











# Strategic Options

*Though this document is written from the perspective of a County, it is just as applicable to MD's, special areas, improvement districts, cities, towns, villages, summer villages, First Nation communities, Inuit, and Métis settlements.*

: Planning, Policy | : Engineering | : Deployment | \$-\$\$\$\$: Cost | -: Benefit

## Option 1 – Status Quo

The first option is to carry on with business as usual, i.e.: to leave Internet services to traditional incumbent wireline and wireless providers with no County involvement. Arguments for and against this approach are summarized in Table 1.

*Table 1. Option 1 – Status Quo Approach*

Status Quo
<b>Examples:</b> All communities which have decided to leave broadband issues in the hands of the private sector.
<b>Pro's:</b> No municipal money used and no project execution or operational risk. No perception of government competing in private industry.
<b>Con's:</b> Incumbent services focus on areas which make business sense. Service pricing depends on what can be competitively monetized versus enabling cost-based services that emphasize inclusion, affordability, and economic development. Little to no control over the infrastructure or service levels, either to meet municipal requirements or those of residents and businesses. Internet speeds and reliability are business as usual.
<b>Risks:</b> Internet service levels may lag residential and business requirements, potentially leading to declines in population, business activity, and County revenue. Given the pace of advancing technology, the projected impact of digital technologies on quality of life, entrepreneurship, and business growth, any mismatch between residential and commercial requirements and the availability of Internet services throughout the County may negatively impact economic development. If service availability is not uniform, some County districts may end up on the wrong side of the digital divide.
<b>Risk Management:</b> Turn County direction to other economic development initiatives.

## Option 2 – Enhance Engineering and Construction Guidelines

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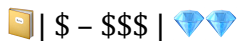
With a modest level of effort, a County could augment its policy and engineering standards to promote the development of enhanced broadband network capabilities in new developments or greenfield situations and to leverage any planned linear infrastructure deployments or refurbishment programs. Requirements on municipal access agreements and permitting might also be updated and increased to ensure all telecommunication infrastructure adheres to consistent engineering design guidelines. These would be in place to protect against interim builds that do not meet County requirements and prevent situations where the County may need to address issues or account for lower quality infrastructure. These guidelines should be structured to support County participation in any of the options to follow. See Table 2.

Table 2. Option 2 – Engineering Design Approach

Provide Engineering Design
<p><b>Examples:</b> City of Calgary, Town of Olds.</p>
<p><b>Pro’s:</b> No County money used for infrastructure build.</p> <p>No perception of government competing in private industry.</p> <p>Protects long-term County interest in developing reliable Internet infrastructure by protect-ing right-of-way access from lower quality telecommunication builds. If at a future date, the municipality decides to build and/or operate a community broadband network, this would enable augmenting existing infrastructure with future infrastructure builds.</p>
<p><b>Con’s:</b> As this only impacts new infrastructure, if growth is slow or negative, the impact will be minimal.</p> <p>This approach does not address the current issues with inadequate Internet infrastructure or support.</p> <p>Internet speeds and reliability are business as usual.</p> <p>Little to no control over the infrastructure or service levels, either to meet municipal requirements or those of residents and businesses.</p>
<p><b>Risks:</b> Internet service levels may lag residential and business requirements, potentially leading to declines in population, business activity, and County revenue.</p> <p>Given the pace of advancing technology, the projected impact of digital technologies on quality of life, entrepreneurship, and business growth, any mismatch between residential and commercial requirements and the availability of Internet services throughout the County may negatively impact economic development.</p> <p>If service availability is not uniform, some County districts may end up on the wrong side of the digital divide.</p>
<p><b>Risk Management:</b> Turn County direction to other economic development initiatives.</p>

## Option 3 – Partner with Internet Service Providers (ISPs)

### (a) Augment Market Demand Incentives





Leverage the County’s telecom, cable and Internet service providers to support their own builds in compliance with the Engineering Design guidelines. Offer municipal ‘grant’ dollars to encourage them to deploy their networks and services into areas the County prioritizes. Arguments for and against this approach are summarized in Table 3.

