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Fiber-to-the-Premises Financial Forecast and Partnerships

Initial Study

**Prepared for City of Santa Cruz, California
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1 Executive Summary

This report presents a framework of objectives and partnership models, and aims to supplement other materials and efforts to support the City as it pursues a gigabit fiber-to-the-premises (FTTP) network deployment.

The City of Santa Cruz (City) sits on the north side of Monterey Bay, and is south of Silicon Valley—an area known as the center for technical innovation. Many Santa Cruz residents commute “over the hill”, driving California State Route 17 several hours a day to work at jobs in Silicon Valley cities.¹ The City seeks to work in conjunction with a private partner to develop robust connectivity for its residents and businesses, in part to support efforts like teleworking and business retention.

1.1 Project Background

CTC prepared a high-level cost analysis and presentation to help evaluate a potential partner relationship with Cruzio Internet, a Competitive Local Exchange Carrier (CLEC) located in Santa Cruz County. The City is considering moving forward with a partnership arrangement with Cruzio, and seeks to understand potential risks and rewards.

This overview presents some considerations for the City as it determines how best to proceed in a public–private partnership arrangement, including emerging partnership models and potential City objectives. The preliminary analysis considers the financial pro forma documents that Cruzio provided to the City in comparison to high-level financial analysis that CTC conducted.²

1.2 Public and Private Sector Advantages and Disadvantages

The term “overbuild” refers to deploying a network in a market where incumbent providers already serve customers. The new FTTP network competes directly with existing local cable, digital subscriber line (DSL), and other incumbent Internet service providers (ISPs) to offer services to customers.

Generally, fiber overbuilds do not offer a high rate of return, which is why there are not many private sector providers clamoring to build fiber networks in markets where customers are already served. Instead, private and public sector entities that opt to overbuild usually consider alternative reasons and benefits for deploying a new network. These entities focus on other value and drivers that make overbuilding make business sense.

¹ <http://blog.civonomics.com/2014/03/31/santa-cruz-tech-car-commuter-survey-results/>, accessed July 2015.

² There are some discrepancies in assumptions and outcomes between the respective financials that should be investigated and analyzed further in an effort to better understand the City’s overall risk in pursuing this partnership. CTC acknowledges Cruzio’s expertise operating a for-choice Internet service.

For example, a municipality may choose to enter the market as an overbuilder for economic development purposes, such as serving business and research parks. Or, a private entity may opt to overbuild and offer services to supplement other parts of its business. Google Fiber is an example of this: by disrupting the market and incenting other providers to step up their data offerings, Google's other business branches (e.g., web-based services and mobile application development) can potentially thrive. That is, consumers in an environment with greater choice and access to high-speed offerings are more likely to take advantage Google's various other services and products that rely on a robust data connection.

The public and private sector each have unique advantages and disadvantages that will likely impact their ability to undertake a standalone overbuild. A private and public entity could complement one another by developing a partnership that can take advantage of each entity's strengths, and may significantly reduce risk.

For example, a private provider has certain cost advantages that a public entity simply cannot replicate, like buying power with vendors for decreased electronics costs and the potential to reduce or entirely avoid maintenance fees for electronics. Large private providers will often maintain their own inventory of core electronics and share use of electronics over deployments in multiple markets. This is a cost savings and an advantage with which the City is unable to compete, but that may be realized in a partnership. Cruzio would likely need a vendor to stock electronics like core routers, but it likely possesses the internal technical capability to configure and manage the equipment itself.

Most private providers possess internal technical capabilities, and they may share staffing with other deployments. Technical support, sales, customer service, and other personnel may be reallocated to support deployment in a new market, with little to no impact on overhead costs and no need to hire additional staff. For example, a large provider like Comcast does not necessarily have to hire additional staff to support an influx of 20 thousand new customers. It can leverage its existing staff pool, which is already supported by its customer base in other markets.

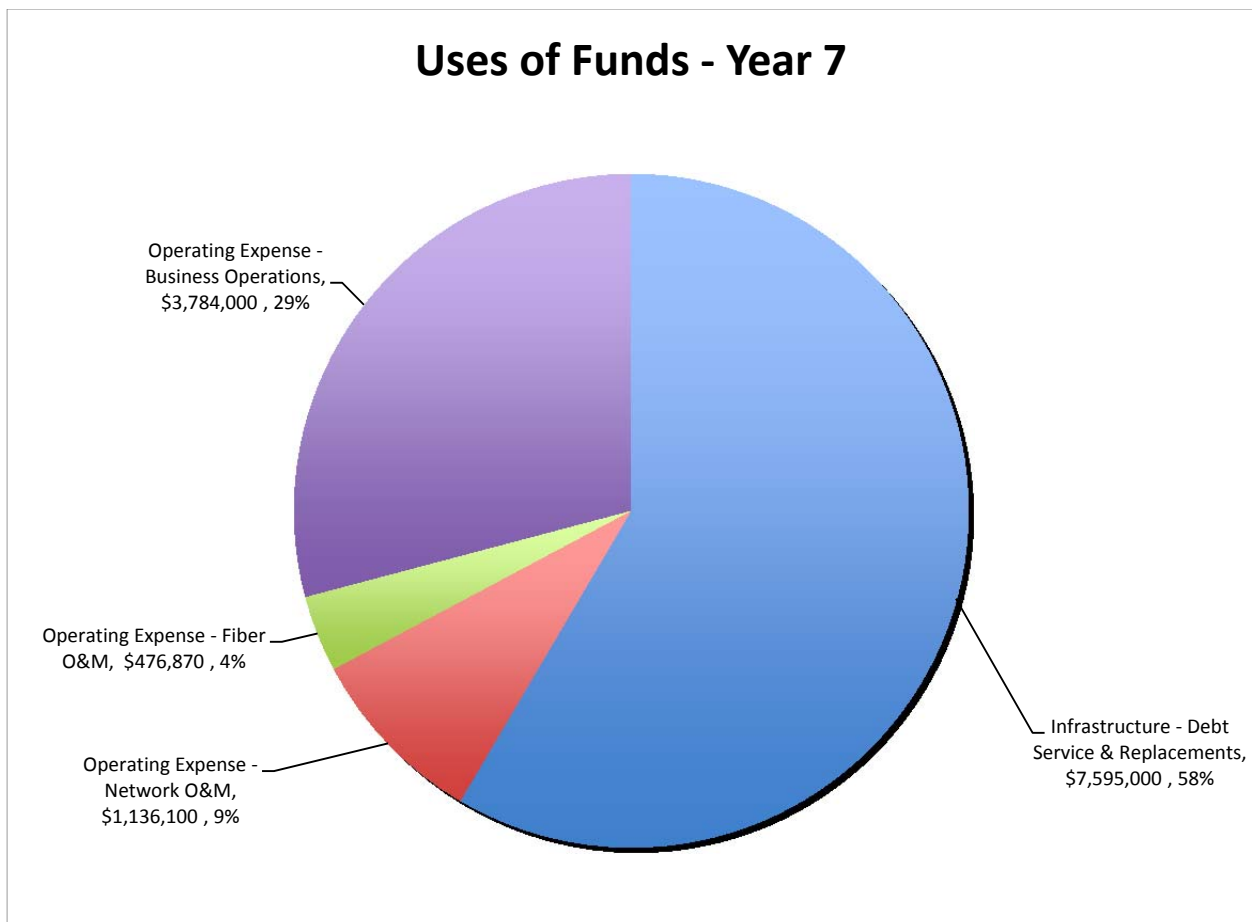
The operational costs that the City can expect to face are greater and more complex than what an established, private-sector entity with economies of scale might incur. Cruzio obviously does not yield the size and market power of a large incumbent like Comcast, and it will need to add and allocate staff to support the partnership. Cruzio does have several advantages in that they already serve a substantial customer base in Santa Cruz and the surrounding communities, and it has existing resources and skills to run an ISP, data connections into Silicon Valley, and an existing data center in Santa Cruz.

1.3 Breakdown of How Capital and Operations Funds are allocated

To illustrate the City’s potential costs, we created a breakdown to show how funds are used. The analysis uses year seven to develop a snapshot of how funds are used because this is the point at which the model has stabilized—for example, the required take rate has been met, the buildout is complete, and the depreciation reserve fund has started. Some expenses follow take rates, some are fixed, and some are step functions—the examples below are set at the 56.7 percent take rate for residents and businesses.

Figure 1 shows that 58 percent of the funds in year seven go toward infrastructure: debt service for the capital investment (fiber, startup funds, and network electronics), and asset replenishment (the depreciation reserve fund which is used to pay for network upgrades and replacements).

Figure 1: Breakdown of How Funds are used in Year 7



Of the remaining uses of funds, 29 percent is estimated for operating the business, 9 percent is estimated for network electronics operations and maintenance (O&M), and 4 percent is estimated for fiber O&M—for a total of 42 percent in estimated operating expenses.

1.3.1 Infrastructure Costs

Figure 2 shows that debt service, or principle and interest (P&I), payments account for 65 percent of infrastructure costs. The depreciation reserve fund, which is used to pay for the cost of replacing infrastructure and equipment, accounts for 35 percent of infrastructure costs.

