- Working with the centralized structure on regulatory and policy compliance
- Developing user requirements, technology requirements (for the network and for devices), and application requirements to support the PSBN
- Procuring broadband and PSBN related services from vendors
- Delivering user training
- Conducting exercises
- PSBN promotion and onboarding
- Serving as a point of contact for user concerns and issues"

The report further outlines "next steps that include the following activities that need to be undertaken:

- Financial modelling to support governance structure
- Detailed design and approval of governance structure
- Funding and establishment of centralized and distributed governance functions
- Identification and development of national standards
- Evaluation of deployment strategy and development of go-to-market strategy
- Procurement and implementation of PSBN
- Individual jurisdictional procurement of PSBN services
- Individual jurisdictional procurement and implementation of enhancements such as additional coverage, hardened infrastructure."

The report can be found at the following link.

https://www.publicsafety.gc.ca/cnt/rsrcs/pblctns/2021-psbn/index-en.aspx#b01

Resilience and Redundancy

There are several ways in which organizations can build resilience into their communications network.

- Access Diversity, involving two or more access paths into a building, or campus,

- Route Diversity, involving two or more physically diverse routes for cables to follow between two points of a network; and
- Service Provider Diversity, involving redundant connections through multiple service providers, such that if or when one service provider's network is not functioning, the business can operate over the second service provider's network.

Network resilience and redundancy should be considered for any critical applications or government functions, such as emergency management.

The Regional Infrastructure and Service Availability Report (Appendix A) found that across the Regional District, there are several facilities-based ISPs providing connectivity services to the majority of residential, business and government premises, providing a healthy environment for service provider diversity in most serviced areas. However, as connectivity is rolled out to the underserved areas of the Regional District with lower population density, due to the capital-intensive nature of network construction, the private sector will focus on being first to an area, and shy away from being the second, as the majority of customers (and therefore revenue) will already be served, thus challenging their business cases. The CVRD should consider and require route diversity, wherever possible, for any emergency management infrastructure being implemented.

From Current State to Future State

Infrastructure Considerations

In order to achieve the regional vision for connectivity, the following infrastructure improvements are needed:

1. In addition to the Connected Coast program, backbone fibre infrastructure should be extended from available existing network service provider points of presence sites (POPs) to underserved areas, thereby improving ISP business cases, enabling them to focus on last-mile access network, improving the penetration of acceptable broadband services to underserved communities across the Regional District.
   - On a case-by-case basis, this could include working with any of the existing service providers with nearby high-capacity transport backbone (Shaw, Telus, Bell, Rogers, Freedom), or also with CityWest transport to the Vancouver Internet Exchange via the Connected Coast infrastructure at landing sites.
   - It may also be accomplished through building and operating fibre infrastructure within the CVRD or one of the local municipalities, making fibres available to numerous service providers interested in extending their reach. If operated within or for the CVRD and also used to interconnect CVRD sites, this could be handled through the establishment of a Regional Broadband Service.
2. Improve the coverage of mobile cellular networks, by constructing new antenna sites (towers) in underserved areas and extending fibre optic infrastructure to them for backhaul. This may be accomplished cooperatively with existing wireless service providers, through working in partnership with wireless infrastructure (tower) providers such as SBA Communications, or by building and operating towers and fibre infrastructure within CVRD. It could be realized through the establishment of a Regional or Local Area Service.

Initial backbone extensions with which to support and entice service providers to extend service to underserved areas are identified on the following map.

Proposed Initial Network Extensions

Legend
⬡ Communities
📌 CVRD Facilities
● Existing Towers
— Initial Backbone Extensions
▢ Prioritized Communities
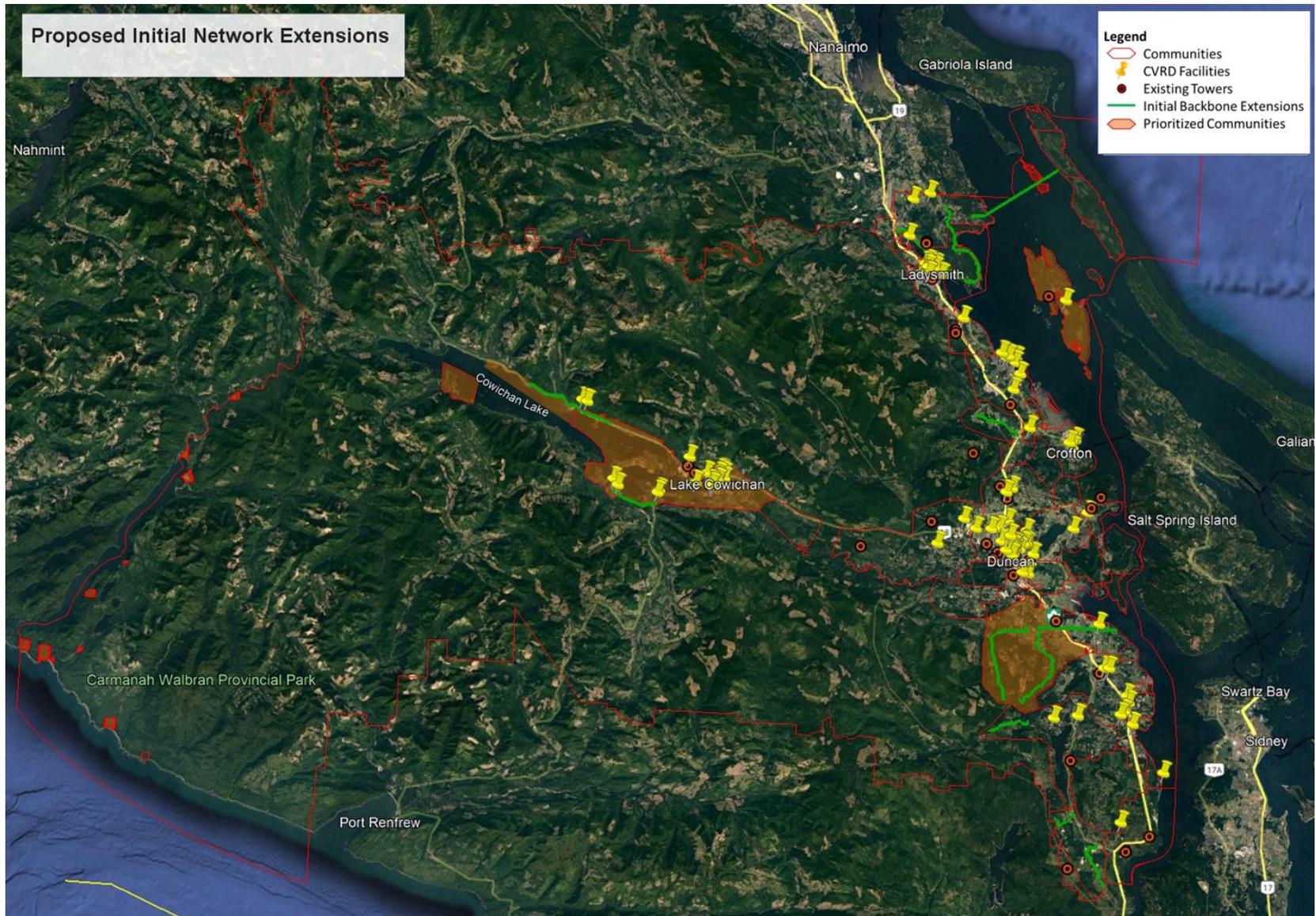
The Regional Strategic Direction for Connectivity