Table 3. Option 3(a) – Augment Market Demand Incentives with Municipal Funding Programs

Augment Market Demand Incentives with Municipal Funding Programs
<p><b>Examples:</b> A popular approach. In years past, this was the model upon which Wildrose operated and deployed towers in a number of counties. In the Regional Municipality of Wood Buffalo area, this approach was used to improve services in the Gregoire Lake Estates area. More recently, negotiations with private suppliers to improve services in select areas often result in a request for a cash infusion to make the providers’ effort in particular areas worth their while. Surprisingly, in return for the funding, some providers are reluctant to provide much of a commitment other than – <i>we’ll do what we can.</i></p>

<p><b>Pro's:</b> The government is not competing with private industry.</p> <p>Protects long-term municipal interest in developing reliable Internet infrastructure by protecting right-of-way access from lower quality telecom infrastructure builds. If at a future date the County decides to build and/or operate a community broadband system this would enable augmenting existing infrastructure with future infrastructure builds.</p> <p>Provides incentive to ISPs to build more infrastructure in priority areas.</p>
<p><b>Con's:</b> Perception that the County is either picking a winner or subsidizing a local favourite.</p> <p>Given the high capital costs associated with infrastructure deployment, the cash infusions/grants/ subsidies may be significant. In spite of this:</p> <ul style="list-style-type: none"> <li>• All ownership and infrastructure control vests with the private providers.</li> <li>• No municipal access of flexibility to meet larger connectivity requirements.</li> <li>• No direct return on the municipal investment.</li> </ul> <p>Little to no control over the infrastructure or service levels, either to meet municipal requirements or those of residents and businesses.</p>
<p><b>Risks:</b> While the one-time infusion may help put assets in place, area revenues may be insufficient to cover on-going operational and upgrade costs in some districts – as was the case with the Wildrose subsidies years ago. Over time, quality-of-service declines, and additional subsidies may be required.</p>
<p><b>Risk Management:</b> Due diligence on the selected companies and their operations.</p> <p>Careful evaluation of the network's scalability requirements and operational costs.</p> <p>Longer term agreement with coverage, deployment timeframes, scalability requirements, service levels, and operational requirements built-in.</p>

## (b) Establish a Public-Private-Partnership (PPP)

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Public-private-partnerships provide a way to leverage the funding strength of the County with the operational and, perhaps, deployment expertise of private enterprise. In this way, the County could seek to leverage suitable private providers – ISPs, telecom incumbents, utility companies – to support builds in priority areas in compliance with the Engineering Design guidelines. A PPP could be structured to support County participation in any of the options to follow. Summary arguments for this approach appear in Table 4.

Table 4. Option 3(b) – Establish a Public-Private-Partnership

Establish a Public-Private-Partnership
<p><b>Examples:</b> While an increasingly popular approach in rural areas of the US, the PPP model for broadband has not yet been undertaken in Alberta, likely due to the time and legal expenses involved.</p>
<p><b>Pros:</b> Would enable the County to leverage and balance the funding strength of the County with the operational and, perhaps, deployment expertise of private enterprise.</p> <p>A utility-based private partner such as AltaInk may be able to leverage their utility assets to significantly reduce the costs of infrastructure deployment.</p> <ul style="list-style-type: none"> <li>• In the case of power transmission and distribution companies, it could provide access to significant infrastructure such as the optical groundwires atop high voltage transmission towers and low voltage phase conductors on distribution lines and thereby significantly reduce deployment expenses.</li> </ul>

<ul style="list-style-type: none"> <li>• With gas and water co-operatives, it could enable access to rights-of-way and novel deployment techniques.</li> </ul> <p>Utility providers may have significant capital to invest and only require longer term, bond-type returns, in return.</p> <p>Could provide a way in which the County could achieve an open-access vision, retain some control over the infrastructure, and share both the risk and returns of the investment.</p>
<p><b>Cons:</b> Depending on the scope and structure of the PPP, perception that the County is either picking a winner or subsidizing a local favourite.</p> <p>Depending on the infrastructure to be leveraged, County design guidelines may not be applicable.</p> <p>Private providers' requirements may not be acceptable to the County and they may only be interested in serving certain areas of the County.</p> <p>PPP's can be complex and, due to legal requirements, can be expensive to establish.</p>
<p><b>Risks:</b> Management may change and, with that, their return or control requirements.</p>
<p><b>Risk Management:</b> Due-diligence on the selected companies and their operations.</p> <p>Careful evaluation of the network's scalability requirements and operational costs.</p> <p>Longer term agreement with coverage, deployment timeframes, scalability requirements, service levels, and operational requirements built-in.</p>