The public sector has an advantage over the private sector for 65 percent of infrastructure costs—38 percent of total uses of funds (65 percent of 58 percent of total uses of funds). This is because fiber is a long-term investment that is typically best suited for the public sector. Although the private sector has some buying power advantages, the public sector needs only to break even, and it is better positioned to make a long-term investment. It does not have to show a 10 percent or higher rate of return on the investment over 20 to 30 years—a public entity simply needs to break even.

Figure 2: Infrastructure Costs in Year 7

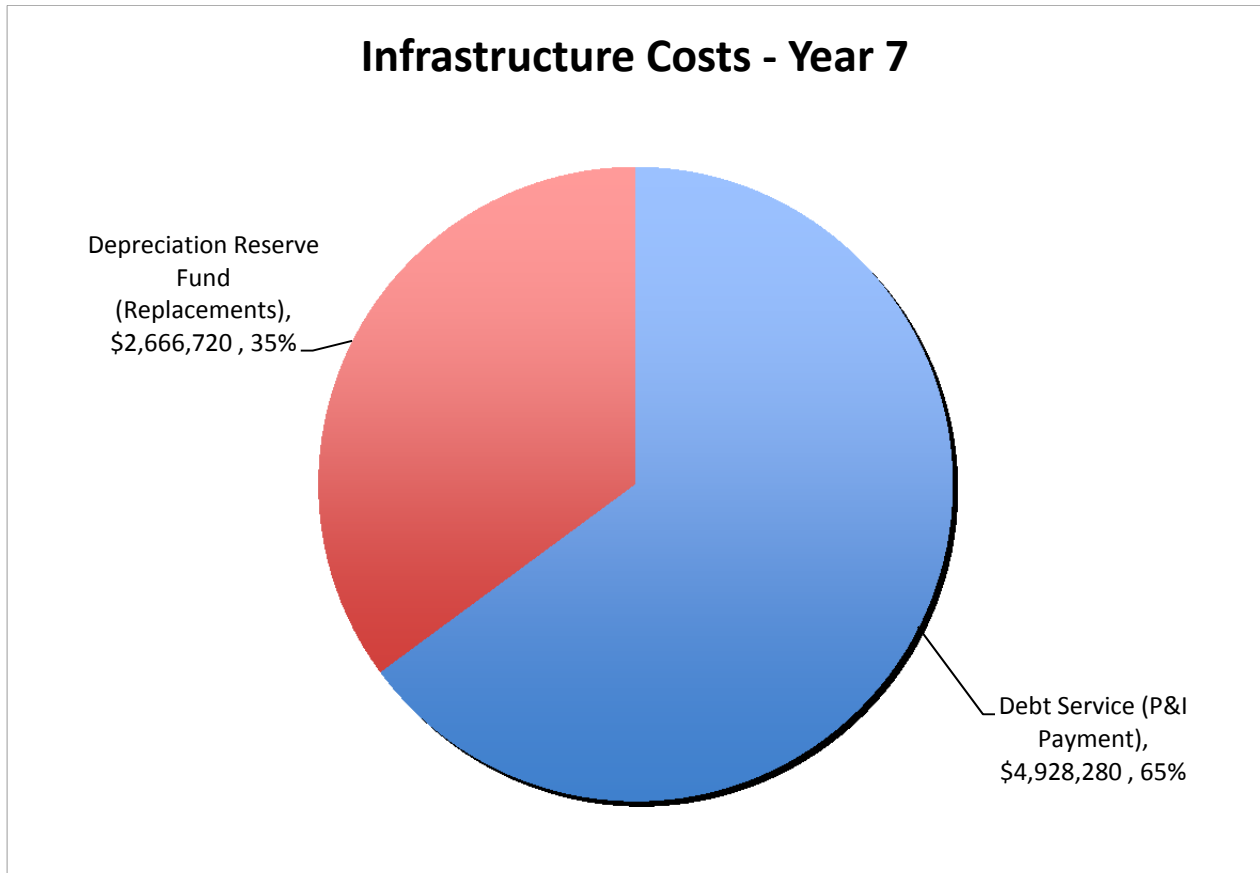
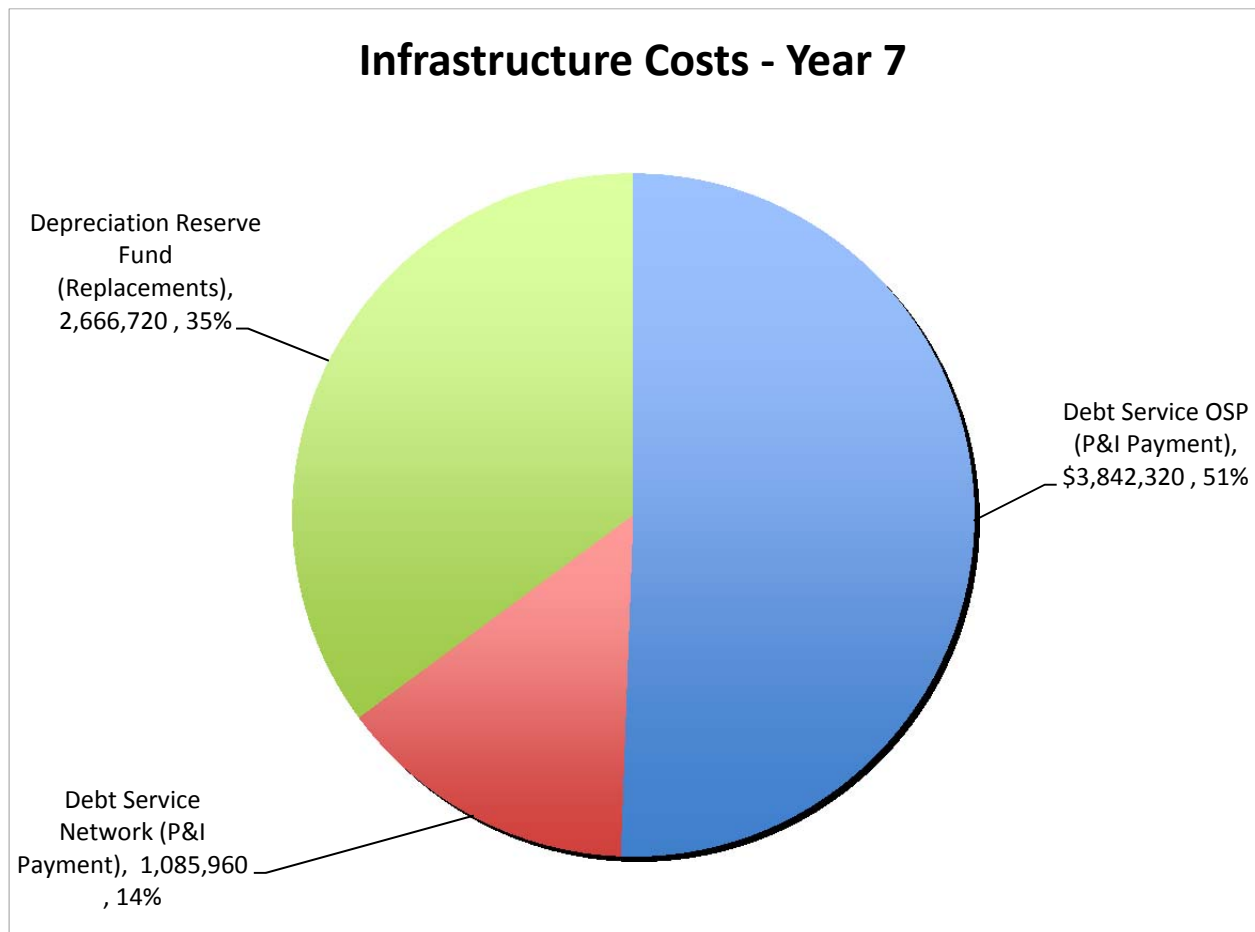


Figure 3 shows that the depreciation reserve fund, or network replenishments, accounts for 35 percent of infrastructure costs; debt service (or P&I) payments for the network are an estimated 14 percent; and debt service (or P&I) payments for the outside plant (OSP) are estimated at 51 percent.

Figure 3: Infrastructure Costs in Year 7 (Breakdown)



1.3.2 Operating Costs

As previously noted, Figure 1 shows that 42 percent of the uses of funds (29 percent, 9 percent, and 4 percent) are allocated for operating the business, and operations and maintenance (O&M) for the fiber and the network (electronics). Figure 4 shows that 9 percent of the operating expenses are for fiber O&M, 21 percent are for network O&M, and 70 percent are for business operations.