There are several possible approaches to implementing the strategy to extend backbone and/or cellular coverage to underserved areas, ranging from influencing the build of infrastructure by existing service providers, to building infrastructure, to doing nothing, as detailed below:

1. Observe, Advocate and Influence (current approach)
    o Influence ISPs to build backbone and access to underserved areas
    o Influence Wireless Service Providers (WSPs) to build cellular towers in strategic locations, thereby extending fibre for backhaul and filling holes in current coverage
2. Build Infrastructure
    o Build and operate a municipal area backbone network, interconnecting CVRD sites. This extends broadband connectivity to outlying CVRD sites, enabling remote monitoring, telemetering, or control of water or other infrastructure, communications to remote schools, community centres, libraries, and maintenance facilities in underserved areas. This may be undertaken directly, or through joint builds with ISPs.
        ▪ Make excess backbone fibres available to ISPs at a moderate rate, improving business cases for last-mile distribution
        ▪ ISPs to build out last mile access infrastructure to residences and businesses
    o Build towers in strategic locations and extend backbone from nearest service provider point of presence to those towers, to backhaul traffic to service provider networks. Strategic locations to be identified (typically elevated positions providing line of site to users), extending coverage in underserved areas towards pockets of population, or filling in holes in coverage along roadways.
        ▪ Extend reach of first response and forestry services radio systems
        ▪ Cell providers and Wireless Internet Service Providers (WISPs) to collocate on those towers
        ▪ Gives temporary relief until FTTH built by private sector
    o Build backbone from existing service provider points of presence towards underserved communities
        ▪ Connected Coast landing sites
        ▪ Shaw, Telus and other existing backbone networks
3. Passive Approach
    o Allow market forces to eventually deliver connectivity services to the underserved homes and businesses across the Regional District. The CVRD has already recognized that this approach is unlikely to succeed in delivering appropriate connectivity to the region.

Option	Advantages	Disadvantages
1. Observe, Advocate and Influence	• Low cost (staff only, no capital) • Influence prioritization of areas and services delivered • Leverages relationships with senior levels of government to prioritize funding for projects within the CVRD, advancing deployment of networks and helping to address affordability of services • Builds relationships with service providers	• No direct control over the build program
2. Build Infrastructure	• Directly Influence market (services and timing) • Prioritizes CVRD internal connectivity requirements • Improves ISP last-mile distribution business cases	• Highest cost (capital intensive) • Ongoing management of network infrastructure
3. Passive Approach	• No cost • Allows market forces to prevail	• No influence • Timing and services delivered based on private sector profits • Susceptible to competitive blocking gamesmanship

The Role of the CVRD

The CVRD should continue in its role of observing, advocating and influencing. The CVRD's Board of Directors has identified broadband connectivity as a priority and included the development of this strategy in its 2020-2022 Strategic Plan. Staff from Economic Development Cowichan have been working on the connectivity file ever since. Furthermore, the CVRD recently adopted a Telecommunications Antenna Structures Policy to clarify its involvement in these matters.

This role involves monitoring connectivity activity within the Regional District and advocating for both residents and service providers to influence the rollout of connectivity to the underserved areas of each community. As opposed to letting market forces alone determine connectivity availability across the Regional District, the CVRD should, within its capacity, continue to take an active role in providing guidance to the industry and influencing future builds, based on the needs of its underserved constituents.

Where appropriate, the CVRD should continue to facilitate and support infrastructure funding applications, such as was done for Thetis Island in 2021. This role should also include working with mobile service providers to hold them to account for published coverage maps and influencing future buildouts through community engagement to identify concerning holes in coverage.

The CVRD is recommended to create a "Dig Once" policy for new development within the region to lower the cost of development of future infrastructure. It is recommended that the CVRD consider making telecommunications conduit a condition of rezoning and/or development permits where any services are added to property and ground is open for access. Conduit should also be specified with enough capacity for growth of services and competitive service providers.

The CVRD's role may evolve to begin addressing affordability issues by building and providing access to centralized WiFi hotspots, or providing multi-year financing for connectivity charges to lower-income households. In First Nations communities, the CVRD should also engage Band Councils to participate in the identification and implementation of solutions for their lower-income households.

As the need arises, the CVRD's role may evolve towards becoming more active in building and operating infrastructure as a fourth utility. This may occur through partnership with private tower or infrastructure providers, providing direct funding to incumbent mobile service providers, and/or establishing a public-private partnership (P3) agreement to build and operate a broadband network on behalf of the Regional District.

In order for a regional district to be directly involved in operating connectivity services, a regional or local area service must be established. There are two options:

1. Create or use an existing regional service for the provision of improved and affordable internet and cell service to meet emergency service needs and/or address affordability issues, or
2. Given that only approximately 4% of Cowichan premises are deemed to be underserved, if needed, create Local Service Areas to fund improved service to specific underserved communities.