## Option 4 – Establish a Network Utility

### Context

Of the options available, that to establish fibre or hybrid fibre/wireless networks in the areas of interest and make them available on an open-access, utility basis to all service providers has considerable merit. The rationale for this approach is five-fold:

1. **Survival of rural communities:** According to Broadband Communities Magazine, a quarter to a half of the population declines in rural areas of the US is attributable to poor or no broadband access.<sup>1</sup> Assuming similar results for Canada, capable broadband services are critical to the survival of our rural communities.
2. **Capital efficiency:** Deploying one network is two to three times more capital efficient than multiple private enterprises each deploying their own. With this efficiency, more capable networks can be deployed more deeply in to rural areas.
3. **Connectivity infrastructure:** As an increasingly critical asset, a network utility could provision the core infrastructure required to enable much higher speed, Internet services and improve local access to global assets, global access to local assets, increased business efficiency, and disruptive entrepreneurship. Perhaps more importantly, it will provide the base connectivity infrastructure needed to support advanced wireless access services such as those promised by 5G and as outlined under Option 4(b) and the Internet-of-things.
4. **Services-based competition:** With the network off the table, service providers both big and small can compete in the services space on the basis of innovative services and customer support as opposed to being locked out by traditional incumbents focused on maintaining their client-base via monopoly control of the connectivity infrastructure.<sup>2</sup>
5. **Social mandate issues:** Municipal or public control of this infrastructure enables communities to address social mandate issues such as access to, and affordability of, these services, as well as to provide wholesale network services on a cost recovery basis versus a private sector focus on monetization and meeting the

<sup>1</sup> Ross, Steven R.: Update: Rural Population Loss Still Tied to Poor Broadband; Broadband Communities Magazine; 2018-08/09

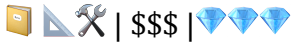
<sup>2</sup> While the CRTC is developing regulation to enable third-party access to the access components of these assets, this approach is less than ideal. Issues include service limitations, cost structure, visibility into operational support systems, and response times.



quarterly return requirements of distant shareholders – thus ensuring the most bandwidth for the least cost versus the least bandwidth for the most cost.

To establish a regional utility network, the County could deploy, on either a dark or lit basis, a backhaul network, as can be justified, in rural areas and middle-mile connectivity and/or access networks in more urban settings and make them available on a wholesale, open-access basis to telecom, cable, fixed wireless, and mobility service providers.

### (a) Backhaul Infrastructure (Rural)



As an increasingly critical asset, the County could consider establishing a county-wide backhaul network that would:

- establish points-of-presence (POPs) in hamlets and rural subdivisions and thereby enable fibre to be further deployed into any areas requiring it
- provide connections to ISP fixed wireless access (FWA) towers that are in need of additional backhaul capacity and thereby enable improved services provided off the tower
- provide connections to larger rural commercial and industrial facilities
- provide connection to rural County facilities – from community halls, fire stations, and other facilities
- provide a jumping off point to run fibre deeper into rural areas

Summary arguments for this approach appear in Table 5.

