Broadband Vision Report

March 2, 2021

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1. Introduction

The Town of Snowmass Village (TOSV) is exploring the costs and benefits of various levels of involvement in the management of future telecommunications, smart city technologies, and possibly even municipal broadband options. The Town understands that it needs to create a long-term Vision to address the community's goals for advanced communication and smart city outcomes. Additionally, the Town understands that it is critical to understand community will and Town Council wants/needs. It also understands the importance of assessing local technology assets to determine how these assets can best be leveraged, as well as identifying available DOLA grants/other funding sources.

In July of 2020, Town leaders selected HR Green to complete a multi-phase project that included a Visioning Study. At the conclusion of the Visioning Study, the Town will have a high-level telecommunications master plan for the community and that it will be prepared to submit an application to DOLA to fund a full feasibility study to support implementation of necessary infrastructure.

This Visioning Study will help the community explore whether municipally operated retail broadband is a viable option for the community. Given the level of telecommunications activity in the region (e.g., Aspen, Project Thor, Council of Governments) and statewide, as well as Holy Cross Energy's initiative, Snowmass Village will have the option to be a stakeholder rather than creating a municipal broadband solution. This Visioning Study will help clarify the community's inclination.

During the Visioning Study, HR Green walked Town staff through the process to develop a vision of the future for planned Fiber and Commercial Broadband deployments. In general, communities considering broadband deployments typically share common objectives when considering an investment in a broadband network. In our experience, most communities have some or all of the following goals:

- Ubiquity
- Affordability
- Consumer choice
- Competition in the market
- Ownership and control of assets
- Performance
- Risk aversion
- Positive cash flow

Choosing which goals to prioritize can be challenging, as some of these objectives can be complementary, while others lie in strict opposition. Our work helped the Town surface these competing objectives and provided the staff with a sound footing upon which to base its future decisions.

On September 14, 2020, a Vision Working Session was conducted with the Town Council. Several weeks prior to the Session, a two-part Vision Exercise Survey (Part 1: Vision Survey and Part 2: Competing Values Survey) and supporting materials were shared with the members of the Town Council and the Town's leadership staff. We sincerely appreciated the successful efforts of each participant to review the supporting materials and complete the Survey.

The Agenda for the September 14, 2020, Vision Working Session included a project progress update that focused on the findings from Outreach Meetings with Town staff, anchor institutions, neighboring communities, and community partners. The Agenda also included a review of the Town Council Vision Survey findings, a review of Broadband Service Models, a review of the findings from the Competing Values Survey of Town Council, and a look at the project's next steps. The outcomes from the Session contributed to the recommendations listed at the end of this report.

2. Outreach Meetings

During August 2020, outreach meetings took place with Town stakeholders, anchor institutions, and businesses. The various goals of these meetings included identifying community expectations, evaluating existing infrastructure, and collaborating with neighboring communities and regional entities.

Outreach meetings were held with the following stakeholders:

Town Staff

- Town Attorney
- IT Manager
- Public Works Director
- Community Development Director
- Tourism Director
- Assistant Town Manager
- Project & GIS Manager

Anchor Institutions

- Aspen School District
- Pitkin County Regional Emergency Dispatch Center

Neighboring Communities

- City of Aspen
- Town of Carbondale
- Pitkin County

Businesses

- Aspen Skiing Company
- East West Partners

(Insert list of invitees that did not participate or respond here)

Key Findings

Here is a summary of some of the key findings from the outreach meetings.

- It is important to be able to deliver services from the entry into Snowmass Village up to and including the Ski Mountain.
- Our guests expect connectivity. A world-class guest service experience includes reliable internet.
- Improving coverage in areas that do not have good connections should be a priority.
- Options for service should be encouraged to help costs stay competitive.
- Access to internet services is crucial to our tourism industry in both the summer and the winter.
- Reliable and resilient broadband infrastructure would provide service to educational, health care, and public safety agencies who rely on this service to serve the community.
- Backhaul of cellular signals is a growing concern particularly as small cells and 5G are implemented, which drives the need to improve fiber infrastructure.
- Need a "plan" that does not compromise the core values of the community.
- Broadband speeds are a growing concern for businesses, residents, students, and people working from home (made even worse during the pandemic).
- It is extremely important to understand the impacts of wireless services.
- Current cable and telephone services in the Town are overwhelmed with the demand placed on their networks, especially during peak seasons and events.

- Town would like to have its own fiber / conduit infrastructure to interconnect its facilities and to potentially lease to providers for interconnecting their facilities.
- Town needs a colocation or dig once policy.

3. Vision Survey

Prior to the September 14, 2020 Town Council Vision Working Session, HR Green developed and sent to all five Council Members a two-part Vision Exercise Survey and supporting materials. The first part of the Vision Exercise Survey, the Vision Survey, included questions about the level of importance Council would rate statements regarding high-speed internet and cell phone coverage in the Town.

Questions and Key Findings

Here are the Vision Survey questions and responses (key findings) from the five members of the Town Council.

Question 1: Please indicate the level of importance that Snowmass Village residents, guests, and businesses have access to high-speed internet.
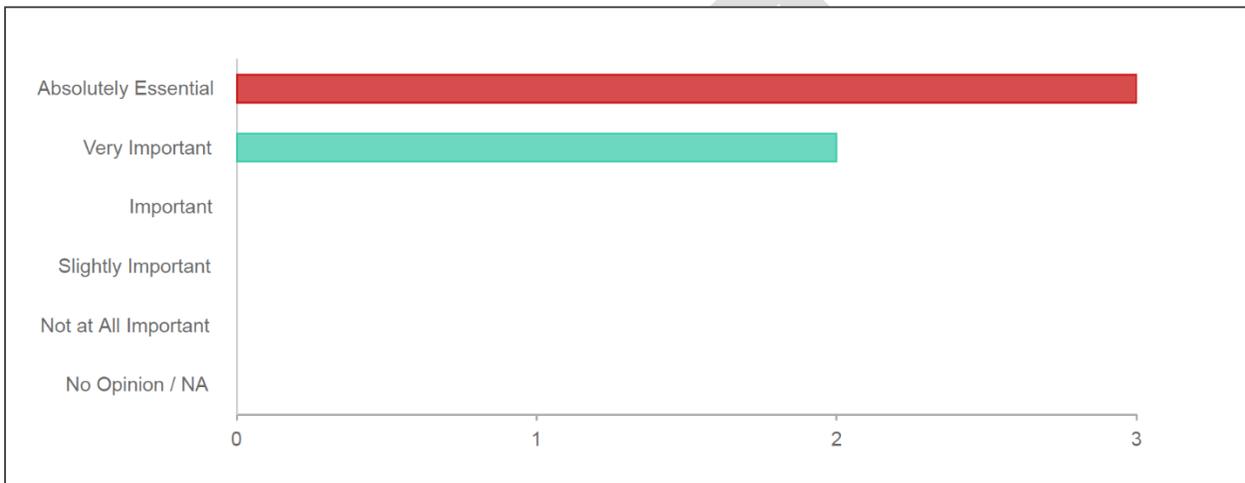
Question 1 Findings: The survey results indicate that Council views that access to high-speed internet is essential to the Town.

Question 2: Please indicate the level of importance of high-speed internet options in Snowmass Village are accessible and affordable to all.
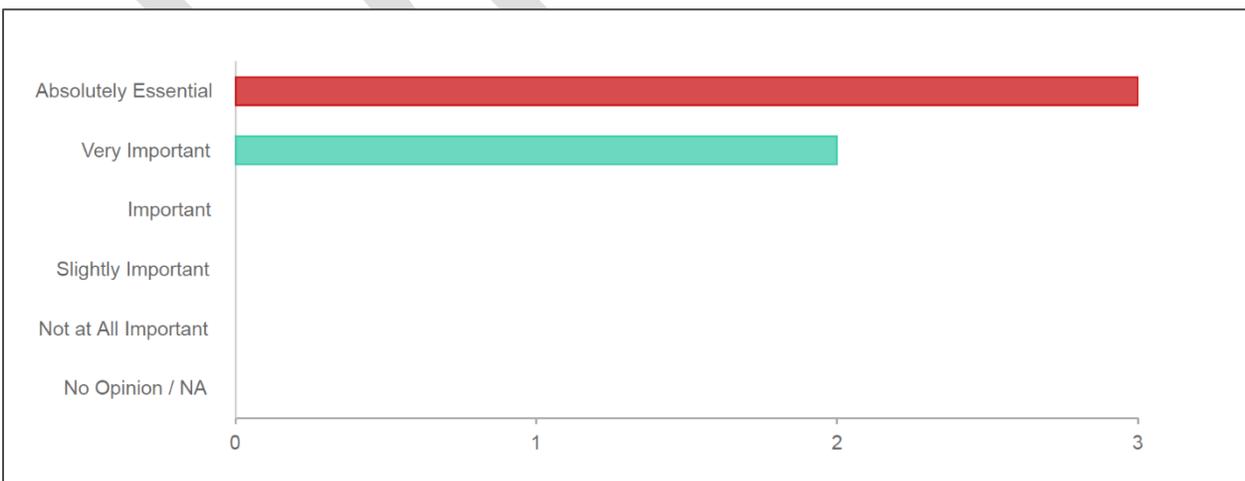
Question 2 Findings: The survey results indicate that Council views that it is essential to the Town that high-speed internet options in Snowmass Village are accessible and affordable to all.