The CVRD does not have an existing service that could be utilized for connectivity, so a new service would need to be created. Creation of a new service requires a referendum, alternative approval process, or petition for services (for local area service).

High-Level Cost Estimates

Based on estimates of $60/m to construct rural fibre infrastructure (primarily aerial construction), and $1000 to connect each premise, the costs associated with constructing fibre broadband infrastructure to serve all underserved road segments and connect all underserved premises are identified in the following table. Note that priority underserved communities are marked in orange in the table.

While cost estimates do not include extension of backbone from a neighbouring community, they do include extending fibre optic cable along every underserved road segment, whether or not those segments contain any underserved premises. This level of costing is sufficient to prioritize projects and required levels/sources of funding. Refinement should occur during detailed design.

| Community	Length Fails 50	Prem Fails 50	Cost to Fibre underserved road length	Cost to connect underserved Premises	Cost to Resolve BB Connectivity	Average Cost per Household
Arbutus Ridge Area	-	-	$0	$0	$0	$0
Caycuse Area	6,919	3	$415,140	$3,000	$418,140	$139,380
Chemainus Area	10,094	68	$605,640	$68,000	$673,640	$9,906
Cherry Point Area	-	-	$0	$0	$0	$0
Cobble Hill Area	2,832	1	$169,920	$1,000	$170,920	$170,920
Cowichan Bay Area	4,676	23	$280,560	$23,000	$303,560	$13,198
Cowichan Station Area	33,408	184	$2,004,480	$184,000	$2,188,480	$11,894
Cowichan Tribes	8,422	50	$505,320	$50,000	$555,320	$11,106
Crofton Area	396	1	$23,760	$1,000	$24,760	$24,760
Diamond, Ladysmith Area	751	4	$45,060	$4,000	$49,060	$12,265
Ditidaht First Nation	3,487	77	$209,220	$77,000	$286,220	$3,717
Duncan Area	-	-	$0	$0	$0	$0
Eagle Heights Area	4,004	31	$240,240	$31,000	$271,240	$8,750
Genoa Bay Area	-	-	$0	$0	$0	$0
Glenora Area	839	4	$50,340	$4,000	$54,340	$13,585
Halalt First Nation	-	47	$0	$47,000	$47,000	$1,000
Honeymoon Bay Area	2,889	12	$173,340	$12,000	$185,340	$15,445
Koksilah Area	-	-	$0	$0	$0	$0
Lake Cowichan Area	13,883	104	$832,980	$104,000	$936,980	$9,009
Lyackson First Nation	1,785	16	$107,100	$16,000	$123,100	$7,694
Malahat Drive Area	2,249	10	$134,940	$10,000	$144,940	$14,494
Malahat First Nation	2,016	-	$120,960	$0	$120,960	$0
Maple Bay Area	113	-	$6,780	$0	$6,780	$0
Maple Mountain Area	1,219	-	$73,140	$0	$73,140	$0
Mayo Rd Area	5,151	3	$309,060	$3,000	$312,060	$104,020
Mesachie Lake Area	2,483	2	$148,980	$2,000	$150,980	$75,490
Mill Bay Area	-	-	$0	$0	$0	$0
Mt Sicker Area	6,534	35	$392,040	$35,000	$427,040	$12,201
Penelakut Tribe	7,679	1	$460,740	$1,000	$461,740	$461,740
Quamichan Lake Area	89	-	$5,340	$0	$5,340	$0
Ruxton Island	3,166	-	$189,960	$0	$189,960	$0
Sahtlam, Paldi, Riverbottom Area	21,593	66	$1,295,580	$66,000	$1,361,580	$20,630
Saltair Area	1,699	6	$101,940	$6,000	$107,940	$17,990

Community	Length Fails 50	Prem Fails 50	Cost to Fibre underserved road length	Cost to connect underserved Premises	Cost to Resolve BB Connectivity	Average Cost per Household
Shawnigan Lake Area	5,576	26	$334,560	$26,000	$360,560	$13,868
Somenos Area	2,149	7	$128,940	$7,000	$135,940	$19,420
South Shawnigan Area	12,704	52	$762,240	$52,000	$814,240	$15,658
Stoney Hill Area	9,170	58	$550,200	$58,000	$608,200	$10,486
Stz'uminus First Nation	7,458	28	$447,480	$28,000	$475,480	$16,981
Thetis Island	25,715	264	$1,542,900	$264,000	$1,806,900	$6,844
Town of Ladysmith	2,009	6	$120,540	$6,000	$126,540	$21,090
Ts'uubaa-asatx Nation	508	-	$30,480	$0	$30,480	$0
UNCLASSIFIED	337,108	25	$20,226,480	$25,000	$20,251,480	$810,059
Westholme Area	4,422	19	$265,320	$19,000	$284,320	$14,964
Yellow Point, Cedar Area	1,758	6	$105,480	$6,000	$111,480	$18,580
Youbou Area	17,154	144	$1,029,240	$144,000	$1,173,240	$8,148
CVRD Total	574,107	1,383	$34,446,420	$1,383,000	$35,829,420	$25,907
Prioritized Communities Total	**110,130**	**714**	**6,607,800**	**714,000**	**7,321,800**	**$10,255**

The costs per household identified above are consistent with what has been seen in other parts of British Columbia and the country.

For instance, the cost of extending fibre-based broadband to 10,500 households in Kootenay totaled $105 million, averaging approximately $10,000 per home passed. In Ontario, recent projects funded under the Ontario Connects program ranged from $15,000 and $20,000 per home passed.

In some cases, however, it may not be economically viable to deliver broadband over fibre-based infrastructure. For instance, the Unclassified areas of the CVRD contain approximately 25 underserved homes and 337 km of underserved road segments. At an estimated cost of $810,000 per home, it is not viable to deliver fibre infrastructure. In extreme cases like this, low earth orbit satellite services are potentially more suitable. In other areas where underserved homes are in closer proximity but fail to meet acceptable investment criteria for fibre infrastructure, fixed wireless is also a potential solution. Market failure conditions in financing these projects become priority analysis requirement.