*Table 5. Option 4(a) – A Backhaul Build*

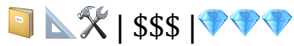
<i>Backhaul Build</i>
<p><b>Examples:</b> This approach has been evaluated in detail for the City of Calgary, the Counties of Clearwater, Cypress, Forty-mile, Newell, Red Deer, Strathcona, the County of Acadia, and Special Areas 2, 3, and 4, among others. Red Deer County recently awarded an RFP to deploy a backhaul network</p>
<p><b>Pro's:</b> Enables support for smart County infrastructure and services as well as improved wireless and Internet speeds in the targeted areas throughout the County.</p> <p>In lieu of a direct subsidy, this may help to promote competition amongst ISPs.</p> <p>No perception of government competing in private industry.</p>
<p><b>Con's:</b> While an enabler that private enterprise can use to improve Internet service levels, they may not do so.</p> <p>As backhaul infrastructure will not initially run everywhere, there may be the perception that the municipality is favouring some ISPs, commercial complexes, and communities over others.</p> <p>As an infrastructure play, such deployments can be expensive with little in the way of a business case.</p>
<p><b>Risks:</b> Internet service levels may lag residential and business requirements, potentially leading to declines in population, business activity, and County revenue.</p> <p>Given the pace of advancing technology, the projected impact of digital technologies on quality of life, entrepreneurship, and business growth, any mismatch between residential and commercial requirements and the availability of Internet services throughout the County may negatively impact economic development.</p> <p>If service availability is not uniform, some County districts may end up on the wrong side of the digital divide.</p>
<p><b>Risks:</b> Internet service levels may lag residential and business requirements, potentially leading to declines in population, business activity, and County revenue.</p> <p>Given the pace of advancing technology, the projected impact of digital technologies on quality of life,</p>

entrepreneurship, and business growth, any mismatch between residential and commercial requirements and the availability of Internet services throughout the County may negatively impact economic development.

If service availability is not uniform, some County districts may end up on the wrong side of the digital divide.

Due to interdependencies between the opto-electronics and distance, this option is best done on a lit basis. Note that if the County does not control the opto-electronics, they will not be in control of the network.

### (b) Connectivity Infrastructure (Communities)



Though an end-to-end buried fibre network is the gold standard in terms of long-term scalability, it is initially expensive to deploy and does not address the growing need for high data-rate, untethered communication. To address both issues, in smaller communities and more urban settings, the County could consider a converged network strategy in which the initial fibre deployment is limited to supporting wireless access connections and connections to larger business and enterprise clients that require it. Wireless options, whether provided by third party ISPs or as part of the County build, offer a way to improve services more quickly and with significantly reduced upfront capital. With proper design, the option to then move to a fibre-to-the-premise (FTTP) solution, either where needed or on a staged basis, as capital becomes available, does not need to be compromised.

To better enable this approach and the options it makes available, it's best to divide the network utility strategy into its connectivity and access components and then consider each separately.

**A connectivity network** in a community provides middle-mile connections between a central hub (office) and access distribution points, critical infrastructure, wireless access points (APs), and Internet of things (IoT) devices. The network could be provided on either a dark or lit basis and could be provisioned as the first phase of a potential FTTP deployment, but configured so that the feeder portion would support a comprehensive set of APs – which would be used to provide last mile access to residential and business premises at much less cost. In the converged network illustrated in Figure 1, initially only the fibre-to-the-tower (FTTT) or antenna portion of the connectivity network would be deployed.

As bandwidth demands increase, the connectivity network would be extended, where needed, into an FTTP network. Likely the fibre would be extended to the business and industrial communities first (shown by the Ethernet connections), and to the residential areas down the road (the FTTP portion). This is currently the approach being taken by the Town of Vermilion – except that for the initial pilot, point-to-point (PTP) wireless links are being used to connect the APs in lieu of fibre. The pilot is focused on Vermilion's industrial area and,