Question 3: Current cell phone coverage is adequate in the core of Snowmass Village.
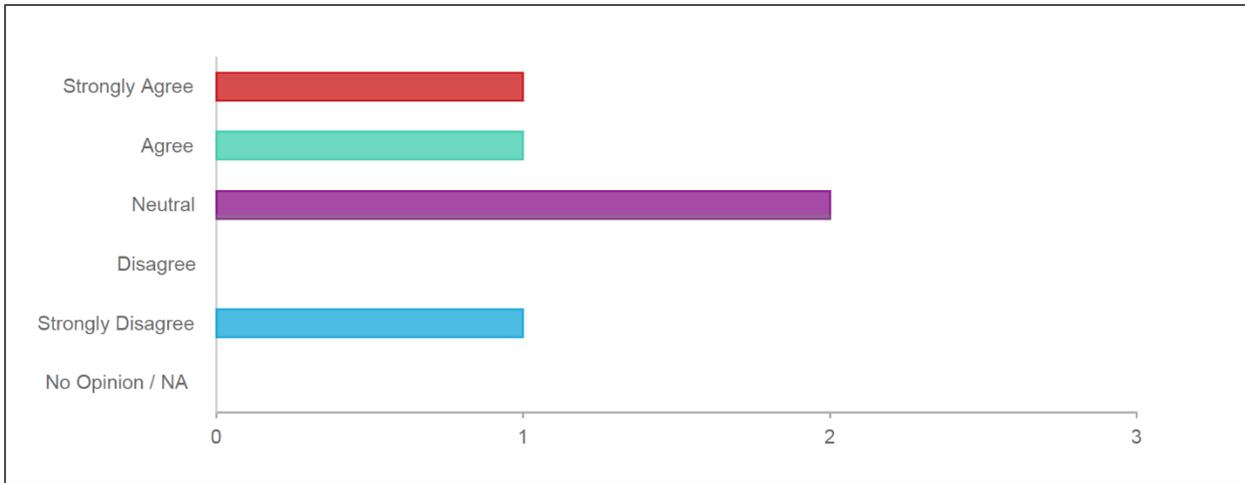
Question 3 Findings: The survey results indicate that Council has various views regarding the cell phone coverage in the core of Town. When asked about this feedback, Council members that live closer to the downtown area felt they had adequate coverage, but those that live further away from the downtown area did not feel that way.

Question 4: Cell phone coverage is adequate in the residential areas of Snowmass Village.
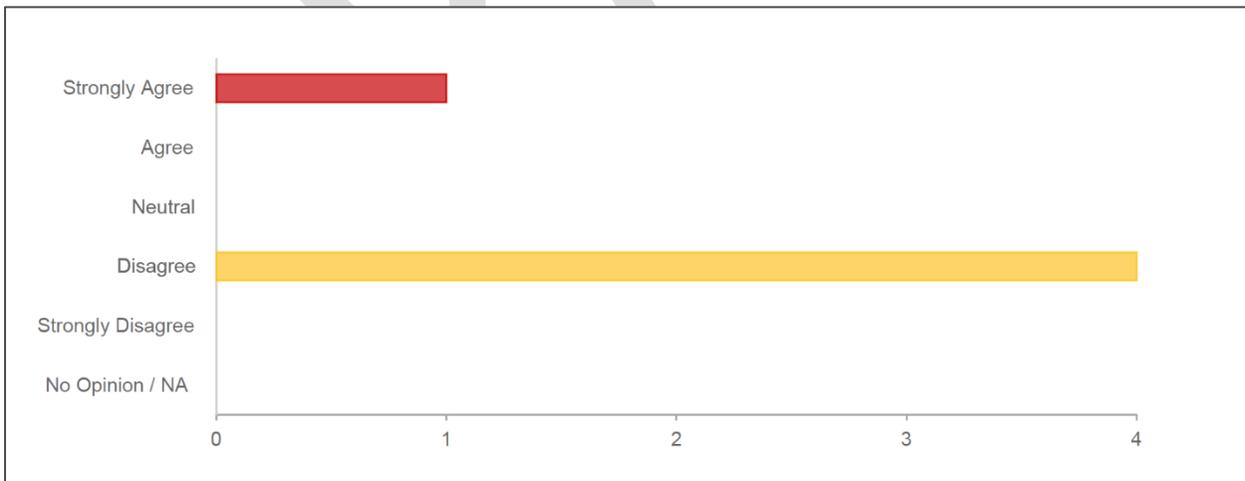
Question 4 Findings: The survey results indicate that 4 out of 5 Council members do not feel that there is adequate cell phone coverage in the residential areas of Snowmass Village.

Question 5: Cell phone coverage is adequate on Snowmass Mountain and in remote recreation areas in Snowmass Village.
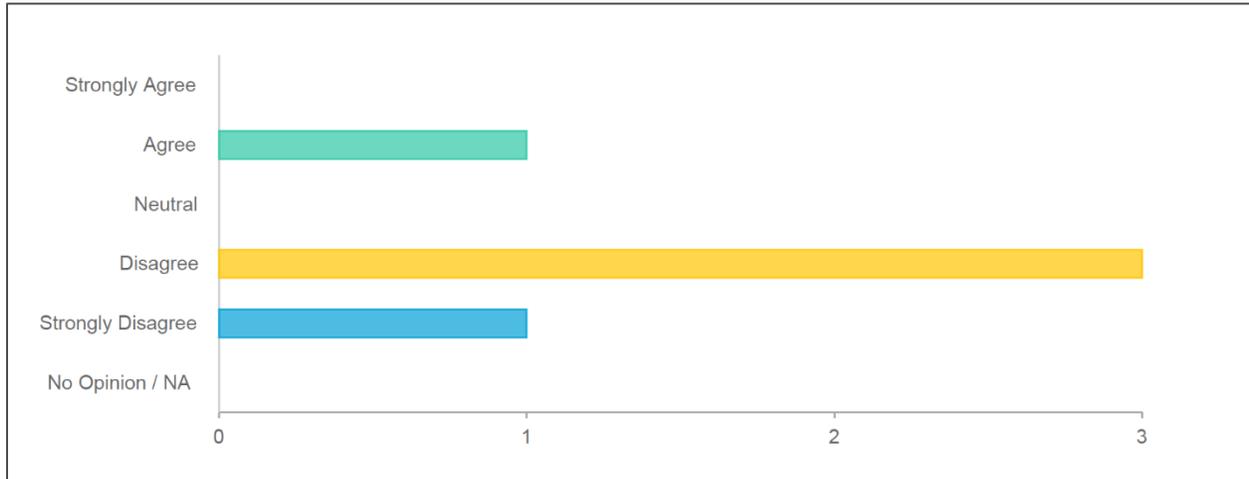
Question 5 Findings: The survey results indicate that 4 out of 5 Council members do not feel that there is adequate Cell phone coverage on Snowmass Mountain and in remote recreation areas in Snowmass Village.

Question 6: Broadband infrastructure and cell phone equipment should not be highly visible in Snowmass Village.
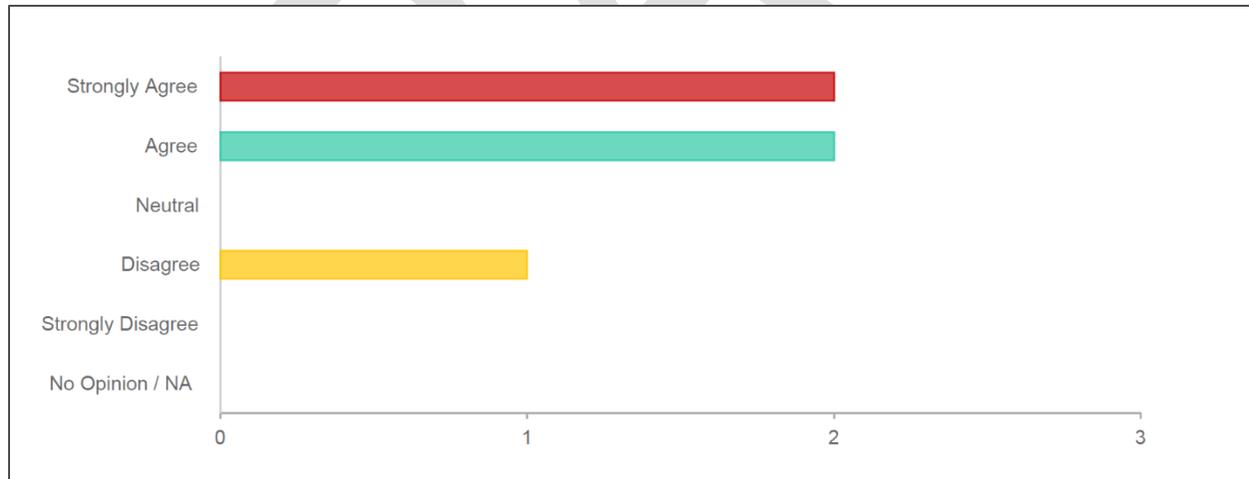
Question 6 Findings: The survey results indicate that 4 out of 5 Council Members agree that broadband infrastructure and cell phone equipment should not be highly visible in Snowmass Village.