The prioritized communities are highlighted in the following map.
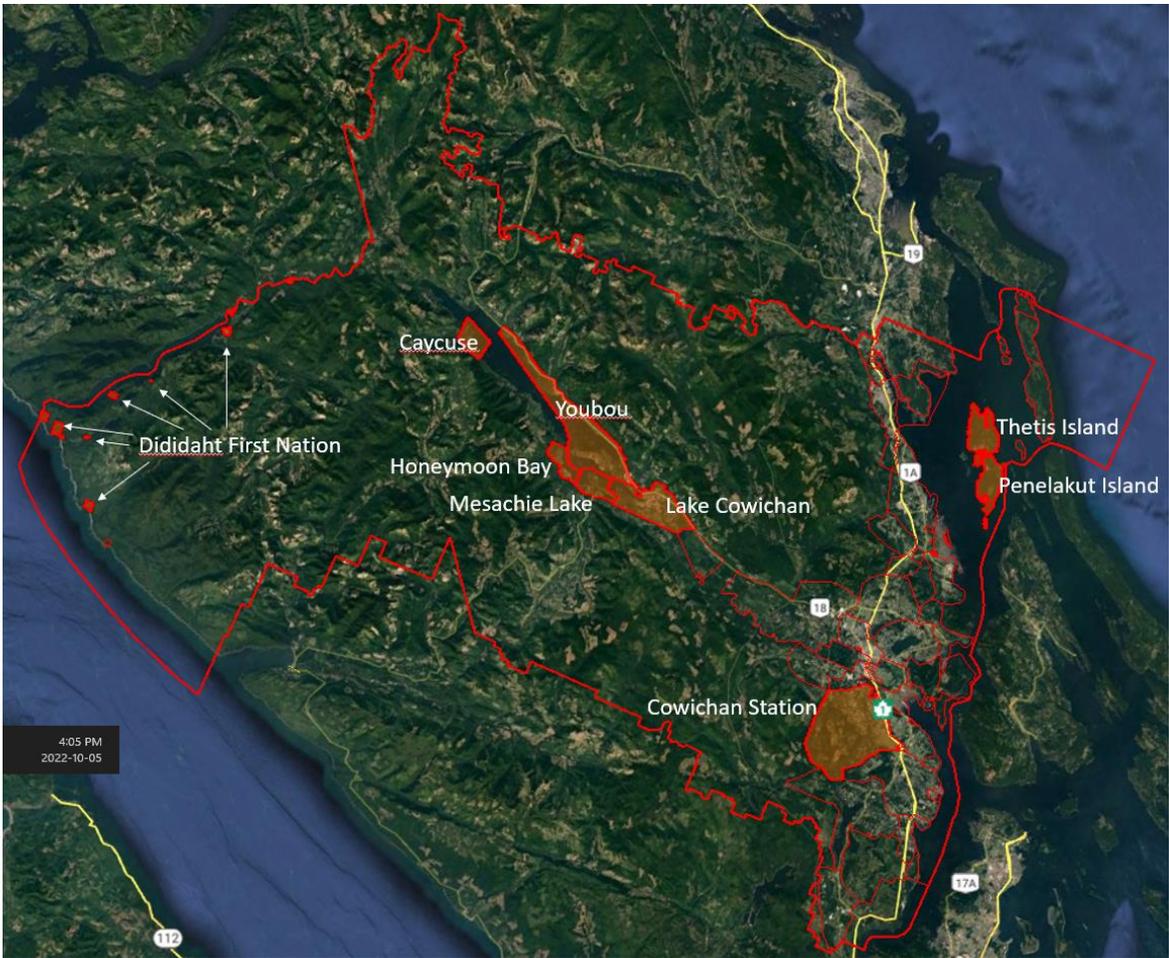
Market Failure Analysis

Private sector ISPs typically prioritize their project investments based on payback period. All potential projects in a given year vie for a limited amount of available capital. Typically, winning projects need to show a payback period of 2-3 years or less. For broadband expansion projects, this implies a threshold of approximately $2,000 to $3,000 per home passed. The threshold for urban projects is typically at the lower end of the range, ($2,000-$2,500/home passed) due to density of households and level of competition in a given area. For rural projects, ISPs typically experience lower levels of competition, enabling them to count on higher take-rates and longer subscriptions. Their acceptable thresholds for rural projects are therefore found to be closer to $2,500-$3,000 per home passed. Above these thresholds, the private sector market tends to fail, requiring public investment to encourage private sector participation.

When comparing these thresholds to the high-level cost per household for each community, the magnitude of public sector involvement can be estimated. For example, in the table above, the four prioritized areas show a combined estimated cost per household of $10,255. If private ISPs are willing to invest a maximum of $3,000 per home passed, public funding of approximately $7,255 per household would be required to move the project(s) forward.

Funding Options

Several sources of funding are available to regional districts to assist and/or enable connectivity projects, extending connectivity to rural and remote communities. These sources include:

- Canada Community-Building Fund (aka Gas Tax Fund), if possible. These funds are limited, but do not require borrowing, or undertaking referendums. This option is preferred, but many projects are too costly to be covered fully by this fund
- Service – create a local or regional service to borrow the required funds, and/or requisition the funds through increased taxation
    - Repay the loan through taxation
    - Any profit derived from revenue-sharing agreements with service providers may:
        - Be directed towards the service to lessen the burden of taxation. Once the loan has been repaid, the income earned through the agreement could be used to fund other connectivity activities. Any income earned through the service must be invested back into the service, so a connectivity service can only fund connectivity activities, or
        - Be directed to another service to provide other community services, such as a granting program
    - Some regional districts have created a regional connectivity service, while others have used their existing regional economic development service

Grant funding is also available, including:

- Connecting Communities BC (CCBC)
- Universal Broadband Fund (CRTC)
- Pathways to Technology (All Nations Trust Company)
- First Nation Infrastructure Fund (Indigenous Services Canada)
- Investing in Rural and Northern Communities Infrastructure (Infrastructure Canada)
- Community Investment Program (Canadian Internet Registration Authority)
- Rural Economic Diversification and Infrastructure Program (REDIP)
- Community Worker Response Grant (WorkBC)

The CCBC Fund is a fibre-to-the-home program created in partnership between the provincial and federal governments to provide up to $830 million to support the growth and development of broadband services to underserved communities in BC. Priority will be given to remote and Indigenous communities. The intent of the funding is to achieve a target to provide connectivity for all households in the province with a minimum of 50/10 Mbps by 2027.