Figure 4: Operating Expenses in Year 7

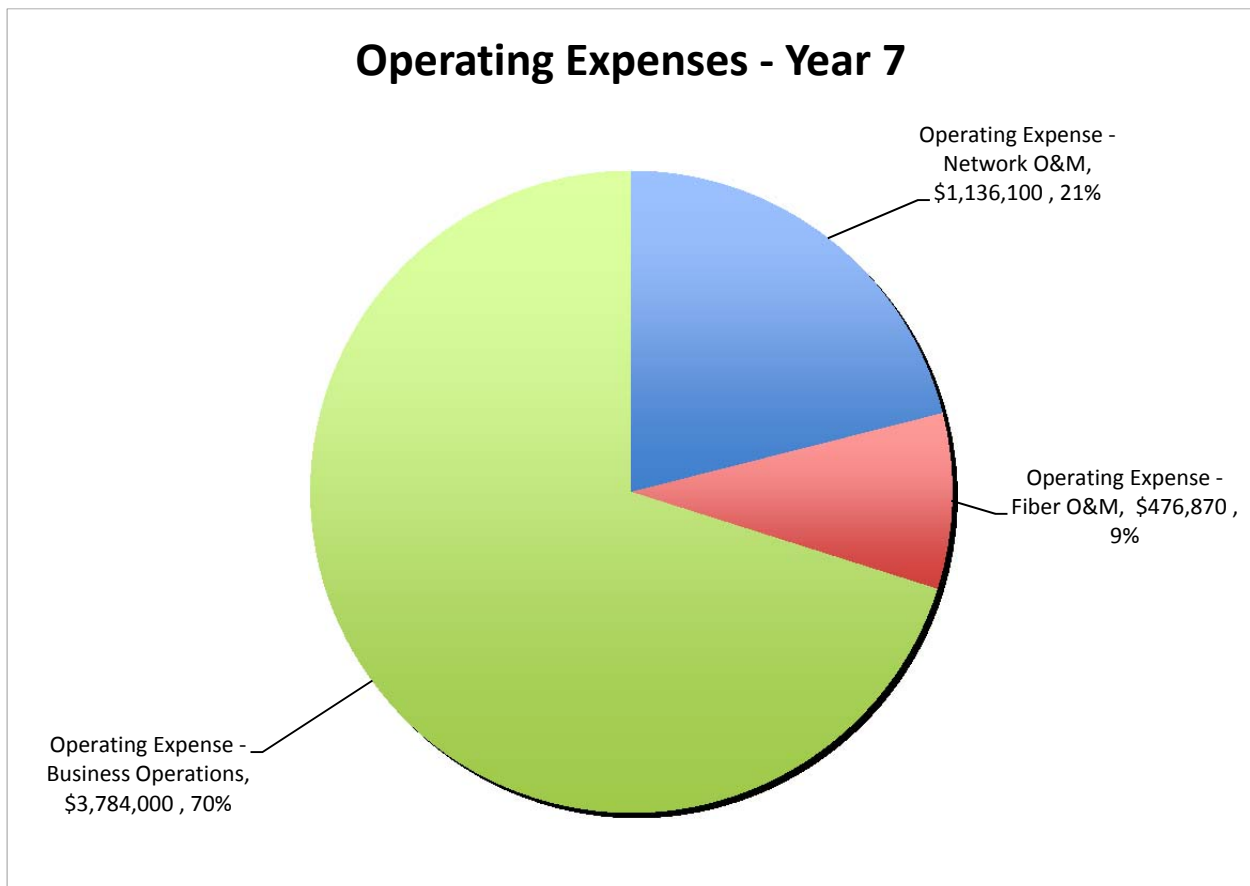


Table 1 and Figure 5 further break down the estimated operating expenses. Labor costs for business operations expenses account for approximately 50 percent of all operating expenses. As we noted, private providers are at an advantage because they can generally leverage existing resources and spread their costs over deployments in multiple markets. The public sector will likely need to hire some additional in-house staff and contract out some of its needs, and the City does not have prior experience with this particular type of specialized staffing.

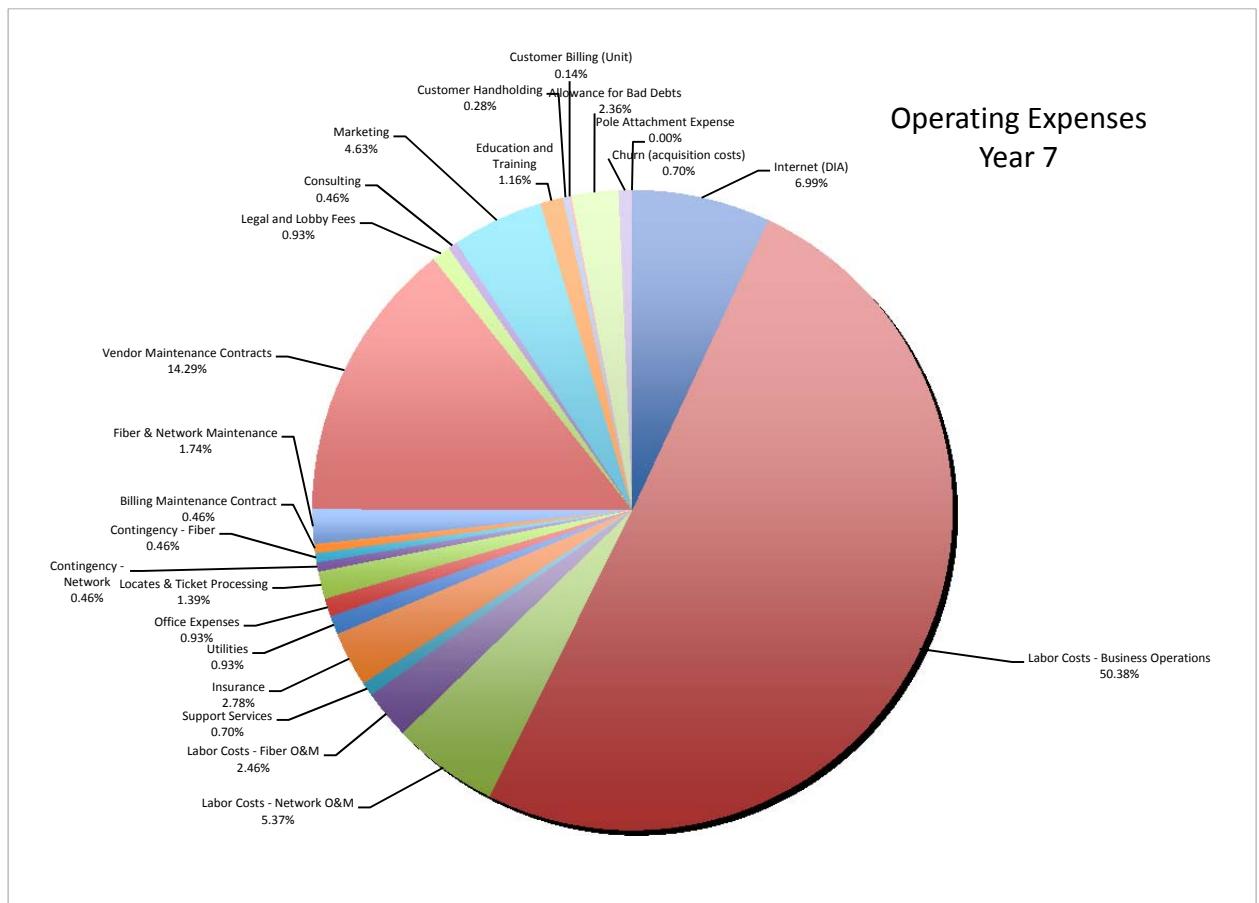
Vendor maintenance contracts account for over 14 percent of operating costs, and this is an area where the private sector has an advantage. As with other areas, private entities can potentially leverage their own existing resources and disperse costs over multiple deployments—and if the private entity is large enough, it may be able to completely eliminate some of these costs. Although Cruzio is not as large as incumbents like Comcast, it does possess some economies of scale.

Direct Internet access (DIA) accounts for 6.99 percent of operating costs, and it is calculated at \$0.50 per Megabit per second (Mbps) per month. This is a competitive cost for DIA, and is based on Cruzio’s previous efforts to obtain dark fiber into carrier facilities in the Silicon Valley. However, larger providers are able to avoid more costs with on-net servers from peering partners like Netflix. Further, costs tend to be minimal for private providers (almost nonexistent for some) due to the high volume of DIA that they purchase. Again, this is an area where Cruzio can bring its private sector advantage to the relationship.

Table 1: Breakdown of Operating Expenses in year 7

Expense Category	Total Cost	Percentage of Total
Internet (DIA)	\$377,060	6.99%
Labor Costs - Business Operations	2,718,800	50.38%
Labor Costs - Network O&M	289,800	5.37%
Labor Costs - Fiber O&M	133,000	2.46%
Support Services	37,600	0.70%
Insurance	150,000	2.78%
Utilities	50,000	0.93%
Office Expenses	50,000	0.93%
Locates & Ticket Processing	75,000	1.39%
Contingency - Network	25,000	0.46%
Contingency - Fiber	25,000	0.46%
Billing Maintenance Contract	25,000	0.46%
Fiber & Network Maintenance	93,870	1.74%
Vendor Maintenance Contracts	771,300	14.29%
Legal and Lobby Fees	50,000	0.93%
Consulting	25,000	0.46%
Marketing	250,000	4.63%
Education and Training	62,830	1.16%
Customer Handholding	15,040	0.28%
Customer Billing (Unit)	7,520	0.14%
Allowance for Bad Debts	127,550	2.36%
Churn (acquisition costs)	37,600	0.70%
Pole Attachment Expense	-	0.00%
Total	\$ 5,396,970	100.00%

Figure 5: Breakdown of Operating Expenses in Year 7



1.3.3 Public and Private Entity Cost Advantages and Disadvantages

Private entities have cost advantages with operating costs, while the public sector has an advantage over a long-term investment like fiber. That is, the private sector has the many advantages we enumerated above that have to do with operational costs for which private entities are typically staffed and prepared. The City has the advantage of being able to make a longer-term investment than most private providers because it does not have to demonstrate a high rate of return right away. This balance of advantages could work favorably in a partnership relationship.