Question 7: The Town should encourage and/or enable the deployment of internet and telecommunication services in Snowmass Village.
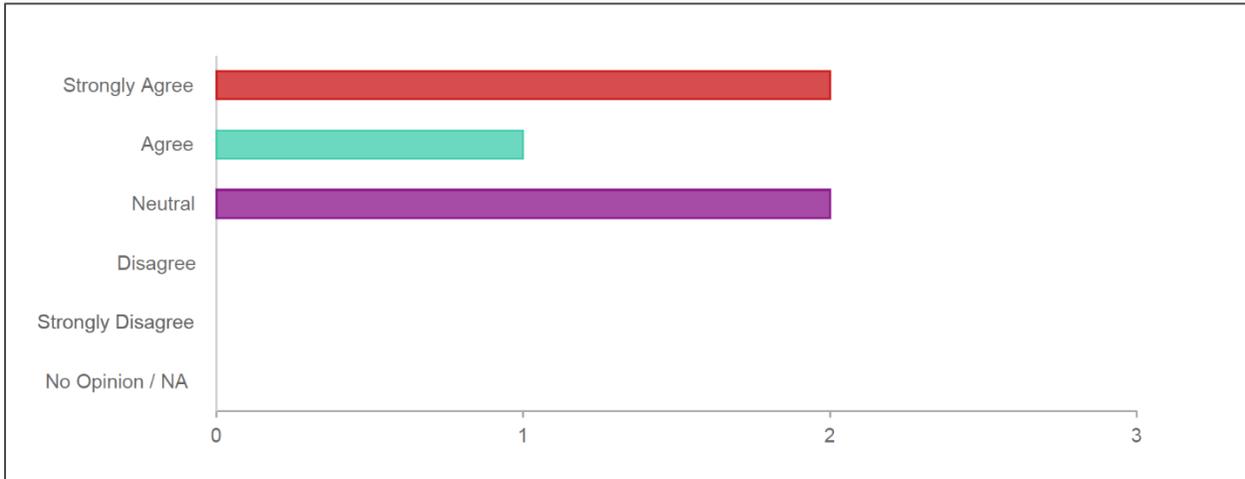
Question 7 Findings: The survey results indicate that 3 out of 5 Council Members agree that the Town should encourage and/or enable the deployment of internet and telecommunication services in Snowmass Village.

Question 8: What do you see as the biggest opportunities for Snowmass Village to enhance internet and communication services? And why?

Question 8: Responses (Findings)
The biggest opportunity is to create a system to attract visitors and part time residents to the town who can stay longer in town because they have fast internet connections to their home or work. Increasing the length of stay and generating more revenue for the town.
I think this project is too large for a town the size of TOSV. It would require taxpayer approval for bonding. Unlikely in today's environment.
Most people have moved away from land lines and are more reliant on cell coverage and we need to make sure we can provide adequate service to the various areas of the village. Also, strong internet and communication services will make it easier for people to spend time here because connection is not an issue. It is hard to attract visitors for longer periods of time when it is not easy for them to connect to work, etc.
Improve productivity for those running their own businesses, as well as commercial businesses. Once available, major marketing opportunities for resort in promoting our product, such as group sales.
Allow state of the art facilities but not to the point of creating clutter.

Question 9: What are your biggest concerns for Snowmass Village in regards to the future of broadband internet and telecommunication services? And why?

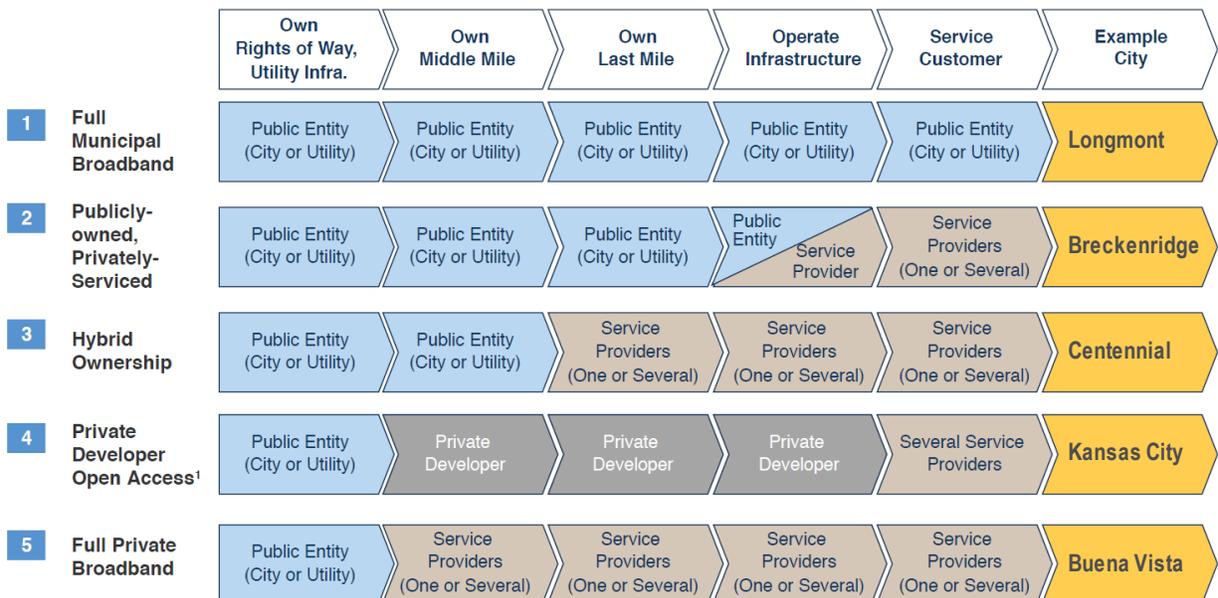| Question 9: Responses (Findings) |
|---|
| While more and more people get rid of their land lines and only use cellular service it is very important to have good coverage in all areas of the village. However, I am very concerned about 5G and the potential health impacts. This should be a very important consideration. As we have seen with COVID, more and more people need to be able to connect wherever they are and while I agree that this is extremely important, we also need to better understand the impacts of such service. |
| Too many cell sites cluttering up streets. |
| The largest concern is for unregulated growth of the technologies. TOSV needs a standardized repeatable system in place before these technologies go from infancy to full blown necessity. |
| Safety. Some health studies report impact of potential radiation. |
| Like much of the infrastructure in TOSV, we overbuild so that at peak population (winter and summer guest seasons) our infrastructure can handle the crowds then when they leave the infrastructure is not representative of a small mountain town. Where will competition come from? We are a small community. Without competition how can we keep rates affordable? By owning the assets, the municipality is put in a position to upgrade equipment as the industry evolves. This requires additional personnel to keep up with changes and additional reserves. How quickly is the industry evolving? |

4. Broadband Service Models

During the Vision Working Session with Town Council on September 14, 2020, various Broadband Service Models based on the following information were discussed. Please note that the following information about Broadband Services Models was included in the Vision Exercise Survey materials that were shared with the Town Council prior to the Vision Working Session.

The following information is from a guide created by *US Ignite* in July of 2020 for communities considering ways to expand broadband service. The guide, titled **Broadband Models for Unserved and Underserved Communities**, includes models for fully private and fully public broadband networks, but also covers a growing range of municipally enabled broadband strategies that rely on a combination of public and private investment. It is intended to help communities understand how much capital is needed for different models of deployment, what returns to expect, and finally how to avoid the most common pitfalls.

Five Models

There are several models for fully private and fully public broadband networks, plus a growing range of municipally enabled broadband strategies that rely on a combination of public and private investment. Despite the many ways that municipalities have gone about implementing their broadband programs, there are five main ways to do it, each requiring a different level of investment and engagement from the municipality. The five models are shown in the following chart.