To be eligible for the CCBC program, the applicant must be:

- A corporation, either for profit or not-for-profit, that is incorporated in Canada;
- An Indigenous entity including:
    - A profit or non-profit organization run by and for First Nations, Métis, or Inuit Peoples;
    - A band council within the meaning of section 2 of the Indian Act;

o An Indigenous government authority established by a self-government agreement or a comprehensive land claim agreement;
- A public sector body that is established by statute or by regulation or is wholly owned by a provincial, municipal or regional government, which provides services to communities; or
- A partnership, joint venture or consortium that is composed of parties identified above.

And, that:

- Builds owns and operates broadband infrastructure; or
- Enters into a contractual arrangement with an entity identified above to design, build, own and operate broadband infrastructure.

Source: Applying to Connected Communities BC

Eligibility will generally be determined by:

- The community's current level of service (Served or Underserved – based on ISED data)
- The existence of a business plan for the network and service
- Experience being a broadband construction and operations provider OR have a partnership in place with an experienced broadband construction company and operator.

This funding is available to eligible applicants through the Connecting Communities BC program. https://www2.gov.bc.ca/gov/content/governments/connectivity-in-bc/20601

Region-Wide Recommendations

Advocate and Facilitate

Arguably the most important role for the CVRD in advancing connectivity is one of advocacy and facilitation. With private industry focussed on return on investment, and funding available from multiple sources, it will be up to the CVRD to advocate on behalf of its residents and businesses and facilitate expansion of connectivity services in a way that makes sense for Cowichan's unique needs. The following recommendations speak to this role.

1. Develop a policy around requests for letters of support from ISPs, whereby:
    a. Requests will first be brought to staff for review and comment, before going to the Board.
    b. Requests will be presented in a closed session to maintain confidentiality of the ISP's business plans.
    c. Staff and the Board shall evaluate requests for letters of support using the criteria in Appendix F of this report.
2. Facilitate ongoing conversations and engagement with communities, service providers, funders, utility providers, internal CVRD Divisions and higher levels of government.
    a. Engage the various communities with periodic meetings and communications to maintain currency with issues and opportunities.
    b. Support/facilitate funding applications from communities or third-party ISPs. Consider leading such applications where there is staff capacity and strategic opportunity.
    c. Engage the various service providers and BC Hydro, providing a periodic forum for ongoing communications, reviewing community-level issues and advocating for and prioritizing opportunities to extend connectivity to underserved areas.
    d. Encourage service providers to engage CVRD in the planning stages of new deployments, and to provide support for applications for funding to higher tiers of government.
3. Ongoing measurement of progress related to improvement of connectivity services to underserved communities.
    a. Establish a map-based web-portal where residents can report holes in wireless coverage, either by service address or by road segment.
    b. Maintain a subscription to the Canadian Internet Registration Authority (CIRA) Internet Performance Test community landing page and encourage residents and businesses to complete internet speed tests.
    c. Update the current state technical analysis in 2027 to gauge progress towards the vision.
4. Consider forming a Connectivity Committee to champion the implementation of the Cowichan Regional Connectivity Strategy. Broadband and cellular connectivity needs are complex and evolving, with no quick fix. A committee could be formed to focus on initiatives such as:
    a. Aligning CVRD policy to remove barriers to connectivity investment.
    b. Overseeing grant funding applications for priority areas.
    c. Addressing affordability issues across the region.

       d.   Engaging with higher tier governments to maintain understanding and currency of funding programs, advocate for funding and encourage/assist with the prioritization of CVRD communities for funding opportunities in comparison to others across the province.

       e.   Nominate Committee member(s) to sit on the BC Regional Connectivity Knowledge Network, facilitated by the Province.

       f.   Report back to the Board with updates and recommendation on improving regional connectivity.

5. Actively participate with Provincial and Federal initiatives related to the development and implementation of a Public Service Broadband Network (PSBN), as part of its Emergency Preparedness planning activities.

Affordability, Digital Literacy, and Access to Technology

There are several ways to begin addressing affordability issues that should be considered on a case-by-case basis. Furthermore, as residents gain access to affordable connectivity services and equipment, it will be important to ensure there are opportunities for them to learn how to make best use of these tools and avoid any pitfalls (i.e., cybersecurity).

6. Raise awareness of programs available to provide lower-cost connectivity plans. For example, the Federal government recently launched a $20 per month high-speed internet service as part of the Connecting Families initiative, and in conjunction with several major ISPs including Bell, Rogers, Shaw and Telus. The program targets low-income families and seniors.

7. Raise awareness of existing digital literacy programs. For seniors, ConnectedCanadians.ca offers technology support and coaching services. Connected Canadians uses a customized, hands-on centred approach to address digital literacy. Volunteers with a high comfort level in technology are paired with senior clients. Working together, either one-on-one or in group workshops, clients' various technology challenges are addressed. Funded under the Government of Canada's New Horizons for Seniors Program, online wellness classes are also offered.

8. Expand the delivery of free or reduced rate WiFi services at community centres, libraries or other Regional District sites, with priority given to sites in communities or areas where household income is lower and some are forced to choose between cell phone and internet services. For First Nations communities, consideration should also be given to engaging with band councils for a collaborative approach to addressing challenges when they arise.

9. To improve on regional health and safety, investigate opportunities to increase connectivity at key CVRD Parks and Trails sites, prioritizing the most underserved and most heavily visited sites.

10. Work with Vancouver Island Regional Library to investigate opportunities to add coworking spaces in Cowichan region libraries for those who do not have appropriate space to work/study at home.

11. Investigate opportunities to facilitate the collection, refurbishment, and distribution of locally available (including CVRD) used computers to communities and families that face financial barriers to access.