1.4 Recommended Next Steps

The City is on the precipice of a unique and singular opportunity to develop a long-term relationship with a promising private partner. Our initial, high-level analysis indicates that this partnership could have enormous benefits by striking a balance between leveraging each party's strengths and carefully managing risk. Above all, we encourage the City to exercise appropriate caution in moving forward with this relationship to avoid inadvertently taking on

more than its share of risk. Partnership models that have emerged in the past few years have only recently begun to yield minimal data about lessons learned—the City is uniquely positioned to tailor this partnership to its needs—thus, we encourage methodically evaluating the agreement prior to entering into a contractual relationship.

1.4.1 Confirm the Desired Partnership Model Structure

There are several key areas that the City and Cruzio need to consider as they evaluate the partnership model, and one of the most important is to refine and clearly understand the financial forecast, and ensure that the parties are in agreement. Further, each party should carefully evaluate any potential funding that might be available to the partnership—these are monies that do not have to be paid back (e.g., the City could allocate budget money to invest in fiber infrastructure).

Several steps go into confirming the desired partnership model structure, and we encourage the City to carefully evaluate risks, objectives, responsibilities, and the assets that each party can bring to an agreement. We cannot overstate how important it is to carefully and methodically evaluate a partnership agreement prior to entering into a binding contract with any partner. This relationship will last for years—even decades—and conducting due diligence now will potentially save both parties trouble in the future, and can help start the partnership off on the right foot.

1.4.1.1 Review Assets and Define Goals and Expectations

A logical starting point is to perform a thorough inventory of each party's assets and their ability and willingness to put those toward the agreement for the partnership's overall health and risk aversion. It is important to understand each party's assets, goals, and expectations so that the partnership agreement can outline how assets should be leveraged and how to assign tasks appropriately to each party. An important consideration for the partnership is whether each asset should be evaluated on a case-by-case basis, whether all the assets each party possesses should be put toward the best interest of the partnership, or if there is some combined solution. For example, Cruzio currently possesses physical space that could house a network operations center (NOC) and host core equipment. The existing proposal recommends charging the City rent at market price to use this space. This makes sense for Cruzio's business model, but may not be the best arrangement for a public-private partnership.

Similarly, the City brings a certain branding to the table that potentially comes with a high level of community trust, and it could prepare message and mobilize resources to endorse the partnership with Cruzio as its named partner. This type of marketing could go a long way toward fostering a sense of trust within the community for Cruzio as a retail provider. The City

could ostensibly charge a fee for this type of service, but doing so would not necessarily be in the public-private partnership's best interest.

1.4.1.2 Develop the Partnership Model to Leverage Each Party's Strengths

As we noted in Section 1.3.3, the City has an advantage over the private sector in terms of deploying, paying for, and owning fiber assets. Network deployment tends to be capital intensive, and the return on investment often takes much longer than the private sector can sustain without other incentives for building fiber.

Another important consideration is the evolution of open access and how it may impact the City's offering. If an unfettered data product is available, the City and a private partner may be able to take on responsibilities that play to their strengths while mitigating their risk and avoiding tasks for which they may be ill equipped. Cruzio can potentially avoid making a large capital investment while the City can avoid the unknowns and variability of providing retail service.

The City may find it beneficial to contract exclusively with Cruzio at the outset for partnership. The partner could operate the City-owned FTTP network, and after a certain number of years, the City may opt to make the network truly open access so that any provider that wishes to offer service over the infrastructure has the option to do so. Such an arrangement could significantly reduce the City's cost.

Further, this could allow the City to leverage a private entity's buying power for electronics, reduced DIA costs, and other uses of funds. This could result in a much lower take rate necessary to make the enterprise cash flow positive. For example, if the City could reduce salary expenses, reduce costly vendor maintenance contracts (by allowing the private partner to manage these relationships), and reduce DIA costs, the necessary take rate could be reduced. This take rate could potentially be lowered even further by pursuing a strategic deployment approach that requires a neighborhood to reach a certain take rate threshold before the City builds fiber there.

A municipal FTTP offering will be challenging for the City—it will likely see tremendous benefit from working with the private sector to reduce costs and leverage strengths. If it is willing and able to make a long-term investment in fiber infrastructure, it then also has the advantage of a greater degree of control by retaining ownership of the FTTP network.

It is clear that the City is in the best position to own and maintain the fiber, and Cruzio is positioned to offer retail services. However, responsibility for network electronics ownership, ongoing replenishments, and network electronics operation requires further review and consideration.

1.4.1.3 Articulate and Assign Responsibilities in the Agreement

The partnership agreement should provide a clear division of tasks that will be assigned to each party. The City may use a more complex version of the breakdown in Table 2 in discussions with Cruzio to indicate the areas for which the ISP expects to be responsible in a partnership. Or, the City may use a similar structure to indicate the tasks for which it expects to be responsible and to identify tasks for which it expects Cruzio to be responsible.

The list in Table 2 may not represent the exact tasks that the City and Cruzio will carry out in the partnership. Rather, it is a framework for the City to consider what tasks and responsibilities may go into a partner relationship. It is also a starting point for the City to consider those tasks for which it is well equipped and for which it already has staff and infrastructure. This can help the City understand areas where it may incur only incremental costs by taking advantage of its existing functions (e.g., existing billing and customer service staff can potentially be reallocated instead of hiring new staff, contracting out those services, or assigning them to Cruzio).

Table 2: Example Breakdown of Tasks and Responsibilities

Functional Area	Task/Responsibilities
Outside Plant (middle- and last-mile)	<ul style="list-style-type: none"> • Locates • Trouble ticket processing • Fiber maintenance – material • Fiber maintenance – labor
Network Operations	<ul style="list-style-type: none"> • Network operations center – facilities • Network operations center – staffing 24x7 • Provide direct Internet access • Network engineering (last mile) • Network engineering (middle mile) • Fiber drop installation (network demarcation to building entry) • In-building wiring • Customer installation (on-premises) • Customer activation and provisioning • Maintain inventory (optical network terminal and network elements) • Hardware and support maintenance Fees
Customer Service	<ul style="list-style-type: none"> • Billing and invoicing • Bad debt • Collections • Tier 1 support 24x7 (basic customer issues) • Tier 2 support 24x7 (basic technical support) • Tier 3 support 24x7 (advanced technical support)

Functional Area	Task/Responsibilities
Sales & Marketing	<ul style="list-style-type: none"> • Branding and marketing • Sales • Customer acquisition (sales) and retention • Service catalog • Recommend pricing • Approve pricing • Customer ownership • Develop and manage customer contracts • Execution of customer contracts • Prepare service level agreements (SLAs)
Reporting	<ul style="list-style-type: none"> • Provide City subscription records • Provide City invoice and payment status • Provide partner network status information (for tier 1 support) • Provide partner network status information (for tier 2 support) • Provide partner network status information (for tier 3 support) • Provide City weekly sales and leads reports

1.4.2 Develop Exit Strategies in the Agreement

The best time to articulate a solution to a dispute is before a disagreement occurs. As indicated above, being as specific as possible regarding responsibilities will help reduce the potential for disputes. However, even the most deliberate and well thought out agreement cannot anticipate every potential scenario that may arise—thus, it is critical to outline exit strategies in case of a dispute or one of the parties is unable to continue to meet its obligations in the agreement.

2 Municipal and Partnership Objectives

There are often key objectives that localities prioritize when pursuing FTTP deployments, and we outline those here.

2.1 Redefining Open Access

As the industry and technologies have evolved, new ways have emerged to secure the policy objectives of open access competition without requiring traditional forms of open access by utilizing the potential for service differentiation and competition across a robust data pipe. “Open access” traditionally means one network infrastructure over which multiple providers are able to offer service. In an open access municipal network, the locality typically owns the fiber optic network and enters into wholesale transport, dark fiber lease, or indefeasible right of use (IRU) agreements with third party providers to offer retail data, video, and voice services over the network.

The definition of open access has shifted recently, just as the broadband landscape has evolved in recent years. While it has traditionally meant that network owners must provide access to their infrastructure, some communities are finding that they can achieve their broadband goals without a traditionally open-access network. Instead of multiple ISPs and other private entities providing service over one network, open access is achievable through multiple over-the-top OTT providers offering various services.

This is especially effective if the network is provisioned for affordable unfettered 1 Gbps data service—ultra-high speed fiber optic broadband networks offering top tier speeds possess the capacity to provide a variety of different OTT applications to meet consumers’ needs. Thus, the City’s network can support triple play by enabling OTT applications that effectively provide all these services—while at the same time simplifying the consumer’s experience and potentially lowering their overall cost.

As awareness and access increase and prices decrease, consumers are likely to continue pursuing alternatives to conventional voice and video services. A new era of OTT content via 1 Gbps data services is emerging—and with it comes an updated definition of open access, and alternative paths for communities to attain their broadband goals.