City Main Business Model Options for Broadband Expansion

	Own Rights of Way, Utility Infra.	Own Middle Mile	Own Last Mile	Operate Infrastructure	Service Customer	Example City
1 Full Municipal Broadband	Public Entity (City or Utility)	Public Entity (City or Utility)	Public Entity (City or Utility)	Public Entity (City or Utility)	Public Entity (City or Utility)	**Longmont**
2 Publicly-owned, Privately-Serviced	Public Entity (City or Utility)	Public Entity (City or Utility)	Public Entity (City or Utility)	Public Entity / Service Provider	Service Providers (One or Several)	**Breckenridge**
3 Hybrid Ownership	Public Entity (City or Utility)	Public Entity (City or Utility)	Service Providers (One or Several)	Service Providers (One or Several)	Service Providers (One or Several)	**Centennial**
4 Private Developer Open Access[1]	Public Entity (City or Utility)	Private Developer	Private Developer	Private Developer	Several Service Providers	**Kansas City**
5 Full Private Broadband	Public Entity (City or Utility)	Service Providers (One or Several)	Service Providers (One or Several)	Service Providers (One or Several)	Service Providers (One or Several)	**Buena Vista**

Note: 1) Private Developer is defined as private company that builds, owns and operates the network infrastructure and offers open access to it to several retail SPs that provide service on the top

Four Key Factors

Generally, there are four key factors that municipalities should consider when making decisions on which municipal broadband model to pursue:

Key Decision Factors	Options	Definition	Impact on Town Decision
Capital Availability	**Good Access to Capital / Funding**	There are sufficient financing sources to fund a significant part of the build	Good capital availability should push the municipality to own / fund a larger part of the project without bringing in private ISPs
	Poor Access to Capital / Funding	There is limited capital / funding availability, so seeking commercial capital will be required to fund the build	
Existing Infrastructure	**Good Existing Infrastructure / Capabilities**	There is an existing public utility with conduit / infrastructure and operating capabilities	Presence of existing infrastructure and/or capabilities should push the municipality to take more control over the project, which provides a "bargaining" chip with ISPs
	Poor Existing Infrastructure / Capabilities	There is no existing utility or there is, but infrastructure and operating capabilities are poor	
Partnership Options	**Viable ISP Partner(s)**	The municipality has attractive demographics or a good value proposition for a third-party ISP	Lack of viable ISP partnerships limits the municipality's options to those models that require a significant involvement from the ISP
	No Partner Options	The municipality is too small, too remote, or otherwise unattractive for a third-party ISP	
Objective and Risk Tolerance	**Community Benefit**	Using the broadband infrastructure to create innovation and benefit the community in non-financial ways	Strong public support towards anchoring the project around community benefits should push the municipality to seek more control / ownership over the infrastructure
	Meeting Financial Goals (High Risk)	Using the broadband infrastructure to meet measurable financial goals while maximizing broadband availability	Focusing on meeting financial goals / targets should push the municipality to more predictable financial models (e.g., third-party driven)
	Meeting Financial Goals (Low Risk)		

Decision Tree

Depending on where municipalities fall on the criteria for the four key factors, there may be a business model that is a more optimal choice for them. To steer municipalities in the right direction the choices have been distilled into the following decision tree that could help communities to develop the best strategy.

Capital Availability	Existing Infrastructure	Partnership Options	Objective and Risk Tolerance	Optimal Business Model	
Good Access to Capital / Funding	Good Existing Infrastructure / Capabilities	Viable ISP Partner(s)	Community Benefits	**Full Municipal Broadband** – maximizes community benefits when capital / infrastructure are available	1
			Meeting Financial Goals	**Publicly-owned, Privately Serviced** – reduces risk when full control over service not as important	2
		No Partner Options	Community Benefits	**Full Municipal Broadband** – maximizes community benefits when capital / infrastructure are available	1
			Meeting Financial Goals	**Full Municipal Broadband** – is the only option when no ISPs will partner	1
	Limited Existing Infrastructure / Capabilities	Viable ISP Partner(s)	Community Benefits	**Publicly-owned, Privately Serviced** – reduces risk in absence of operational capabilities	2
			Meeting Financial Goals, High Risk	**Publicly-owned, Privately Serviced** – maximizes return potential while leveraging ISP partnership	2
			Meeting Financial Goals, Low Risk	**Private Developer Open Access** – limits risk to the municipality but maximizes chances of success w/ISP partner	4
		No Partner Options	Community Benefits	**Full Municipal Broadband** – is the only option when no ISPs will partner but there's capital	1
			Meeting Financial Goals		
Limited Access to Capital / Funding	Good Existing Infrastructure / Capabilities	*Does not matter*		**Hybrid Ownership** – hybrid models are optimal when capital is limited but there's existing infrastructure, regardless of other factors	3
	Limited Existing Infrastructure / Capabilities	Viable ISP Partner(s)	Community Benefits	**Private Developer Open Access** – maximizes municipal control in light of limited funding / infrastructure	4
			Meeting Financial Goals	**Full Private Broadband** – maximizes chances of success while ensuring goals are met	5
		No Partner Options	*Does not matter*	*Limited options, have to go back and seek more capital, likely government funding / subsidies*	

While a decision tree like this may suggest that picking a business model is easy, it is quite the contrary. A decision tree is a good "rule of thumb"; however, there are unique circumstances that each municipality faces and doing a thorough diligence across all potential options should always be the starting point. To do that analysis accurately, a municipality first needs to understand how much capital is required and what the financial returns of the program may be.

Financial Considerations

Municipal broadband programs are long-term investments, and these projects can take up to five to ten years to complete. Fiber is a resilient and future-proof piece of telecom infrastructure, but it is also expensive to deploy. This means investment in fiber is hardly a "no-brainer" for all municipalities. Those looking to invest to close the digital divide in their communities should prepare for payback periods of 15+ years, particularly across smaller and/or rural communities. These paybacks have often deterred interest from the private sector and make careful planning and business analysis critically important for any municipal broadband program.

The capital expenditures (CAPEX) associated with building a fiber-to-the-home network include a range of fixed and variable costs. These include the cost of laying the initial network infrastructure, which could range from $500 to $4,000 per home largely depending on the density of the municipality, as well incremental costs to connect each customer. Costs to connect each customer can include the cable drop to the home, the modem at the home, and the labor cost of the installation. Those could add up to $1,000 for each incremental customer. All-in, capital requirements for a broadband program in a municipality with 100,000 residents could end up around $150M.

Operating costs can vary greatly as well, and those depend on experience and efficiency of the broadband provider, number of synergies with the core municipal staff (if any), and types of services delivered to the customers. Municipalities that want or need to offer TV to its residents must prepare for lower margins given high and rising content costs (although this can be mitigated with Over-The-Top offers). We see municipalities most often budgeting between $40 and $100 of OPEX monthly for each residential subscriber they sign up.

Not all municipalities will have to cover all these costs. Those that bring in a private ISP or developer to help service the customers and/or build the network can split operating costs, capital costs, or both with that third party. In return they would most typically offer free or low-cost access to municipal infrastructure, fixed payments, or some variable revenue share typically tied to the number of subscribers in the municipal broadband program.
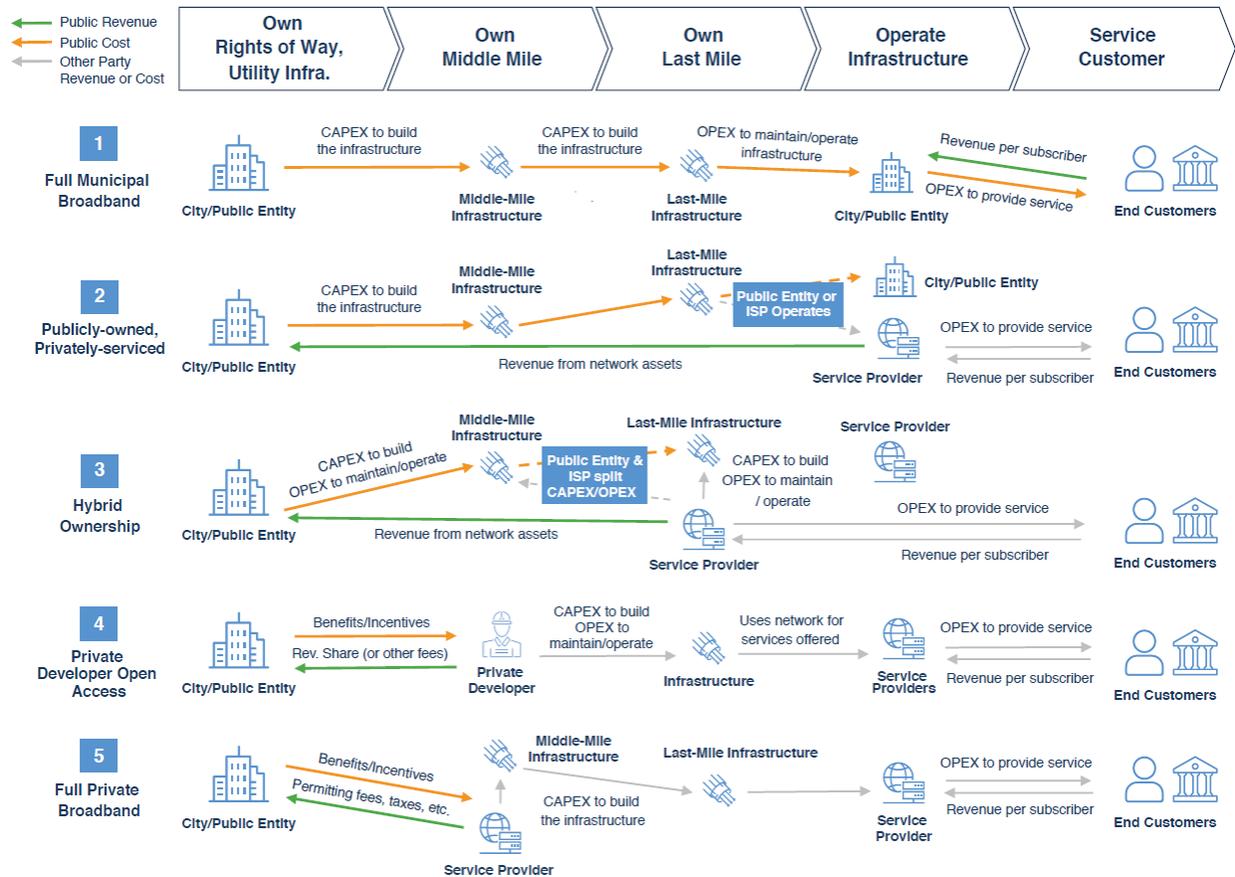
In addition to impacting share of required costs, the business model also dictates the amount of revenue that municipalities can generate from the program. On the high-end, municipalities that deploy and operate Full Municipal Broadband themselves could generate direct revenues of up to $140 per residential customer every month, without considering additional revenue streams from businesses and other anchor institutions. On the low-end, municipalities that choose Full Private Broadband models would generate limited revenues, aside from permitting and tax fees, which could even be waived in many cases to entice private engagement.