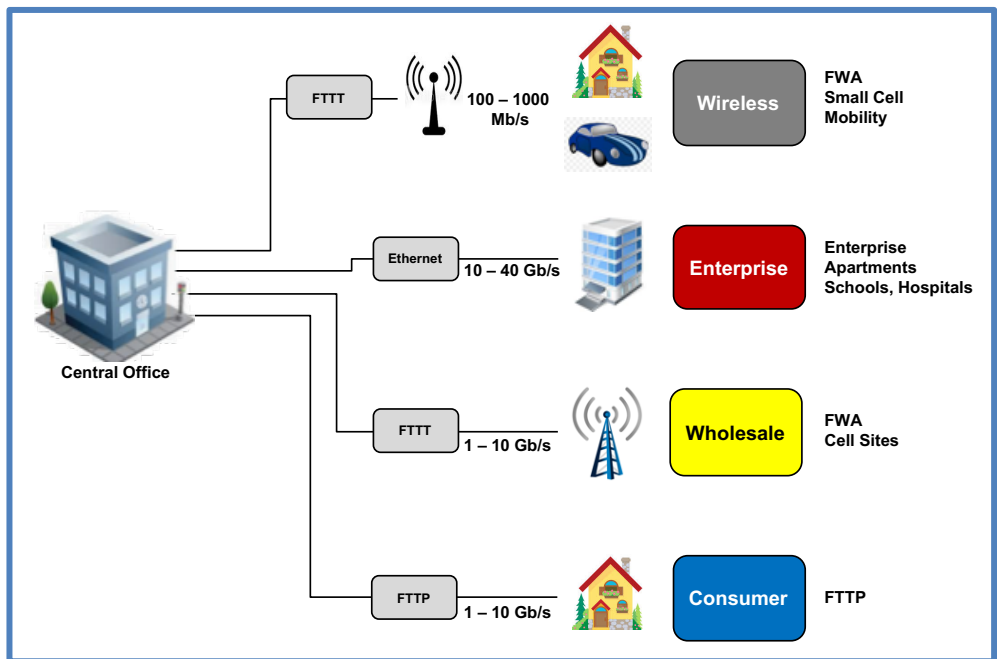


Figure 1. Converged hybrid fibre-wireless networks.

due to complications from the Covid-19 pandemic, will not go live until June, 2020. If successful, the wireless PTP links will be replaced by fibre and then used to support five additional APs

that will cover their north-east industrial area and college campus. The process will then continue until services (and fibre) are available throughout the town.

The importance of connectivity infrastructure is outlined in Figure 2.

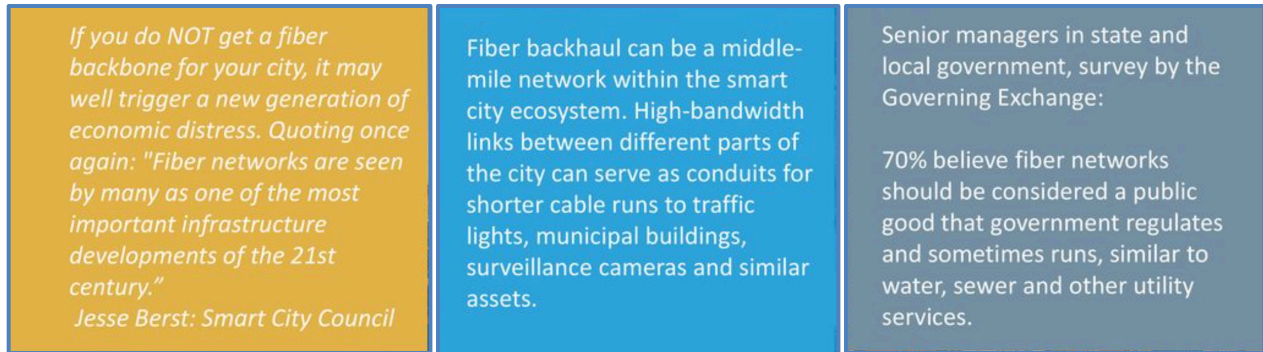


Figure 2. As critical infrastructure, fibre should be considered a utility.<sup>3</sup>

In summary, the connectivity option opens the door to a variety of hybrid fibre-wireless deployments that can hasten ubiquitous coverage at a reduced cost, while not limiting the ultimate scalability of the network to a full FTTP deployment.

Summary arguments for this approach appear in Table 6.