2.1.1 Open Access Goals

Localities have traditionally sought to develop open access networks in their pursuit of other community goals—key among these is competition. The purpose of open access networks is to enable as many providers as possible to deliver service over the network, to give consumers greater choice and flexibility in picking a provider, and ultimately to broaden availability.

Communities are recognizing that competition is key, and that providing a competitive marketplace for consumers may not look like what has traditionally been considered open access. Providing a competitive environment with numerous applications and offerings that enable consumer choice meets customer needs in a new way—and a data connection enables cloud-based applications and services. A public or public-regulated offering that provides a robust retail data service and competitively priced wholesale transport access brings open-access objectives to the market.

If the City's FTTP network delivers an unfettered data offering that does not impose caps or usage limits on one use of data over another (i.e., does not limit streaming), it has created an open access network on the applications side. All application providers (data, voice, video, cloud services) are equally able to provide their services, and the consumer's access to advanced data opens up the marketplace.

The City or its partner as a premium data-only provider fosters access in the near-term to create an open network. This is a building block toward potentially opening the network further in the future as the FTTP enterprise evolves, if this form of open access remains an ongoing goal for the City.

Getting to traditional open access where multiple ISPs offer service has been slow and problematic in the U.S. Focusing on other forms of open access provides a viable and attractive substitute in the meantime, and may ultimately eliminate the need for traditional open access. One of the most important elements to successfully redefine open access is the emergence and evolution of OTT providers and next generation applications to support consumers' needs.

2.1.2 Evolving Over-the-Top Providers

OTT or "value added" services have evolved more quickly in the voice market than in video, though it is not a new concept in either. Recent announcements of expanded OTT video offerings suggest that consumers are seeking alternatives to traditional video services, and the market is responding.

Consider important changes in the landline telephone market over the past decade to illustrate what is likely to happen with video content. Ten years ago, home telephones were still nearly ubiquitous, even in households where all members subscribed to wireless phone service. Yet data from a December, 2013 National Institutes of Health (NIH) report showed that nearly 40 percent of households in California were wireless only, with no landline telephone.³

³ National Institutes of Health. (2014). Wireless Substitution: State-level Estimates from the National Health Interview Survey, 2012 (Report No. 1250). Retrieved from <http://www.cdc.gov/nchs/data/nhsr/nhsr070.pdf>.

National usage has continued to decline—January through June 2014 was the first six-month period during which a majority of U.S. children lived in households with wireless-only telephone service.⁴ This decline was possible due to increasingly accessible and affordable cellular and wireless service along with other alternatives to landline—programs like Skype and Google Voice, services like Vonage and Lingo, and technology like magicJack and Ooma.

The cable industry may be poised to see a similar shift toward nontraditional technologies, applications, and services that allow consumers greater flexibility and choice. An increased desire for OTT offerings could have a significant industry impact, though this will likely be more gradual than changes to the voice industry because of cable content owners' great degree of control. Major industry shifts have been predicted,⁵ but major industry changes have been slower to materialize than in the voice industry.

To understand why the shift may be gradual, consider Google Fiber's entry into the Kansas City market just a few years ago as an example of the firmly rooted power of cable. Google Fiber found that a data product alone was not strong enough to obtain the necessary market share to make its endeavor viable. If it wanted to get people to switch providers, Google Fiber *had* to offer cable, deviating from its original plan and introducing more cost and complexity than the simple data service it intended to offer. Google Fiber may have found that offering traditional cable television was unnecessary if OTT cable options with a broad range of content were widely available when it entered the Kansas City market.

Google Fiber was forced to set a precedent offering traditional cable services when entering the Kansas City market, and has necessarily continued these offerings in subsequent markets. It will likely eventually phase out its traditional cable offering in favor of promoting OTT content and seeking other, less costly alternatives to traditional cable. This may be especially likely as more non-traditional content providers emerge and greater programming variety becomes available via OTT.

Consumer demand and expectation is another potentially key driving factor that may facilitate change in the industry. Due to the always-on and at-your-fingertips nature of applications and services that are supported by access to the Internet, consumers have come to expect “on-demand” services and control over their choices in ways that have not previously existed.⁶ Consumers who are used to having Internet access—especially digital natives⁷—are

⁴ National Institutes of Health. (2014). Wireless Substitution: Early Release of Estimates from the National Health Interview Survey, January-June 2014. Retrieved from <http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201412.pdf>.

⁵ <http://www.businessinsider.com/cord-cutters-and-the-death-of-tv-2013-11>, accessed June 2015.

⁶ <http://www.businessinsider.com/the-on-demand-economy-2014-7>, accessed May 2015

⁷ <http://www.cnn.com/2012/12/04/business/digital-native-prensky/>, accessed May 2015

accustomed to quickly and easily receiving the goods and services they desire. There is an increasing expectation among consumers in the U.S. that services will be readily available on-demand with minimal effort. By simply engaging an application on a smartphone or clicking a mouse on a laptop, consumers expect instant access to goods, services, and content.

Further, in part because of the growth of cloud services, there is an increased consumer desire for simplicity and integration among services and content. And because of technological advancements and “cheap computing power,”⁸ the costs associated with what would have been luxuries for the rich only a few years ago are now attainable for the average household.

Companies that hope to compete in the video market are likely to find that they must adjust their business models, marketing strategies, and understanding of consumer demands and desires. In 2015, Comcast’s broadband subscribers outnumbered its cable subscribers for the first time ever—an unprecedented and major shift in the industry.⁹

Since the start of this year, the market has begun to shift more dramatically with the emergence of additional OTT content. Dish Network launched an OTT service in early 2015 that offers sports programming on channels such as ESPN as well as other programming and popular TV channels without a cable subscription. The service, called Sling TV, is streamed over the Internet.¹⁰ It does not require any additional hardware and is enabled by installing an application on a device such as a smartphone, tablet, laptop, or Internet-connected television. Sling TV currently is priced at \$20 per month with no time commitments, but it is complex and fraught with limitations and restrictions.¹¹ Traditional cable content providers’ attempts at OTT have seen varying degrees of success, but it is significant in the industry for these providers to even acknowledge the need for these services.

In addition to recent entrants to the OTT market, there are numerous established services and applications that will likely continue to promote change in the cable industry and drive an increase in consumers’ desire for greater choice and control over how they access content. Standalone media-streaming boxes like Apple TV and Roku have enabled consumers to stream content with applications such as YouTube, Netflix, and Hulu without a cable subscription since 2008. These “cord-cutters” cancel their cable subscriptions in favor of accessing their favorite content via applications and services streamed over the Internet.

⁸ <http://www.economist.com/news/leaders/21637393-rise-demand-economy-poses-difficult-questions-workers-companies-and>, accessed May 2015.

⁹ http://www.nytimes.com/2015/05/05/business/media/comcasts-earnings-rise-10-driven-by-high-speed-internet.html?_r=0, accessed May 2015.

¹⁰ <https://www.sling.com/>, accessed April 2015

¹¹ <http://www.pcworld.com/article/2909572/sling-tv-channel-guide-all-the-programming-and-all-the-restrictions-all-in-one-chart.html>, accessed May 2015.

Since the debut of Apple TV and Roku, similar devices like the Chromecast, Google Nexus, and Amazon Fire TV have entered the market, allowing consumers greater choice. Further, consumers can now purchase smart TVs, which come with preinstalled platforms that support streaming applications. These devices require no additional hardware—with only an Internet connection, consumers can stream music, TV shows, movies, and even play games.

While Comcast’s own attempt at OTT content through its “Streampix” offering was not a huge success,¹² that pursuit illustrates the cable giant’s understanding of streaming as the future of content delivery. The fact that its broadband subscriptions surpassed its cable subscribers this year further puts to rest the notion that the video industry can move forward without embracing new and innovative content delivery mechanisms. Although the video industry has been slow to change, content providers have begun efforts in recent years to provide OTT content to keep up with consumer demand for greater flexibility, and to compete with companies like Netflix and Hulu.

Verizon FiOS announced earlier this year its own “a la carte” offering called Custom TV, which allows consumers to choose from bundled packages that more appropriately reflect their programming desires and include less unwanted channels.¹³ While this is not a true OTT application, it demonstrates the recognition within the incumbent market that consumers are dissatisfied with traditional content delivery and are seeking alternate choices.

Further, HBO announced last year its plans to offer its own OTT service,¹⁴ and as of early 2015 it began offering HBO NOW over Apple devices and to Optimum service subscribers while promising imminent access to Android and Chromecast users.¹⁵ Access to premium programming like sports and HBO has been a stubborn barrier to customers who want to eliminate their cable subscriptions (and to competitors that want to disrupt the market). Often, consumers would happily give up enormous cable bills in favor of more streamlined, inexpensive services—but they do not take the leap because they want specific programming that is only available over cable. It is significant when a content powerhouse like HBO acknowledges the importance of change in the industry.

Companies that hope to compete in the video market will likely find that they must adjust their business models, marketing strategies, and understanding of consumer demands and desires.

¹² <http://www.lightreading.com/video/ott/comcast-turns-off-streampix/d/d-id/711098>, accessed May 2015.

¹³ <http://arstechnica.com/business/2015/04/verizons-new-custom-tv-is-small-step-toward-a-la-carte-pricing/>, accessed May 2015.