It should be clear by the broad ranges quoted above that the financial performance varies greatly not only by the model, but even from municipality to municipality. Using an "average" set of assumptions for a municipality of 100K residents, typical IRRs can be between 9% and 16% for Models 1 and 2, with a significant amount of capital required but also significant cash flow potential once the program is mature. Municipalities that are not ready to take on this amount of risk could pursue hybrid models or fully give up network ownership to third parties – those investments will be relatively low risk, result in high IRRs but also (typically) more limited cash flow upside.

While financial performance varies from municipality to municipality, the inability to budget appropriately is a main reason some programs fail, reinforcing the need to develop a detailed business case as the first step in any municipality's implementation plan.

Four Key Challenges

There are four key challenges common to most municipalities pursuing a municipal broadband program: in addition to poor budgeting, some choose the wrong business model due to a "one-size-fits-all" mentality, struggle to secure adequate funding, or fail to maximize their program's value.

1. **Budgeting**: Detailed budgeting is critical to success. A detailed analysis— including designing a full network plan —is essential during the planning phase. It is also important not to overlook any major sources of costs. Those most typically include labor for delivering the service, managing and maintaining the network, but also costs to support any debt and interest payments. As costs increase, it is also important to be clear-eyed and consider private sector involvement; many private ISPs have much lower operating costs due to their scale and experience, while having private developers build and operate the network can significantly reduce the cost associated with network operations and maintenance.

2. **Funding**: Especially when the total budget is high, securing the right funding may become a roadblock. More "traditional" funding options include soliciting contributions from anchor institutions, selling bonds, enlisting local utility involvement, securing federal and state grants, or asking private partners to co-fund the builds. When those are not an option and/or are not enough, municipalities often get creative. For example, some had their residents contribute money to the program, by either paying for several months of service upfront, or pooling money across neighborhoods and buying bonds from the municipality. Creative approaches like this may work for certain municipalities when securing more traditional funding is not an option.

3. **Diligence**: Even when budgets are finalized and capital secured, it is also tempting to just copy a "success story" from another municipality. Skipping the diligence on evaluating which business model to pursue, however, can lead municipalities down the wrong path. There are numerous examples of municipalities ultimately having to pivot from the initially selected business model because they "dove-in" too quickly.

4. **Related Benefits**: Lastly, when the path is chosen and business model is selected, municipalities should think holistically about how else they can use the program to serve their communities and ensure the network has the architecture to support that plan. For example, while residential service is often the primary motivation, municipalities should not forget about enabling internet access to the commercial sector, which can spur job and value creation. Additionally, while few municipalities have thus far used their municipal fiber to enable "Smart City" solutions, these solutions can spread digital literacy to more residents. And, while the municipality's focus has been on fiber services thus far, there are also scenarios where mobile or fixed wireless broadband are more appropriate for last mile connectivity. Communities should consider where fiber investment is valuable and how it can be tied to other network technologies as needed.

While these challenges are common regardless of the selected business model, Municipalities pursuing models with more municipal involvement are more prone to many of these. To maximize chances of success, special attention should be paid to budgeting and costing, and revenue generation should be prioritized and accelerated to the extent possible. For example, targeting the densest business and residential areas first or starting with commercial-only services is one way to generate a steady inflow of cash to help cover program costs.

Working with the private sector avoids many of the budgeting and costing issues mentioned above, but it brings about a different set of challenges. First, attracting the attention of private ISPs, particularly for smaller municipalities, could be a challenge. Municipalities should be persistent in soliciting private engagement and think creatively about how to entice private cooperation. For example, streamlining permitting and rights-of-way, enabling access to backhaul and middle mile infrastructure (if such exists or can be leased), becoming the anchor institution for the private ISP, or co-sponsoring an "Open Access" network and enlisting a private developer to sign up the ISPs (Model #4) all can improve chances of finding a partner. Once a partner is identified, it is also important to clearly define rules and goals for the program to maintain some degree of control and ensure municipal objectives are met. This is especially true for the "Open Access" programs which require participation of a private developer and one or several ISP partners. These models have been relatively rare in the U.S., but "Open Access" has proven successful in Europe and should be considered as an option for any municipality considering a municipal broadband program today, particularly as it strikes a good balance between providing a municipality the control it needs while also de-risking the investment and operations.

5. Competing Values Survey

During a Vision Study, governing bodies are sometimes confronted with difficult choices regarding competing values. In order to better understand elected official's feelings on these topics the last part of the survey asked questions of Council members regarding competing values for community broadband networks.

Communities considering broadband deployments typically share common objectives when considering an investment in a broadband network. Most communities have some or all of the following goals:

- Ubiquity
- Affordability
- Consumer choice
- Competition in the market
- Ownership and control of assets
- Performance
- Risk aversion
- Positive cash flow

Choosing which goals to prioritize can be challenging, as some of these objectives can be complementary, while others lie in strict opposition. The survey should surface these competing objectives and should provide the staff with a sound footing upon which to base its future decisions.

Prior to the September 14, 2020 Town Council Vision Working Session, HR Green developed and sent to all five Council Members a Vision Exercise Survey and supporting materials. The second part of the Vision Exercise Survey included a Competing Values Survey. The following table was included in the Competing Values Survey materials for the Council members as a tool to help them weigh Ubiquity and Financial Viability and Risk and Complexity. As shown on the table, one objective may have no impact on another (NI), objectives may align (A), or they may conflict (C).

	Ubiquity	Choice	Competition	Ownership	Performance	Affordability	Risk Aversion	Cash Flow
Ubiquity		A	A	A	NI	C	C	C
Choice	A		A	A	A	A	C	NI
Competition	A	A		A	A	A	C	NI
Ownership	A	A	A		A	A	A	C
Performance	NI	A	A	A		NI	A	A
Affordability	C	A	A	A	NI		C	C
Risk Aversion	C	C	C	A	A	C		A
Cash Flow	C	NI	NI	C	A	C	A	

Key Findings

The following chart shows the survey results from the Council members regarding competing values. For each of the paired values an ✦ indicator has been placed between the two competing priorities at the point which most closely matches the beliefs shared by each Council member in the survey. An indicator near the terminal arrow indicates a strong preference for one competing value over its pair, while an indicator near the middle represents a preference but still considering aspects of the competing value.

Competing Values Framework for Broadband Networks

Ubiquity – Service Is Brought to All Areas of a Community – Council members have indicated they feel that ubiquity - which refers to designing and building the network so that it connects every residence, business, and institution in the community - is a key objective.

Affordability – Service Can Be Purchased by Citizens at All Income Levels - Council members indicated that they either support or are neutral about Affordability as a key objective. While this objective is certainly more important for vulnerable portions of the community, affordability is often a necessary objective for localities and cooperatives. Communities may prioritize affordability in an effort to ensure that entrepreneurs and tech startups in its service area can afford the robust connectivity necessary to support their business endeavors.