Table 6. Option 4(b) – A Connectivity Network Build

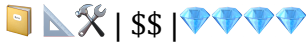
A Connectivity Network Build
<p><b>Examples:</b> This approach is currently being developed in the Town of Vermilion and will likely be replicated in other member community members of the Vermilion River Regional Association.</p>
<p><b>Pro's:</b> Enables support for smart community infrastructure and services as well as improved wireless and Internet speeds within each community.</p> <p>Provides support for a variety of wireless access options – FWA, wi-fi, 5G, small-cell – and operational models (e.g., the Connect Mobility IAAS option, for instance).</p> <p>Provides for both mobility and fixed services and provides support to 5G providers and IoT devices</p> <p>Reduces both the deployment time and the upfront capital required to deploy the network.</p> <p>In lieu of a direct subsidy, this may help to promote competition amongst ISPs.</p> <p>No perception of government competing in private industry.</p>
<p><b>Con's:</b> While an enabler that private enterprise can use to improve Internet service levels, they may not do so.</p> <p>With fewer end-clients, pay-back periods may be lengthy.</p>
<p><b>Risks:</b> Unless the community takes on the access piece as well, Internet service levels may lag residential and business requirements, potentially leading to declines in population, business activity, and County revenue.</p> <p>Given the pace of advancing technology, the projected impact of digital technologies on quality of life, entrepreneurship, and business growth, any mismatch between residential and commercial requirements and the availability of Internet services throughout the County may negatively impact economic development.</p> <p>If service availability is not uniform, some County districts may end up on the wrong side of the digital divide.</p>

<sup>3</sup> Gold, H.; *From FTTX to Fiber Everywhere*; Fibre Broadband Association; Mountain Connect 2017.

**Risk Management:** Arrange for a wireless access provider or look at taking on the access piece as well.

Public campaign to present the decision to delay spending municipal dollars on a major infrastructure build in favour of support to smaller connectivity projects that will spur local economic development within the Internet services market.

**(c) Wireless Access Infrastructure (Communities)**



**Access networks** provide last-mile connections to residential and business premises and facilitate the provisioning of traditional, but much higher speed, Internet services to enable local access to global assets, global access to local assets, increased business efficiency, and disruptive entrepreneurship. Potential smart city (County) applications appear in Figure 3.



Figure 3. Smart cities need smart infrastructure.<sup>3</sup>

With a connectivity network in place, a community has a number of wireless technology options to consider:

- Traditional FWA
- Traditional Wi-Fi
- Small-cell Wireless

Operationally, the County could elect to deploy the access network itself or partner.

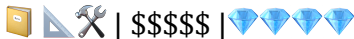
Summary arguments for the wireless access approach appear in Table 7.

Table 7. Option 4(c) – Wireless-to-the-Premise

Wireless-to-the-Premise
<p><b>Examples:</b> Using a traditional fixed wireless approach, a wireless-to-the-premise network is operational in the Town of Viking. A novel pilot wireless-to-the-premise deployment using with Connect is underway in the Town of Vermilion.</p>
<p><b>Pros:</b> Enhances economic development through improved residential and small business attraction across the County.</p> <p>Helps prevent or eliminate downward trends in population and business activity.</p> <p>Scope and ubiquity can be more extensive than an FTTP approach due to reduced cost and faster deployment.</p>

<p>Solution can provide untethered access and can scale to provide Gb/s services.</p> <p>Robust support for IoT devices.</p> <p>Will complement future FTTP deployments.</p>
<p><b>Cons:</b> Increased operational complexity and cost relative to an FTTP solution.</p> <p>Reliability and performance are impacted by terrain, foliage, and weather.</p> <p>Less secure than FTTP solutions – may not be suitable for some enterprise and other clients.</p> <p>Reduced ability to support local ISPs as open-access wholesale options are more limited. Fewer options for ISPs using the network to differentiate themselves.</p> <p>Spectrum availability and cost limits options for smaller communities.</p> <p>Not as scalable or future-proof as fibre.</p>
<p><b>Risks:</b> Without access to licensed or semi-licensed spectrum, service levels and quality may not meet client expectations.</p>
<p><b>Risk Management:</b> Position wireless-to-the-premise as part of a more complete longer-term strategy that, with fibre, will scale to meet all current and future client requirements.</p>