¹⁴ HBO to Launch Standalone Over-the-Top Service in U.S. Next Year. 2014 October 15.

<http://variety.com/2014/tv/news/hbo-to-launch-over-the-top-service-in-u-s-next-year-1201330592/>, accessed March 2015.

¹⁵ <https://order.hbonow.com/>, accessed June 2015.

Perhaps one of the most significant illustrations of this is that, for the first time ever, Comcast's broadband subscribers outnumbered its cable subscribers—an unprecedented and major shift in the industry.¹⁶

In light of the high costs associated with providing traditional cable service, the City will likely benefit most from focusing on a data-only offering as it goes through startup. If a data-only offering does not prove to be viable, the City can then readjust its approach and potentially partner with a private provider that can offer IP-based cable. One important goal is for the City to drive the market by showing consumers that a high-capacity data product is sufficient to meet all their content needs, and can lead to overall telecommunications savings.

2.2 FTTP Objectives

As part of our analysis of business models the City might want to pursue, we evaluated certain common broadband objectives that many communities prioritize, and how these may affect the City's decision-making process. Choosing which goals to prioritize can be challenging, and we sought to provide the City with information to empower decisions about its connectivity needs that will have ongoing positive outcomes.

2.2.1 Community Broadband Objectives

Competition and consumer choice are only two of several objectives that may drive a community's pursuit of a publicly owned fiber optic network. Many public entities share certain objectives when it comes to considering investment in a community broadband network:

- Affordability
- Cash Flow
- Competition in Market
- Consumer Choice
- Ownership and Control of Assets
- Performance
- Risk Aversion
- Ubiquity

Each of these is understandable in the context of what is best for a community, though they do not necessarily all align with one another. In fact, some common objectives that communities prioritize when planning their networks actually conflict with one another. In light of this, communities benefit from careful consideration of which objectives they deem most important to adequately meet their needs.

¹⁶ http://www.nytimes.com/2015/05/05/business/media/comcasts-earnings-rise-10-driven-by-high-speed-internet.html?_r=0, accessed May 2015.

As an example, risk aversion is top priority for some communities—it may be politically challenging to build a network, and the only way to complete it is to assure key stakeholders and the public that there is minimal risk involved. As we explain below, risk aversion is in direct conflict with building the network throughout an entire community, and ubiquity may be the most important objective for another community. Each community must find the balance that is most appropriate to its needs so that it can achieve its goals without sacrificing important objectives. Our analysis does not advise the City on which objective(s) it should prioritize; rather, we describe common objectives and their role in communities, how they interact with each other, and potential advantages and disadvantages of each.

We illustrate in Table 3 below the intersection of common objectives and in the sections that follow we explain these in greater detail as well as how they align and differ. As the key at the top of the following table shows, objectives may have no impact, they may be in alignment, they might conflict, or they may be inapplicable.

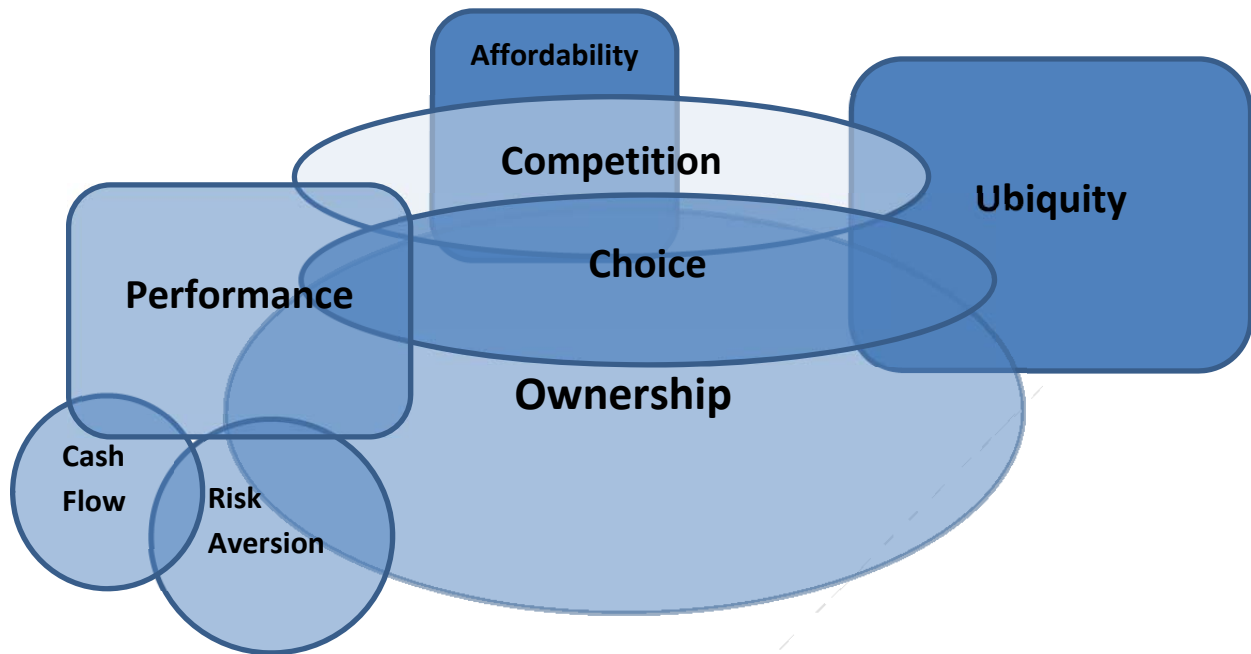
Table 3: Common Goal Alignment

	A: Align		C: Conflict		NI: No Impact		NA: Not Applicable	
	Ubiquity	Choice	Competition	Ownership	Performance	Affordability	Risk Aversion	Cash Flow
Ubiquity	NA	A	A	A	NI	C	C	C
Choice	A	NA	A	A	A	A	C	NI
Competition	A	A	NA	A	A	A	C	NI
Ownership	A	A	A	NA	A	A	A	C
Performance	NI	A	A	A	NA	NI	A	A
Affordability	C	A	A	A	NI	NA	C	C
Risk Aversion	C	C	C	A	A	C	NA	A
Cash Flow	C	NI	NI	C	A	C	A	NA

In the sections below, we further explain this table and how the objectives listed here interact with one another.

We detail below the interaction between objectives, and how prioritizing one objective may impact another. Figure 6 below shows a visualization of Table 3 to illustrate the relationship between objectives.

Figure 6: Interactions between Objectives



There are numerous possible outcomes associated with different objectives, and the City has to determine what it believes will best serve its unique needs and have the greatest impact on its community. This analysis does not seek to urge the City in any particular direction, but we do make recommendations about some of the objectives that may well serve any public network.

For example, performance is an objective that either interacts favorably or not at all with other objectives, and prioritizing performance can have a significant positive impact on the FTTP network’s viability by setting it apart from incumbent providers. Thus, there are no real disadvantages to making performance a top priority for the FTTP network because doing so does not have to be at the exclusion of any other objectives. Further, some objectives can and should be pursued in parallel.

2.2.2 Ubiquity

For most communities that opt to build and operate a network to any degree, ubiquity—which refers to designing and building the network so that it connects every structure in the community—is a key objective. From Connecticut to Minnesota to Oregon, communities (and

community organizations) large and small prioritize ubiquity as a primary goal in their broadband pursuit.¹⁷

This is a respectable objective for any community, and it makes sense that leaders want to bring service to the entire community, but immediate, community wide build-out often entails significant risk and cost. The financial risk alone is significant and in order to make the model sustainable, the service may have to be priced out some consumers' reach.

Overall risk aversion conflicts directly with the notion of a full-scale community build-out, as the City will likely face stringent construction deadlines and much higher capital costs than it would if it were to undergo a phased build-out. The need for outside funding is likely also higher with a ubiquitous network build, which greatly increases the City's risk.

Because the City will likely need to procure financing from an outside source, and due to high capital investment for large-scale construction, it is likely that the City will be forced to raise monthly service fees. This reduces the affordability of the City's FTTP network and to some degree defeats the purpose of ubiquitous build-out. If the service reaches the entire community, but it is priced too high for many residents and businesses to afford it, this fails to meet the City's goal of providing access to its citizens—it is essentially inaccessible.

Cash flow is another objective that conflicts with ubiquity. The City likely will not expect to make a profit on the FTTP network, but it is important for the entity to become able to financially sustain itself, including operating costs and any debt service payments. This is often referred to as "cash flow" or "breakeven". The higher cost of building out to every structure in the City means that the point at which the FTTP network is able to cash flow will come much later than if the City slowly built out and began generating subscriber revenue earlier on in the process.

2.2.2.1 Impact to Business Model

A key consideration for network implementation is how to fund both capital construction costs and ongoing operational expenses. The importance of factoring in the ongoing cost of operations cannot be overstated—these expenses fluctuate based on the success of the enterprise, and can vary considerably each year, and even month to month. The capital and operating costs associated with a full-scale communitywide build-out will be significant, and the City will likely have to seek outside funding to support construction and the FTTP network's startup costs. It is also possible that outside funding or some internal subsidy will be necessary

¹⁷ <http://www.cnet.com/news/connecticut-communities-join-together-for-gigabit-broadband/>, accessed April 2015.

http://broadband.blandinfoundation.org/uls/resources/Vision_Statement_FINAL_0228.pdf, accessed April 2015.