Constant Speeds (Performance) - The system should deliver Gigabit speeds via fiber to all customers without regard to cost/profit - Council members have indicated they feel that Constant Speeds is a key objective. The Town may find that its fiber to the premise (FTTP) endeavor will struggle and be more prone to failure if it attempts to compete with incumbent providers by offering services similar to existing packages. Instead, it is prudent to recognize gaps in the existing broadband market and seek to fill those with a unique service offering that incumbents are not currently able to provide. A 1 Gbps service that is expandable to 10 Gbps and beyond may be the differentiator the Town needs to stand out.

Outsource (Ownership) - Municipal staff should focus on core services and FTTP services should be delivered by a private partner - Council members have indicated they feel that Outsourcing services is a key objective. The Town may choose to oversee and maintain the network and rely on a private partner to deliver retail services. The Town may also be able to govern price points to support consumer affordability and service speeds to enhance performance. And because the Town would own the network, it would be in control of performance.

City Subsidizes Operations (Cash Flow & Risk Aversion) - If necessary, the Town should carry some of the cost even if this means it must subsidize ongoing operations at a loss - Council members have indicated they feel that City Subsidizing Operations is a key objective. If the Town decides to subsidize services directly, it may find that prioritizing risk aversion and attaining positive cash flow become more difficult. The more debt and responsibility the Town takes on, the higher its risk and the longer it will take for the FTTP network to be cash-flow positive.

6. Vision Working Session

On September 14, 2020, a Vision Working Session was conducted with the Town Council. The outcomes from this Session are reflected in the Recommendations in **Chapter 7** of this Report.

The following is a list of the Session agenda items and highlights of the discussions that took place for each of the agenda items.

Review Existing Infrastructure

- Reviewed the map of the Town's existing streetlight infrastructure.

- Reviewed the map of the Holy Cross Energy's (HCE) infrastructure within the Town. The review included a discussion about a potential new fiber optic cable connection from Highway 82 to HCE's substation located within the Town Limits. Part of the discussion focused on the possibility that this connection could become part of partnership between the Town and HCE, if the Town decides to build some form of a community broadband network.

Review Outreach Meeting Findings

The following feedback from the Outreach Meetings was discussed. Please see **Chapter 2** of this Report for additional information and feedback from the Outreach Meetings.

Feedback
• Problems with cellular service in Town, inside buildings, and on the mountains.
• Potential public safety concerns due to poor wireless coverage in some areas.
• Economic Development is not a driving force behind improved wireless services.
• Topography, aesthetics, and protecting the views are major concerns.
• Backhaul of cellular signals is a growing concern particularly as small cells and 5G are implemented, which drives the need to improve fiber infrastructure.
• Broadband speed concerns for businesses, residents, students, and people working from home (made even worse during the pandemic).
• Need a "plan" that does not compromise the core values of the community.

Review Vision Survey Findings

The following findings from the Vision Survey were discussed. Please see **Chapter 3** of this Report for additional information and findings from the Vision Survey.

- The survey results indicate that Council views that access to high-speed internet is essential to the Town.

- The survey results indicate that Council views that it is essential to the Town that high-speed internet options in Snowmass Village are accessible and affordable to all.

- The survey results indicate that Council has various views regarding the cell phone coverage in the core of Town. When asked about this feedback, Council members that live closer to the downtown are felt they had adequate coverage, but those that live further away from the downtown area did not feel that way.

- The survey results indicate that 4 out of 5 Council members do not feel that there is adequate cell phone coverage in the residential areas of Snowmass Village.

- The survey results indicate that 4 out of 5 Council members do not feel that there is adequate Cell phone coverage on Snowmass Mountain and in remote recreation areas in Snowmass Village.

- The survey results indicate that 4 out of 5 Council Members agree that broadband infrastructure and cell phone equipment should not be highly visible in Snowmass Village.

- The survey results indicate that 3 out of 5 Council Members agree that the Town should encourage and/or enable the deployment of internet and telecommunication services in Snowmass Village.

- What does Council see as the biggest opportunities for Snowmass Village to enhance internet and communication services? And why?

Responses (Findings)
The biggest opportunity is to create a system to attract visitors and part time residents to the town who can stay longer in town because they have fast internet connections to their home or work. Increasing the length of stay and generating more revenue for the town.
I think this project is too large for a town the size of TOSV. It would require taxpayer approval for bonding. Unlikely in today's environment.
Most people have moved away from land lines and are more reliant on cell coverage and we need to make sure we can provide adequate service to the various areas of the village. Also, strong internet and communication services will make it easier for people to spend time here because connection is not an issue. It is hard to attract visitors for longer periods of time when it is not easy for them to connect to work, etc.
Improve productivity for those running their own businesses, as well as commercial businesses. Once available, major marketing opportunities for resort in promoting our product, such as group sales.
Allow state of the art facilities but not to the point of creating clutter.

- What are Council's biggest concerns for Snowmass Village in regards to the future of broadband internet and telecommunication services? And why?

Responses (Findings)
While more and more people get rid of their land lands and only use cellular service it is very important to have good coverage in all areas of the village. However, I am very concerned about 5G and the potential health impacts. This should be a very important consideration. As we have seen with COVID, more and more people need to be able to connect wherever they are and while I agree that this is extremely important, we also need to better understand the impacts of such service.
Too many cell sites cluttering up streets.

Responses (Findings)

The largest concern is for unregulated growth of the technologies. TOSV needs a standardized repeatable system in place before these technologies go from infancy to full blown necessity.
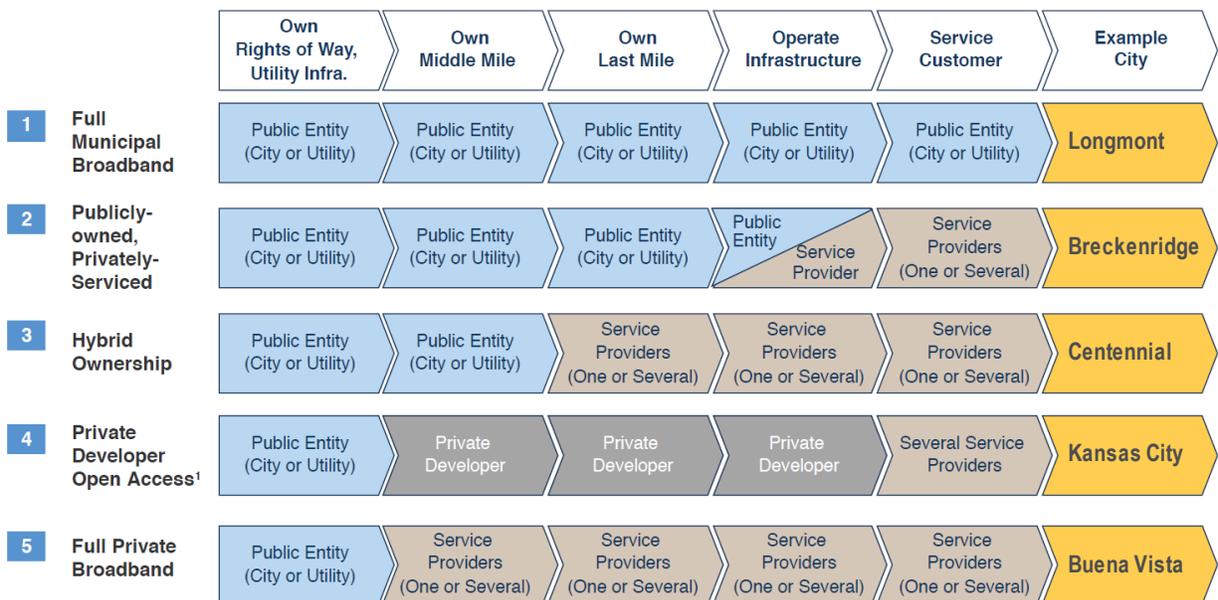
Safety. Some health studies report impact of potential radiation.

Like much of the infrastructure in TOSV, we overbuild so that at peak population (winter and summer guest seasons) our infrastructure can handle the crowds then when they leave the infrastructure is not representative of a small mountain town. Where will competition come from? We are a small community. Without competition how can we keep rates affordable? By owning the assets, the municipality is put in a position to upgrade equipment as the industry evolves. This requires additional personnel to keep up with changes and additional reserves. How quickly is the industry evolving?

Review Broadband Service Models

The five broadband service models shown in the following chart were discussed. Please see **Chapter 4** of this Report for additional information about these broadband service models.