12. As with other utilities, standard broadband connection costs are typically limited to a set distance from the roadside infrastructure. The cost of drops or connections in excess of the stated distance limit (i.e., to farms and buildings on large acreage lots) is usually considered to be the responsibility of the resident or property owner. To assist with these incremental costs, the CVRD may wish to investigate options for financing the additional cost of installation over a 3-year (or similar) period, allowing the resident to spread the cost over time, rather than incurring an up-front charge.

13. Continue to investigate options and strategic opportunities to address equity, inclusion, and access concerns as it relates to regional connectivity.

Infrastructure

The CVRD can play a key role in advocating for and influencing the quality of infrastructure development in the region, and may even take on the construction and operation of connectivity infrastructure through strategic partnerships.

14. Establish relationships with cellular service providers, tower providers, fibre providers and fibre ISPs, which will enable CVRD to advocate on behalf of underserved areas and provide a forum for discussions required to gain rough consensus on network routing to benefit both wireless and fibre service providers.

15. Empowered by the Community Connectivity Plans (see Appendices B, C, D and E), encourage community-led leadership in resolving connectivity concerns for underserved communities. Based on staff capacity, provide support and guidance to the first four prioritized communities in implementing their community plans.

16. Initiate discussions with ISPs with the aim of creating backbone redundancy in the region, to address concerns related to emergency management.

17. Engage with local communities to confirm local acceptance of wireless technologies, as recent feedback from public engagements highlighted a general concern for further deployment of wireless technologies, and a much greater support for fibre optic network connectivity, including fibre to the home (FTTH) solutions.

18. In most rural scenarios, especially across rocky terrain, the most cost-effective method of construction would be to attach aerial fibre optic cables to existing power/utility pole lines, rather than attempting to build buried or underground infrastructure. These power/utility poles are generally owned by either BC Hydro or Telus in the region. To improve cooperation between power utility and connectivity service providers, the CVRD should advocate to the Provincial Government to open channels of communication and increase collaboration between the industries.

19. The cost to install fibre optic cable is high, regardless of fibre strand capacity. It is therefore considered best practice to provision high-capacity cables in terms of fibre strand count, so that many service providers can take advantage of fibre connectivity. In cases of extending backbone to underserved areas, future planning should also consider the provision of fibres to future new service providers.

20. Investigate CVRD/Municipal sites as anchor clients, providing a base revenue stream to ISPs to build backbone.
21. Explore Public-Private Partnership (P3) opportunities to build and operate connectivity infrastructure.
22. Provide direct funding to ISPs under a partnering agreement to build backbone to underserved communities through the creation of new services – either regional or local-area.[4]
23. Leverage towers and structures (conduits, etc.) constructed for the PSBN where possible, for the expansion of consumer and business broadband and cellular networks across the Regional District.

Local Government Policy

Connectivity is now being recognized as the fourth utility delivering services to residents and businesses across the country. As such, equipment siting policies and infrastructure dig-once policies should be appropriately reviewed.

24. Review and/or establish strong dig-once policies to leverage any rezoning / development applications or infrastructure construction to build telecommunications duct structure (conduit), through which service providers may later thread fibre, substantially lowering the expense of installation. A "strong" dig once policy will serve to incent cooperation amongst service providers and to capitalize on the cost saving opportunity to achieve the goal of region-wide connectivity.
    a. Consider making the installation of telecommunications conduit a condition of rezoning and/or development permits, similar to other utility services (water, power, natural gas, etc.). Such policies should specify that enough conduit capacity be installed to allow for growth of services and service provider diversity. Note: within Regional District Electoral Areas, a rezoning policy to require dig-once would not be applicable to (or legal with respect to) public roads.
    b. As the Regional District does not own / operate its roadways (this is managed by the BC Ministry of Transportation and Infrastructure), the inclusion of a dig-once policy statement in the CVRD's Official Community Plan for the Electoral Areas is recommended.
    c. Dig-once policies may need to be enforced to varying levels, depending on the remoteness of the area in question, or its proximity to other areas, as infrastructure islanded from connecting infrastructure for extended periods of time runs the risk of becoming a stranded investment that may not be recovered prior to the end of its usable lifespan.
25. Establish CVRD and Municipal corporate dig-once policies, that look to expand the provision of fibre backbone connections to underserved communities when undertaking infrastructure projects (trails, utilities, etc.).

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[4] "Local Government Act section 275 (1) (c)", Government of British Columbia, December 16 2015, https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/r15001_08#section275

26. Review and align zoning and tower siting policies to reduce timelines and barriers to expanding wireless networks while enforcing co-location to encourage cooperation and minimize the number of adjacent structures. (Make it easier to build the first tower, but more difficult to build adjacent towers.)
    a. Consider modification and enforcement of equipment siting policies, effectively expanding "dig-once" policy concepts to "build-once" policies. The inclusion of tower infrastructure in this concept would encourage service providers to share such infrastructure, rather than having several adjacent single-user structures. It would also encourage near-term expansion of cellular networks, as the first to market would have an additional revenue stream due to joint use of the tower structure from other service providers.
    b. Strict tower and equipment siting policies developed for densely populated residential developments may hinder the placement of towers, pedestals and cabinets in the public right-of-way, within clear line of site of roadways in more rural settings where they may be required to extend wireless coverage towards pockets of remote and underserved communities.
27. Consider access, route and service provider diversity in policy development, and/or when advocating, building, acquiring, or planning for broadband and cellular services.
    a. Dig/build once policies
    b. Tower siting policies

Cellular Coverage

Through the various engagement activities of this project, it was clearly identified that residents are dissatisfied with cellular coverage throughout Cowichan. Coverage is essential for basic communications, including the ability to call for emergency services when needed. While this project examined cellular coverage at a high level, further investigation is needed to determine steps for addressing the gaps.

28. Develop a robust cellular connectivity strategy for the Cowichan region.
    a. Gaps in service should be clearly identified through drive testing and other technical means in order to determine where additional infrastructure is desired.
    b. Outline possible partnership models with wireless infrastructure (tower) providers such as SBA Communications.
    c. Investigate the development of build-once policies.