<https://www.portlandoregon.gov/revenue/article/394185>, accessed April 2015.

to support ongoing operations—everything from network equipment license fees to direct customer support.

The City may be able to go out for bond (i.e., borrow funds) to enable construction of an FTTP network. There are two types of bonds that municipalities typically rely on for capital projects.

General obligation (GO) bonds are directly tied to the City's credit rating and ability to tax its citizens. This type of bond is not related to any direct revenues from specific projects, but is connected instead to citywide taxes and revenues that can be used to repay this debt.

GO bonds can be politically challenging because they may require public approval, which can be hard won. Because of the politically polarizing nature of GO bonds, they are generally issued for projects that will clearly serve the needs of the entire community, such as roadway improvements. It is challenging in many communities to make the case for a fiber enterprise serving the public to such a degree that GO bonds are warranted.

Revenue bonds are directly tied to a specific revenue source to secure the bond and guarantee repayment of the debt. The revenue stream from a municipality's electric, natural gas, or water utility may be used to secure a revenue bond. In fact, in theory, any municipal service that generates some sort of revenue that could be used to pay back the debt might potentially be used to secure a revenue bond—municipally owned public transportation or hospitals, for example. Given this, it stands to reason that the FTTP network's revenues could be used to guarantee a revenue bond, but this is typically not an accepted practice within the bonding community, particularly with FTTP endeavors. Instead, the City would likely need to consider other revenue sources it could tie the enterprise to if it aims to seek revenue bonds.

Seeking bonds increases the City's overall risk and it is much more likely to require outside funding if it intends to pursue a ubiquitous build-out. At the same time, the City may find that a clearly stated goal of ubiquity eases the process of GO bond approval, which could be beneficial. If the City anticipates a need for outside funding for any construction and expects that it may be politically complex to seek bonding, ubiquity may be a reasonable conduit through which to achieve that goal.

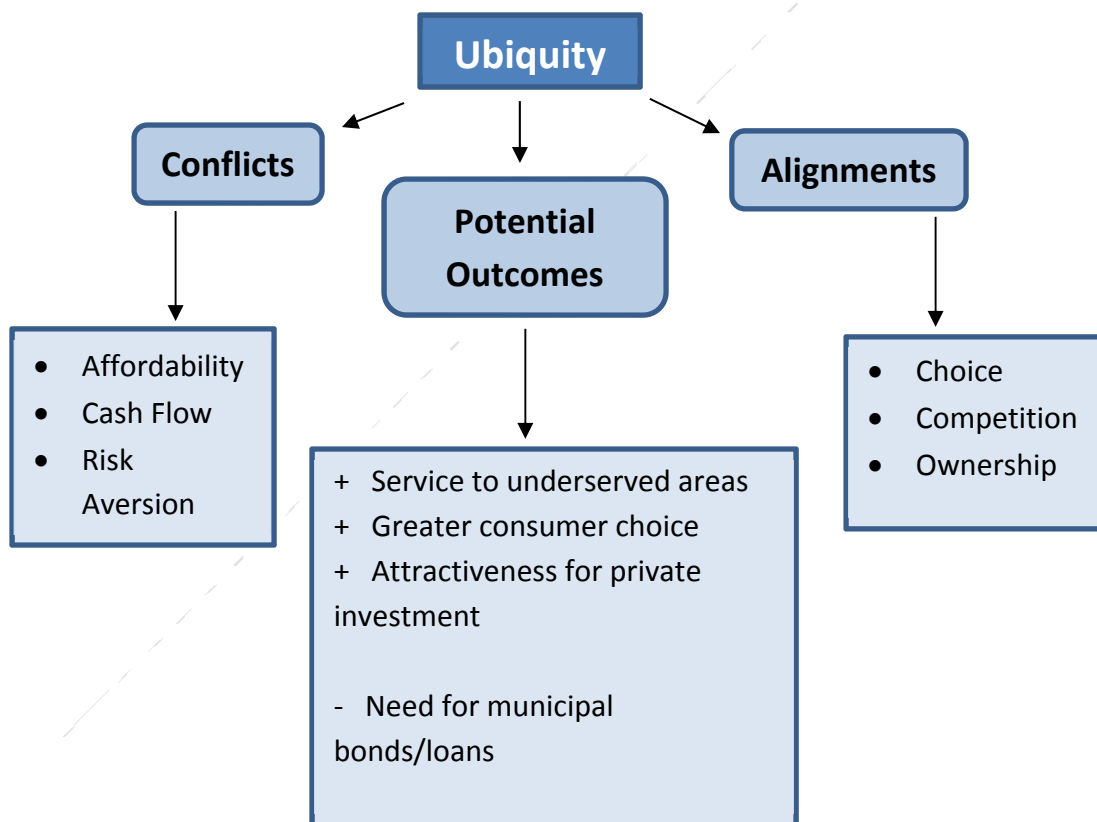
Bonding aside, the City's FTTP deployment is harder to oppose if ubiquity is its primary objective. If the City made it a priority not to cherry pick (that is, build only to economically desirable neighborhoods, which are usually middle-to-upper class and exclude low-income areas), it can make a strong case in favor of its implementation. The City could serve areas that have been historically underserved and build infrastructure to parts of the community where perhaps none previously existed. This would not only bring the City's offering to those parts of the community, but could also enable local Internet service providers to provide service over

the City’s infrastructure and gain market share in areas that had previously been too costly to serve.

The City may determine that it will be best served by not partnering with multiple ISPs but seeking one partner to manage and operate the network. Whether the City pays for network construction will determine whether a ubiquitous network is attractive to a private partner. If the City requires ubiquity but is not prepared to fund significant portions of the network, it will likely find that private entities have little desire to partner. Conversely, if the City funds significant portions of construction of a ubiquitous network that a private partner can then expand and operate, it may find that it is an attractive community for private investment.

Figure 7 shows conflicts, alignments, and potential outcomes associated with prioritizing ubiquity.

Figure 7: Ubiquity Alignments, Conflicts, and Potential Outcomes



2.2.3 Consumer Choice

As we noted, localities often pursue open access as a means to increase consumer choice, and this is an important consideration and a high priority for many communities. Incumbent cable

and Internet providers may have little economic incentive to expand to areas of the community where they believe they will not recover significant portions of their cost.

An overarching goal of developing an open access network is to level the provider playing field to reduce monopolistic and oligopolistic practices by incumbents, and to give consumers greater choice in service providers.

Most other objectives that a community decides to pursue will interact favorably with consumer choice. A ubiquitous network that fosters open access, boosts competition, and reaches all parts of the community enhances consumer choice on a number of levels. In addition to gaining access to residential services that may have previously been unavailable, consumers often end up with greater flexibility to access services at various community locations. Ubiquity and competition enable enhanced services at community centers, religious institutions, educational facilities, and other locations that benefit residents.

Affordability of services is an important component in access that ties directly with competition and consumer choice—being able to pay for services is often a major barrier for consumers. Having affordable access to services with competitive speeds can significantly improve quality of life, make residential areas more desirable, and spur business growth. Access to premium residential services at affordable prices can also incite home-based businesses, support continued education, and enable better access to basic human services like healthcare and education.

Risk aversion could negatively impact consumer choice. If the City decides that it will slowly and organically build out its network and does not take steps to prioritize particularly vulnerable areas, it is possible that only the consumers who have traditionally enjoyed provider choice will be positively affected. The City may find that it can balance risk mitigation with community benefit by deliberately funding service to portions of the community that may be undesirable for a private entity. If the City chooses to seek partnership, this could be negotiated.¹⁸

2.2.4 Competition in Market

Fostering competition in the market is generally the second component of an open access pursuit. That is, communities often seek to develop an open access infrastructure to enable multiple providers to offer service over the network and enhance competition. Like consumer choice, this is generally a major reason communities attempt to pursue a traditional open access infrastructure. Similar to consumer choice, competition in the market can be achieved through open access in the traditional sense as well as through other means.

¹⁸ The Urbana-Champaign Big Broadband (UC2B) public network negotiated a similar partnership with a private entity.

The key for most objectives is to determine whether they are primary, how they may conflict with others, and how best to pursue whatever a community deems is its most important goal(s). We believe that competition both upholds and is upheld by all other potential primary objectives—it aligns with, does not impact, or is not impacted by other common community objectives.

Choice and competition go hand in hand, and seeking ways to encourage competition will likely only result in greater consumer choice in communities. Similarly, a ubiquitous network build will probably result in greater competition among local providers. This is not only through providers potentially offering services over the City's network, but also in the form of incumbent providers lowering prices and enhancing services in response to improved services by other providers.¹⁹ This also speaks to competition vis-à-vis affordability and network performance: the greater the market competition, the greater the likelihood that other providers will seek to improve their services and lower their prices.

Competition in the market and consumer choice can be prioritized simultaneously with other objectives without negative consequences, and localities often find that focusing on the overall well-being of their communities and citizens has numerous advantages.

It is important to note, however, that there may be some risk involved with creating competition in the market. The service provider industry can be inhospitable, particularly to a public provider. A major challenge faced by networks built and operated by public institutions is opposition from existing, private-sector providers, as we previously noted. There are a number of reasons for this, some of which are related to perception while others relate to the market itself. Criticisms will range from allegations of cross-subsidization of expenses, using general or other funds for debt service coverage, to questioning the need or demand for public based connectivity services.