City Main Business Model Options for Broadband Expansion

|		Own Rights of Way, Utility Infra.	Own Middle Mile	Own Last Mile	Operate Infrastructure	Service Customer	Example City
1	Full Municipal Broadband	Public Entity (City or Utility)	Public Entity (City or Utility)	Public Entity (City or Utility)	Public Entity (City or Utility)	Public Entity (City or Utility)	**Longmont**
2	Publicly-owned, Privately-Serviced	Public Entity (City or Utility)	Public Entity (City or Utility)	Public Entity (City or Utility)	Public Entity / Service Provider	Service Providers (One or Several)	**Breckenridge**
3	Hybrid Ownership	Public Entity (City or Utility)	Public Entity (City or Utility)	Service Providers (One or Several)	Service Providers (One or Several)	Service Providers (One or Several)	**Centennial**
4	Private Developer Open Access[1]	Public Entity (City or Utility)	Private Developer	Private Developer	Private Developer	Several Service Providers	**Kansas City**
5	Full Private Broadband	Public Entity (City or Utility)	Service Providers (One or Several)	Service Providers (One or Several)	Service Providers (One or Several)	Service Providers (One or Several)	**Buena Vista**

Note: 1) Private Developer is defined as private company that builds, owns and operates the network infrastructure and offers open access to it to several retail SPs that provide service on the top

Review Competing Values Survey Findings

The following chart that reflects the feedback provided by the Town Council via the Competing Values Survey was discussed. Please see **Chapter 5** of this Report for additional information about the Competing Values Survey.

Competing Values Framework for Broadband Networks
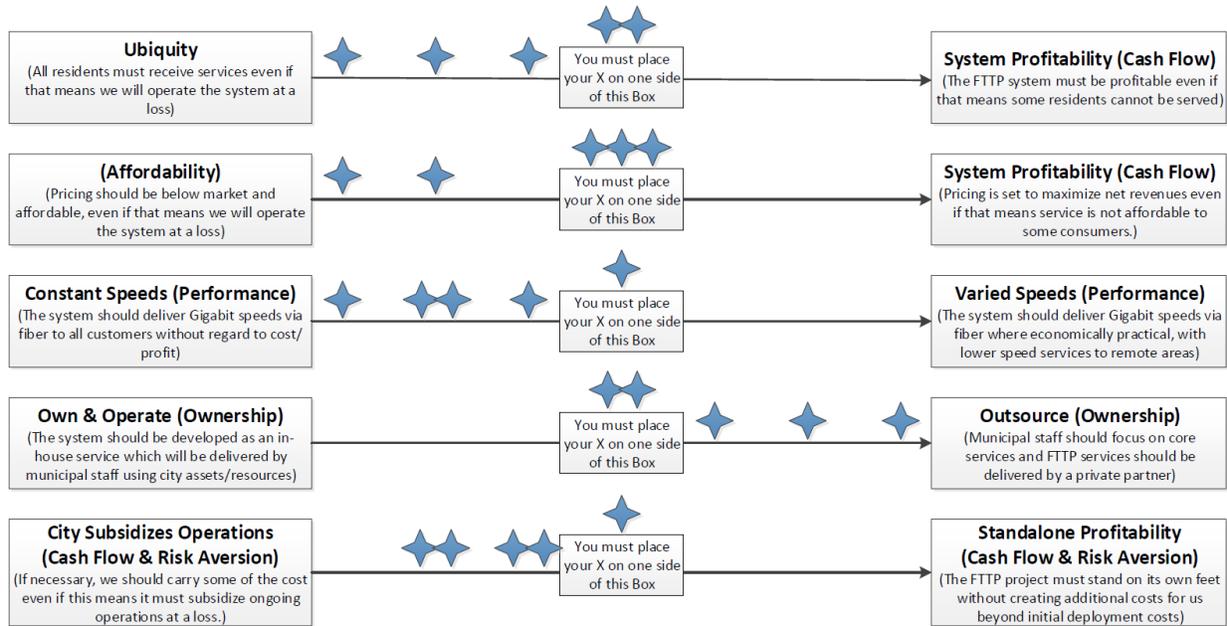
The following summary of Town Council's broadband network key objectives were discussed.

- **Ubiquity** – Service Is Brought to All Areas of a Community – Council members have indicated they feel that ubiquity - which refers to designing and building the network so that it connects every residence, business, and institution in the community - is a key objective.

- **Affordability** – Service Can Be Purchased by Citizens at All Income Levels - Council members indicated that they either support or are neutral about Affordability as a key objective. While this objective is certainly more important for vulnerable portions of the community, affordability is often a necessary objective for localities and cooperatives. Communities may prioritize affordability in an effort to ensure that entrepreneurs and tech startups in its service area can afford the robust connectivity necessary to support their business endeavors.

- **Constant Speeds (Performance)** - The system should deliver Gigabit speeds via fiber to all customers without regard to cost/profit - Council members have indicated they feel that Constant Speeds is a key objective. The Town may find that its fiber to the premise (FTTP) endeavor will struggle and be more prone to failure if it attempts to compete with incumbent providers by offering services similar to existing packages. Instead, it is prudent to recognize gaps in the existing broadband market and seek to fill those with a unique service offering that incumbents are not currently able to provide. A 1 Gbps service that is expandable to 10 Gbps and beyond may be the differentiator the Town needs to stand out.

- **Outsource (Ownership)** - Municipal staff should focus on core services and FTTP services should be delivered by a private partner - Council members have indicated they feel that Outsourcing services is a key objective. The Town may choose to oversee and maintain the network and rely on a private partner to deliver retail services. The Town may also be able to govern price points to support consumer affordability and service speeds to enhance performance. And because the Town would own the network, it would be in control of performance.

- **City Subsidizes Operations (Cash Flow & Risk Aversion)** - If necessary, the Town should carry some of the cost even if this means it must subsidize ongoing operations at a loss - Council members have indicated they feel that City Subsidizing Operations is a key objective. If the Town decides to subsidize services directly, it may find that prioritizing risk aversion and attaining positive cash flow become more difficult. The more debt and responsibility the Town takes on, the higher its risk and the longer it will take for the FTTP network to be cash-flow positive.

Review Project Next Steps

The following project next steps were discussed. It is important to note that during the project Kickoff meeting, the Town asked HR Green to execute the second phase of the project in parallel with the first phase of the project, so the following list of next steps includes tasks from both the first phase and second phase of the project.

- Map priority small cell locations town wide. (COMPLETED)

- Develop draft small cell policy and design standards. (COMPLETED)

- Develop a wireless master concept plan. (COMPLETED)

- Develop public policy recommendations, including a pavement degradation policy, a street cut fee policy, a traffic control policy, and a colocation policy. (COMPLETED)

- Establish a community vision. (Phase 2, Task 1)

- Perform a technology assessment. (Phase 2, Task 2)

- Explore outside funding sources, draft grant applications and/or MOUs. (Phase 2, Task 3)

7. Recommendations

The outcomes from the Vision Working Session with the Town Council, as described in **Chapter 6** of this Report, contributed to the following recommendations. While the recommendations are listed in a sequential order this does not necessarily mean they need to be implemented in this order.
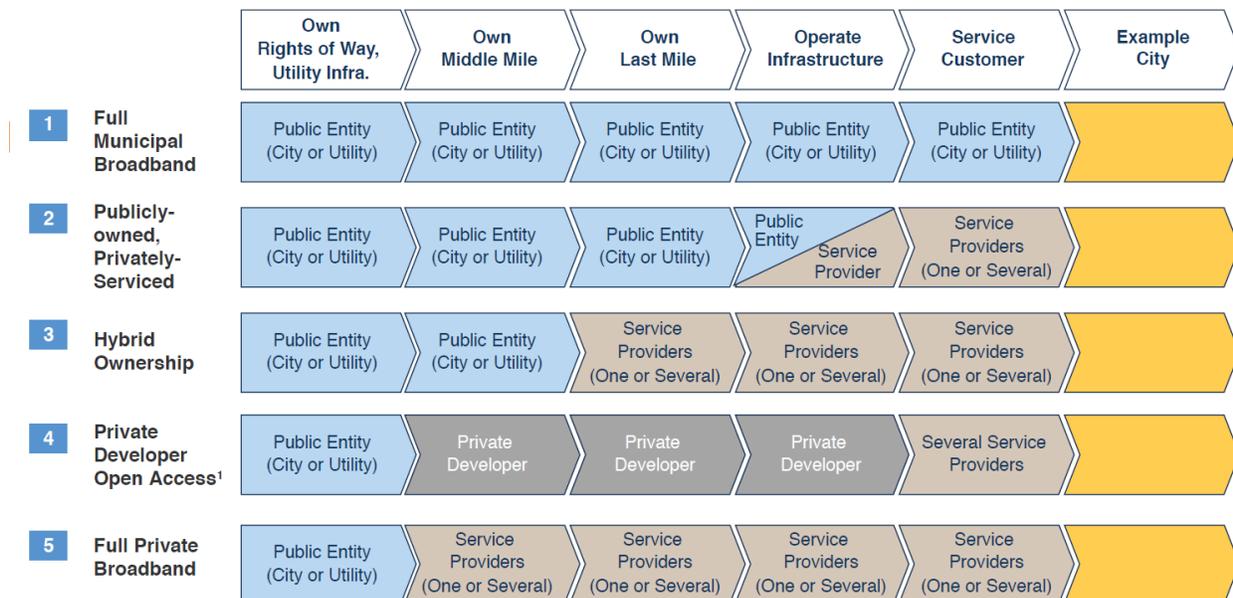
Recommendation #1 – Adopt Community Vision

Town Council, in partnership with Town staff, need to adopt a community broadband vision. Establishing a vision will provide the staff with a sound footing upon which to base its future decisions.