Summary of Recommendations

Advocate and Facilitate

Recommendation	Priority	Lead Agency and Partners
1. Develop a policy around requests for letters of support from ISPs	High	Lead: CVRD Economic Development Division Partners: CVRD Legislative Services Division, Board of Directors
2. Facilitate ongoing conversations and engagement with communities, service providers, funders, utility providers, internal CVRD Divisions and higher levels of government	High	Lead: CVRD Economic Development Division
3. Ongoing measurement of progress related to improvement of connectivity services to underserved communities.	Low	Lead: CVRD Economic Development Division Partners: CVRD GIS Division
4. Consider forming a Connectivity Committee	High	Lead: CVRD Economic Development Division Partners: CVRD Legislative Services Division, Board of Directors
5. Actively participate with Provincial and Federal initiatives related to the development and implementation of a PSBN, as part of its Emergency Preparedness planning activities.	Medium	Lead: CVRD Emergency Management Division Partners: CVRD Economic Development Division

Affordability, Digital Literacy, and Access to Technology

Recommendation	Priority	Lead Agency and Partners
6. Raise awareness of programs available to provide lower-cost connectivity plans.	Medium	Lead: CVRD Economic Development Division Partners: CVRD Communications & Engagement Division, First Nations, Non-profit societies
7. Raise awareness of existing digital literacy programs.	Medium	Lead: CVRD Economic Development Division Partners: CVRD Communications & Engagement Division, First Nations, Non-profit societies

Recommendation	Priority	Lead Agency and Partners
8. Expand the delivery of free or reduced rate WiFi services at community centres or other Regional District/Municipal sites.	Medium	Lead: CVRD Community Services Department, Municipalities, Community organizations Partners: CVRD Economic Development Division, CVRD IT Division
9. Investigate opportunities to increase connectivity at key CVRD Parks and Trails sites	Medium	Lead: CVRD Parks and Trails Division Partners: CVRD IT Division, CVRD Economic Development Division
10. Work with Vancouver Island Regional Library to investigate opportunities to add coworking spaces to Cowichan regional libraries	Low	Lead: CVRD Economic Development Division Partners: Vancouver Island Regional Library
11. Investigate opportunities to facilitate the collection, refurbishment, and distribution of locally available (including CVRD) used computers to communities and families that face financial barriers to access.	Medium	Lead: CVRD IT Division, CVRD Corporate Services Department (Asset Management) Partners: CVRD Economic Development Division, First Nations, Non-profit societies
12. Finance the additional cost of installation for premises outside the standard distance limit from roadside infrastructure	Low	Lead: CVRD Economic Development Division Partners: CVRD Finance Division, CVRD Legislative Services Division
13. Continue to investigate options and strategic opportunities to address equity, inclusion, and access concerns as it relates to regional connectivity.	Medium	Lead: CVRD Economic Development Division Partners: Community organizations

Infrastructure

Recommendation	Priority	Lead Agency and Partners
14. Establish relationships with cellular service providers, tower providers, fibre providers and fibre ISPs	High	Lead: CVRD Economic Development Division
15. Support the first four prioritized communities in implementing of their respective Community Connectivity Plans (see Appendices B, C, D and E).	High	Lead: Priority underserved communities Partners: CVRD Economic Development Division
16. Initiate discussions with ISPs with the aim of creating backbone redundancy in the region	Medium	Lead: CVRD Economic Development Division Partners: CVRD Emergency Management Division

| Recommendation	Priority	Lead Agency and Partners
17. Engage with local communities to confirm local acceptance of wireless technologies	Medium	Lead: CVRD Economic Development Division Partners: Municipalities
18. Advocate to the Provincial Government to open channels of communications and increase collaboration between power utility and connectivity service providers	Medium	Lead: CVRD Economic Development Division
19. Consider the provision of fibres to future new service providers in any backbone infrastructure projects	Medium	Lead: CVRD Economic Development Division
20. Investigate CVRD/Municipal sites as anchor clients, providing a base revenue stream to ISPs to build backbone.	Medium	Lead: CVRD Economic Development Division Partners: CVRD IT Division, CVRD Community Services Department, Municipalities
21. Explore Public-Private Partnership (P3) opportunities to build and operate connectivity infrastructure.	Medium	Lead: CVRD Economic Development Division
22. Provide direct funding to ISPs to build backbone, through the creation of new services – either regional or local-area.	Medium	Lead: CVRD Economic Development Division
23. Leverage towers and structures (conduits, etc.) constructed for the PSBN where possible, for the expansion of consumer and business broadband and cellular networks across the Regional District.	Medium	Lead: CVRD Economic Development Division Partners: CVRD Emergency Management Division

Local Government Policy

Recommendation	Priority	Lead Agency and Partners
24. Review and/or establish strong dig-once policies for telecommunications conduit in new developments	High	Lead: CVRD Land Use Services Department, Municipalities, Thetis Island Local Trust Committee Partners: CVRD Economic Development Division
25. Establish corporate dig-once policies that look to expand the provision of fibre backbone connections to underserved communities when undertaking infrastructure projects	High	Lead: CVRD Land Use Services Department, Municipalities, Thetis Island Local Trust Committee Partners: CVRD Economic Development Division

Recommendation		Priority	Lead Agency and Partners
26.	Review and align zoning and tower siting policies to reduce barriers to development while encouraging colocation	High	Lead: CVRD Land Use Services Department, Municipalities, Thetis Island Local Trust Committee Partners: CVRD Economic Development Division

27.	Consider access, route and service provider diversity in policy development, and/or when advocating, building, acquiring, or planning for broadband and cellular services.
	   a. Dig/build once policies
	   b. Tower siting policies
		Medium	Lead: CVRD Land Use Services Department, Municipalities, Thetis Island Local Trust Committee, CVRD Economic Development Division

Cellular Coverage

Recommendation		Priority	Lead Agency and Partners
28.	Develop a robust cellular connectivity strategy for the Cowichan region	High	Lead: CVRD Economic Development Division
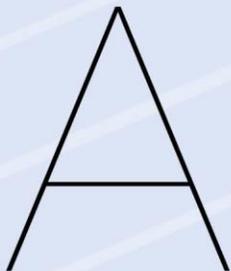
APPENDIX   A