#### (d) Dark-Fibre-to-the-Premise (FTTP)



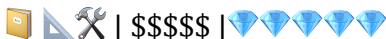
Within communities, deploy connectivity and distribution fibre and make it available on an open-access, wholesale basis to telecom, cable, and wireless service providers as well as enterprise clients. To utilize the fibre assets, interested providers would have to light (add opto-electronics to) the fibre. Once lit, service providers could provide symmetric Internet services at rates up to 40 Gb/s over the infrastructure. Mobility and fixed wireless providers could access the fibre to improve connections to their towers and leverage the capacity to improve cellular and fixed wireless services available off the towers. Larger enterprise clients may wish to use the dark-fibre to establish secure, very high-speed links between their facilities. Summary arguments for the dark fibre approach appear in Table 8.

Table 8. Option 4(d) – Dark Fibre-to-the-Premise

Dark Fibre-to-the-Premise
<p><b>Examples:</b> Large dark-fibre deployments are underway in Calgary and have been completed in Coquitlam, New Westminster, and Campbell River. On a smaller scale, the Olds Institute for Community and Regional Development (OICRD) established a dark-fibre network in Olds, Alberta.</p>
<p><b>Pros:</b> Enhances economic development through improved residential and business attraction across the County.</p> <p>Helps prevent or eliminate downward trends in population and business activity.</p> <p>Scope and ubiquity is only limited by County priorities and financial capability.</p> <p>Solution is fully scalable to meet all future bandwidth requirements of both the County and the residential and business communities.</p> <p>Less perception of government competing in private industry as the infrastructure will support local ISPs as well as the traditional incumbent providers.</p> <p>Minimizes operational issues, complexity, and risk as no opto-electronics are involved.</p>

<p>Provides scale-efficiencies with respect to deployment and management of the dark-fibre assets.</p> <p>Provides attraction for local ISPs to invest in infrastructure – active network components.</p> <p>Enables ISPs to provide higher speed and more reliable Internet services to many users, including businesses.</p> <p>Maximizes the opportunities for ISPs to competitively differentiate themselves.</p> <p>Potential for colocation revenue in the fibre centres established to support the dark-fibre infrastructure.</p> <p>Optimizes the potential for incumbent providers to use the network, whether to improve their mobility offerings, or to support 5G deployments.</p> <p>County can access the infrastructure to meet all its internal connectivity requirements.</p> <p>Enables large enterprise clients to deploy very high-speed links between local facilities.</p>
<p><b>Cons:</b> The large capital cost to the County.</p> <p>Many local ISPs are not set up to light and run fibre networks.</p> <p>Though small relative to the dark-fibre investment, the required opto-electronics investment may be significant to smaller ISPs.</p> <p>In rural areas, once one ISP has lit the fibre, there may not be sufficient incentive for other ISPs to come in – leaving the initial ISP with a de facto monopoly in the area.</p> <p>County control over service levels provided by the ISPs is limited.</p> <p>In larger centres, multiple providers implies multiple sets of active network electronics, resulting in capital inefficiency.</p> <p>The County will not be able to leverage the multi-wavelength potential of current FTTP opto-electronic systems.</p>
<p><b>Risks:</b> Based on the substantial investment required by the ISPs, the County could be in a situation where a substantial amount of County dollars are spent and there are no actual ISP users.</p>
<p><b>Risk Management:</b> Identify at least one ISP provider that is able to light the network and provide services prior commencing deployment.</p>

## (e) Lit Fibre-to-the-Premise



Within communities, deploy lit connectivity and distribution fibre and make it available on an open-access, wholesale basis to telecom, cable, and wireless service providers as well as enterprise clients. Once lit, service providers could provide symmetric Internet services at rates up to 40 Gb/s over the infrastructure. Mobility and fixed wireless providers could access the fibre to improve connections to their towers and leverage the capacity to improve cellular and fixed wireless services available off the towers. Larger enterprise clients may wish to use the dark-fibre to establish secure, very high-speed links between their facilities. Summary arguments for the lit fibre approach appear in Table 9.