The Town may want to explore the following two broadband service models. These models align with the key objectives that Council said were important to the community via the Competing Values Survey. Please see **Chapter 4** of this Report for additional information about these broadband service models.

2 Publicly owned, Privately-Serviced

- Reduces risk when full control over service is not as important.
- Reduces risk in absence of operational capabilities.
- Maximizes return potential while leveraging an ISP partnership.

3 **3** Hybrid Ownership

- Hybrid models are optimal when capital is limited but there's existing infrastructure, regardless of other factors.

City Main Business Model Options for Broadband Expansion

	Own Rights of Way, Utility Infra.	Own Middle Mile	Own Last Mile	Operate Infrastructure	Service Customer	Example City
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3 Hybrid Ownership	Public Entity (City or Utility)	Public Entity (City or Utility)	Service Providers (One or Several)	Service Providers (One or Several)	Service Providers (One or Several)	
4 Private Developer Open Access[1]	Public Entity (City or Utility)	Private Developer	Private Developer	Private Developer	Several Service Providers	
5 Full Private Broadband	Public Entity (City or Utility)	Service Providers (One or Several)	Service Providers (One or Several)	Service Providers (One or Several)	Service Providers (One or Several)	

Note: 1) Private Developer is defined as private company that builds, owns and operates the network infrastructure and offers open access to it to several retail SPs that provide service on the top

2020. This preliminary network design will become a road map for financial analysis and business modeling, and for future decisions (potentially including detailed engineering, construction, and operations).

Develop Preliminary Network Design Cost Estimates

A cost estimate and supporting documentation for network deployment and interconnection, inclusive of anticipated construction labor, materials, engineering, permitting, quality control and testing will need to be prepared. These estimates should be provided in the form of a cost range and should include a most likely cost with appropriate budget that includes suitable contingencies.

The analysis should provide guidance regarding ongoing costs, medium and long-term needs to refresh and replace equipment and potential revenue sources to support network operations.

Various data points will need to be taken into consideration during the cost estimating process. These included: estimated underground and overhead footage of existing and proposed fiber conduits, total number of splice points, pedestals, and hand holds, total number of fibers, material costs breakout, and labor costs.

Perform a Financial Analysis

A study of the financial feasibility of the project will be performed to determine if a system could be built and operated that meets the Council's goals, while remaining financially self-funding. The financial model will be tested to see if it demonstrates financial viability across 20- and 30-year lifecycles.

The financial model will also be based on the creation of a dark fiber network and subsequent leasing of dark fibers to provider(s) who would extend service to individual homes and businesses.

In addition, the financial model will be based on the preliminary fiber network design and feature the use of current conduit assets and the extension of new fiber and conduit to form a distribution backbone. The model assumes that a private-sector partner will construct and finance individual connections to homes and businesses and will pay lease fees to the Town for the use of the distribution backbone.

Recommendation #3 – Evaluate Funding Alternatives

An initial analysis of the Town's broadband project will need to look at the Town's projected revenue verses expected costs – an examination of whether the revenue that should be generated from the infrastructure can pay for the infrastructure and operational costs that would be incurred. The analysis will need to include a review of funding sources that could help offset infrastructure and operational costs. These grants and other funding options can have significant positive impact on the scope, feasibility, and options of the broadband project.

It should be noted that grant funding and other funding opportunities are a constantly emerging and changing target. The federal government and state legislatures across the country have recognized the need for broadband funding support. The Federal Communications Commission (FCC) and Congress have approved several channels of funding. And state legislatures across the country are working on broadband funding, mostly geared towards the desire to have ubiquitous broadband, specifically in rural areas. The important positive implication of that is there are several opportunities for external project funding that can dramatically improve the financial considerations of broadband projects.

It is also important to maintain awareness of other funding sources. It is not uncommon for an agency (regional, state or federal) to have targeted programs that can provide funding for broadband projects. These can range from utility related topics to community betterment to citizen specific needs to business attraction or retention, block grants, etc.

Colorado Department of Local Affairs (DOLA)

DOLA's Energy and Mineral Impact Assistance Fund (EIAF) program was created to assist **political subdivisions** that are socially and/or economically impacted by the development, processing, or energy conversion of minerals and mineral fuels. Funds come from the state severance tax on energy and mineral production and from a portion of the state's share of royalties paid to the federal government for mining and drilling of minerals and mineral fuels on federally owned land. The creation of the fund is outlined in C.R.S. 34-63-102 (Federal Mineral Lease) and C.R.S. 39-29-110 (Severance). Grant dollars are awarded for the planning, construction, and improvement of public facilities, and for the provision of services by political subdivisions.

Only political subdivisions of the State of Colorado (local governments) are eligible to apply for grants through this program. Local governments must be in compliance with all laws and provisions governing

their operations as well as in compliance with all Department of Local Affairs programs prior to receiving an award. Applicant projects can range from community strategic plans, comprehensive or master plans, and land use codes, to the construction of community capital assets.

Grants can be used for community broadband projects that support local government efforts to provide public institutions, private businesses, and local citizens with access to reliable broadband service at affordable costs. Funding opportunities include **regional planning and interconnectivity**, and **middle-mile Infrastructure**. Additional funding requirements and/or considerations are: Due to the technical complexity of these grants, a more in-depth review by DOLA staff is required, therefore applicants must contact their Regional Manager prior to submitting a grant application, and a 50% match is required for middle-mile infrastructure.

At the time this report was drafted, the Town of Snowmass Village has contingently secured a 50% matching grant.**Colorado Department of Regulatory Agencies (DORA)**

DORA's Broadband Fund exists to connect communities and fuel economic growth in unserved areas across Colorado. The Broadband Deployment Board provides grants through the Broadband Fund to deploy broadband service in unserved areas of the state.

Broadband access has become a crucial factor for economic development in communities across the country. It directly impacts not only local business' ability to operate outside their region but affects residents' access to goods and services like education and healthcare. Communities with broadband access experience real, measurable benefits, and the Broadband Fund seeks to amplify those benefits by enabling more infrastructure projects to kickoff across Colorado.

The Broadband Deployment Board seeks public comment on applications before reviewing and selecting which projects to fund. Grants from the Fund can provide up to 75 percent of infrastructure project costs and may only be awarded to **for-profit entities**, with a few exceptions. The Board awards money from the Broadband Fund according to statutory requirements and Board policy, as well as demonstrated urgency and local commitment to complete the project. These grants are for projects that provide **last mile service**.

Recommendation #4 – Evaluate Potential Partnerships

The model of service identified in this project may need to leverage funding for both core network and last-mile construction available through DOLA and DORA, respectively. This will mean that the town must identify a potential for-profit partner who is interested in leasing the core asset, and in building and managing last mile connectivity. Identifying interested partners, therefore, is an important step to help the Town envision a path forward.

The approach used to engage with potential partners includes building a list of potential partners and other interested parties, developing a request for expressions of interest (EOI), sending the EOI to the list of potential partners, processing responses to the EOI and selecting potential partners based on the level of interest. This approach will create a faster-moving cycle in which partners can be identified and brought to the table more quickly and with a higher likelihood of successful progress.

Recommendation #5 – Complete Formal RFP to Identify Partner(s)

The EOI process conducted as part of the previous recommendation will be useful to determine interested parties but does not provide the Town with enough details to fully determine a proposed partner nor the form of the partnership. It is recommended that the Town conduct a formal request for proposal (RFP) to identify and select its partner(s) for the potential buildout.

Recommendation #6 – Pursue Grant Funding

Most likely for the project to move forward grant funding will need to be identified and committed. It is important to note that DOLA funding can be used for both engineering and final construction expenses. A formal grant application should be submitted as soon as practical to cover final engineering design and construction of the proposed town-owned network.

It is also recommended that the selection of a private partner be timed to allow for coordination of private-sector grant requests to assist with paying for last-mile connectivity. Ideally, a coordinated approach would assure both the private sector and the Town of availability of state funds to complete both the town-owned distribution network and the last-mile connections due to the interdependence of both funding sources to completion of the project.

Recommendation #7 – Construct Core Network

Once a partner is identified and funding is secured, the next step will be to begin the deployment of infrastructure to support broadband improvements. This step can be started as soon as engineering is completed through the selection of a contractor with fiber optic deployment experience. The Town should work closely with its selected private sector partner to ensure that the network constructed meets its required FTTP architecture.