# Regional Infrastructure & Service Availability Report

Underserved Community #1

Underserved Community #2
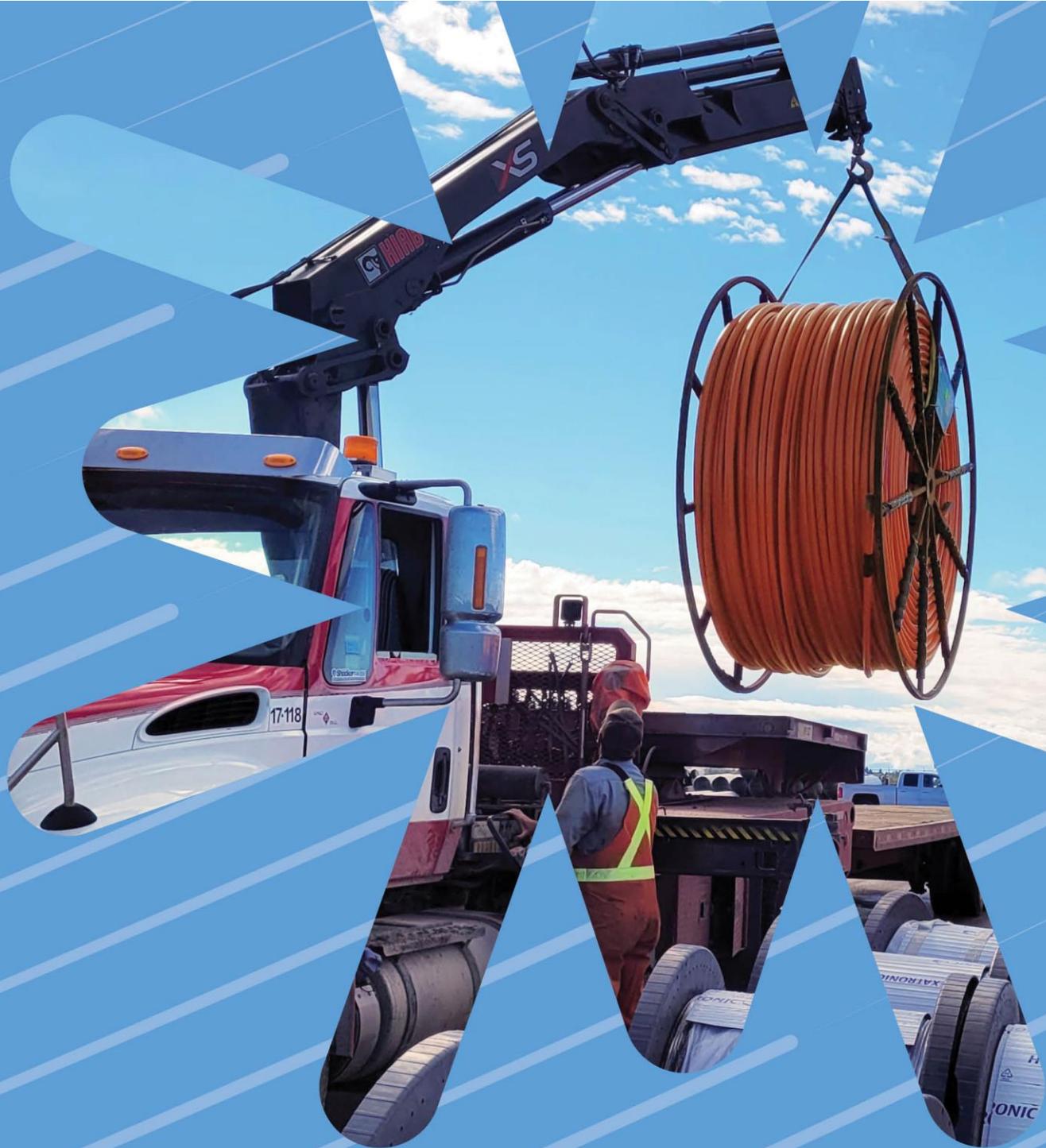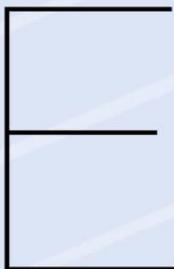
Underserved Community #3

Underserved Community #4

Appendix F – Criteria for Prioritizing and/or Evaluating Connectivity Projects and Requests for Letters of Support

- Number of communities benefiting – the more communities included in a project should mean the project is more attractive than a project addressing fewer communities.
- Number of residents/households/businesses within those communities – the larger the total number of residents/businesses that will be covered by the project should mean the project is more attractive than a project addressing fewer residents/businesses.
- Magnitude of connectivity gap (i.e. how underserved is the community?) – a project that is providing services to a community that only has 5Mbps/1Mbps services available to it is more attractive than a project in a community that currently has 25Mbps/5Mbps services.
- Cost per household/business – The total project cost divided by number of households/businesses serviced is the cost per household/business. The lower the better and this metric is used by some funding agencies.
- Capped Services – What are the service caps for the proposed project?
- Service Levels – what are the minimum service levels being offered by the proposed project?
- Affordability – is a key consideration in determining acceptable high-speed service.
- Existence of willing funding partners – Does the project have committed and adequate funding?
- Existence of community champions – Are there organizations in the community that will work to secure the success of the project or perhaps act as "anchor tenants" for the project?
- Existence of technical, project management, and financial expertise required to complete and operate a project – Can the project demonstrate a high probability of success based on the experience and expertise of key project resources?
- Long term sustainability – Can the project demonstrate a viable business plan with realistic expectations around adoption of services and resulting revenues?
- Choice and Competition – Does the project create choice and competition of services for households and businesses, or is it a single provider? Competition is preferable to a single provider.
- Scalability – A key consideration is ensuring that the technologies used in the proposed project are scalable for future years. As the capacity and need for faster internet services arise, will the proposed project be able to adapt?
- Reliability and Redundancy – Does the proposed project provide redundancy to the area, so that a single cut to the fibre will not result in a loss of service?
- Open or Closed Access Network - In an open access network, all ISPs are offered the same opportunity to deliver broadband internet services to the community by utilizing shared infrastructure. This model allows greater competition by opening the market to smaller providers who may not have the capital to invest in large networks of their own, who in turn, compete for customers.
- Economic Development – what is the potential economic development impact to the region of the proposed project?