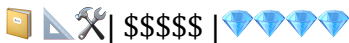
Table 9. Option 4(e) – Lit Fibre-to-the-Premise

Lit Fibre-to-the-Premise
<p><b>Examples:</b> Lit, open-access, utility FTTP infrastructure is being actively pursued in the Counties of Clearwater and Big Lakes, the Towns of High Prairie, High River, and Vermilion, among others.</p>
<p><b>Pros:</b> Enhances economic development through improved residential and business attraction across the County.</p>



<p>Scope and ubiquity is only limited by County priorities and financial capability.</p> <p>Solution is fully scalable to meet all future bandwidth requirements of the County and the residential and business communities.</p> <p>Less perception of government competing in private industry as the infrastructure will support local ISPs as well as the traditional incumbent providers.</p> <p>Provides the County with maximum control over the infrastructure and the services offered over it.</p> <p>Provides scale efficiencies with respect to deployment and management of the lit fibre assets.</p> <p>Minimizes the investment and risk required by ISPs interested in providing services.</p> <p>Enables ISPs to provide higher speed and more reliable Internet services to many users, including businesses.</p> <p>Maximizes competition in the services space, leading to innovation and enhanced opportunities for entrepreneurial development in the services space.</p> <p>County has full access to the infrastructure to meet all its current and future internal connectivity requirements.</p> <p>The County can fully leverage the multi-wavelength potential of current FTTH opto-electronic systems.</p> <p>Even with the lit model, dark-fibre services can be provided to those suppliers requiring it.</p>
<p><b>Cons:</b> A larger capital cost than that required for the dark-fibre network. The perception that the County is entering a private industry marketplace.</p> <p>Minimizes the number of opportunities for the ISPs to competitively differentiate themselves.</p> <p>Increased cost and operational complexity, both due to the management of the opto-electronics and to meeting the operational needs of the ISPs using the network.</p>
<p><b>Risks:</b> The network requires the ISPs to provide retail services to users. The County could be in a situation where a substantial amount of County dollars are spent and there are no actual users.</p>
<p><b>Risk Management:</b> Identify at least one ISP provider that agrees to provide retail services prior to commencing deployment.</p>

## Option 5 – Become a Retail Services Provider



Deploy both lit backhaul and access fibre throughout selected areas of the County as in Option 4 and then deploy a full-set of County-supported retail services (Internet, telephone, and television) to residents and businesses throughout the County. All network operations and retail services operations could be outsourced. Summary arguments for this approach appear in Table 10.

Table 10. Option 5 – Become a Retail Services Provider

Become a Retail Services Provider
<p><b>Examples:</b> When the OICRD was unable to attract retail providers to supply services over its dark-fibre network, it established O-Net to both light and provide services over its network. An integrated fibre network and services solution was developed for the Town of Valleyview – but unfortunately interest waned once their CAO moved on.</p> <p>The Incumbents and wireless ISPs.</p>
<p><b>Pros:</b> Full control over all aspects of network and service operations, including coverage, pricing, and quality.</p>



<p>Reduces operational complexity associated with multiple providers using one network and improves operational efficiency.</p> <p>Increased overall profitability and margins.</p> <p>All proceeds from the operation would accrue to the County.</p> <p>Obviates the risk of not being able to attract a service provider.</p>
<p><b>Cons:</b> The large capital cost and increased operational complexity.</p> <p>The perception that the County is entering a private industry marketplace and directly competing in both the network and services space.</p> <p>All technical, deployment, market, and operational risk resides with the County.</p>
<p><b>Risks:</b> Poor execution could lead to cost over-runs and an operational model which is not sustainable.</p>
<p><b>Risk Management:</b> Management and operational complexity can be minimized by outsourcing network and service operations to an experienced provider.</p>

## Acronyms

AP	(radio) access point
CRTC	Canadian Radio-television and Telecommunications Commission
FOTP	fibre-to-the-premise
FOTT	fibre-to-the-tower
FWA	fixed wireless access
Gb/s	gigabits (10 <sup>9</sup> bits) per second
IoT	Internet-of-things
ISP	Internet Service Provider
k	kilo, thousand (10 <sup>3</sup> )
MD	Municipal District
POP	point-of-presence
PPP	Private-Public-Partnership
PTP	point-to-point