An important risk that the City should keep in mind is the potential for litigation from objectors ranging from incumbent providers to watchdog groups. Lafayette's LUS was sued by incumbent providers the same year it proposed creation of a separate utility for fiber-to-the-home-and-business,²⁰ and the Tennessee Cable Telecommunications Association filed a lawsuit against EPB.²¹ These are only two examples of the litigation that public sector entrants to the market have faced from incumbent providers and others. Because the City is partnering with a private

¹⁹ <http://www.cnet.com/news/googles-fiber-effect-fuel-for-a-broadband-explosion/>, accessed April 2015.

²⁰ <http://lusfiber.com/index.php/about-lus-fiber/historical-timeline>, accessed June 2015.

²¹ <http://www.chattanooga.com/2007/9/21/113785/Cable-Group-Files-Suit-To-Try-To-Block.aspx>, accessed June 2015.

entity, it may face less pushback than if it were pursuing a retail FTTP offering of its own, but it still should be prepared to navigate a potentially negative response from incumbents.

2.2.5 Ownership and Control of Assets

Retaining ownership of OSP assets is important to mitigate risk; owning assets is an important way for communities to retain some control of the network. This includes a scenario wherein a community pursues partnership with a private provider—a good way to balance risk and reward is for the City to maintain ownership and control of the assets while it assigns operational responsibilities to a private partner. This enables both parties to perform functions that highlight their strengths while not having to expend resources and energy attempting to carry out tasks for which they are ill-equipped.

Cash flow could potentially conflict with ownership and control of assets, depending on to what degree the City chooses to exert control. Maintaining a fiber optic network can be costly, particularly if the City opts to be the retail provider for the service. Operational expenses are a sizable and often unpredictable portion of overall network cost, and it can be difficult to get the take rate necessary to reach cash flow.

Other objectives either interact favorably or not at all with ownership and control of the assets. If the City retains complete control of the assets, it can make determinations about which provider(s), if any, can offer services over the network. It can regulate which service providers offer services and to what degree, thus allowing for considerable quality control. For example, if a locality offers dark fiber agreements to multiple ISPs, it can determine specific metrics that guide the providers' service.

Similarly, the City may choose to oversee and maintain the network and rely on a private partner to deliver retail services. The City may also be able to govern price points to support consumer affordability and service speeds to enhance performance. And because the City owns the network itself, it is in control of performance at that level. This is the nature of the proposed partnership, and we encourage the City to prioritize this with any relationship it enters.

2.2.6 Performance

Network performance can be a powerful differentiator for a community broadband endeavor. Many communities are already served to some degree by incumbent providers—whether by large national cable or telephone companies or small local ISPs.

Prioritizing performance in a municipal retail offering is not only advantageous, we believe it is necessary to make the offering stand out among existing broadband providers. Market entry is generally a major challenge for municipal retail providers, and even a public-private partnership

will likely benefit from focusing on one or two highly specialized offerings to allow it to thrive among incumbents.

The City's FTTP enterprise will likely struggle and has a greater potential for failure if it attempts to compete with incumbent providers by offering services similar to existing packages. Instead, it is important 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. Our analysis suggests that a 1 Gbps niche service may enable the City to directly serve customers with an exceptional offering, or will enable a private partnership to enter the market and avoid competing with "me too" services.

A 1 Gbps service that is expandable to 10 Gbps and beyond may be the differentiator that the City needs to stand out. By focusing on an extremely powerful data-only offering and communicating with users about the potential advantages of a high-performance, unfettered data product, the City may spark the shift in the market it needs to be successful. The goal is to focus on *unbundling*, and effectively encouraging consumers to leverage the data service to its fullest capacity—by not emulating traditional providers and focusing on television lineup as a selling feature.

Performance interacts favorably or not at all with other objectives, which is shown in the visual breakdown in Figure 7. There are no disadvantages to prioritizing performance as a key objective in a community build, and we believe that this should be a main focus of any fiber enterprise.

As we noted, a 1 Gbps service offering can significantly disrupt the market by enabling OTT content and enabling consumers to make more flexible choices about the services they subscribe to and the providers they select. This enables choice and competition in the market.

As we noted, if the City retains ownership of its assets, it also has better control over performance. The City—whether acting as the retail provider or overseeing a private entity who is serving end user customers—can command the performance that it deems appropriate to best serve the community's needs.

Risk aversion and cash flow both interact well with performance. We believe that the City minimizes its risk by entering the market with a premium 1 Gbps high performance network. The City can set itself apart from other providers by offering a high-speed data product that incumbents cannot.²² Further, it can differentiate itself by having an always-on extremely

²² It is important to note that products like AT&T's GigaPower and Comcast's Gigabit Pro do not set their advertised 1 Gbps and 2 Gbps service as a baseline, which is what we have suggested to the City. Rather, these products offer a 10 Mbps to 100 Mbps baseline with the potential to offer 1 Gbps to 2 Gbps service as occasional

reliable service that customers can use in new and beneficial ways—like to operate a home-based business or telecommute to their job or pursue an advanced degree.

2.2.7 Affordability

Affordability is a common barrier to access for a community's low-income residents, and the persistent digital divide is evidence of a continued and pervasive lack of affordable broadband options. Broadband providers have traditionally been able to cherry pick, or build only to neighborhoods and areas in the community where they believed they stood the best chance to recover construction and operation costs. Historically this has meant building almost exclusively to middle and upper class neighborhoods and excluding low-income areas altogether. And when legislation or franchise agreements have required providers to build to these areas, often the services are priced beyond what consumers can afford.

Providing affordable service to the entire community would likely create tremendous benefit for the City in forms like enhanced quality of life and economic benefit. These “benefits beyond the balance sheet” are not quantifiable on a financial statement, but their impact communitywide is often profound. Bringing ultra-high speed affordable access to portions of the community that may have previously had little to no access to any connectivity may significantly enhance the quality of life, thus often raising a community's overall desirability.

As we previously noted, prioritizing ubiquity may come at the exclusion of affordability for some consumers unless the City is able to offset costs in some other way. It could negotiate an agreement with one or more private partners that includes sensitivity to the need for affordable, accessible services in all parts of the community. Similarly, the City may decide that it is politically palatable to subsidize services for certain portions of the community.

Choice, competition, and ownership all interact favorably with affordability. If the City is able to reduce pricing to a level that is attainable to all of its consumers, the expansion of choice and the likelihood of increased competition will be notable. And if the City retains ownership of its assets, it can make choices about affordability similar to the control it can exert over performance.

If the City decides to subsidize services, it may find that it becomes more difficult to prioritize risk aversion and cash flow. The more debt and responsibility the City takes on, the higher its risk and the longer it will take for the FTTP network to be cash-flow positive. Similarly, even if the City does not directly subsidize services, prioritizing affordability may mean pricing the product low enough that it is challenging to also prioritize risk aversion and cash flow. It will be

exceptions. The City, on the other hand, may be able to provide service up to 10 Gbps and beyond with 1 Gbps as its baseline.

important for the City to determine its priorities, and to strike a balance so that one objective is not achieved entirely at the exclusion of another.

2.2.8 Risk Aversion

Risk aversion is important and it is equally important to balance risk and reward. It may take considerably longer to design, build, and deploy a network if risk aversion is the City's top objective. The "slow and steady" approach is not without merits, but it also does not necessarily give a community a competitive edge. Decreased speed to market—or building out slowly—gives competitors too much time to respond to the City's approach.

Figure 8 shows a risk and reward matrix that highlights the City's most likely low-risk-low-reward, low-risk-high-reward, high-risk-high-reward, and high-risk-low-reward outcomes. The lowest risk with the highest potential reward lies in building the network in a phased approach, specifically based on the Google build-to-demand model.²³ This approach signs up a community by neighborhood (known as "fiberhoods" in the Google model) and once a neighborhood has reached a certain threshold, fiber will be built there.

²³ <http://www.wsj.com/articles/google-fuels-internet-access-plus-debate-1408731700>, accessed April 2015.

Figure 8: Risk and Reward Matrix

		Risk	
		High	Low
Reward	High	<ul style="list-style-type: none"> ○ Deploy a ubiquitous communitywide FTTP build, partner with a private provider to operate the retail component, City maintains ownership and control of assets 	<ul style="list-style-type: none"> ○ Prioritize risk aversion to avoid bonding, slowly expand network in a phased approach and engage private partnership for operation and retail services
	Low	<ul style="list-style-type: none"> ○ City attempts to compete with tiered services similar to incumbents – a “me-too” offering. 	<ul style="list-style-type: none"> ○ Maintain current network and do not pursue expansion of services

If the City chooses this approach, it must recognize that it necessarily sacrifices certain other objectives like affordability and consumer choice. Risk aversion will generally come at the expense of objectives like these, and is especially in conflict with a ubiquitous build-out.

These objectives do not have to be mutually exclusive; instead, the City has to decide to what degree it wants to prioritize which objective, and be prepared for possible conflicts and how to mitigate those. For example, if the City chooses a phased approach, it may opt to first expand service to a location that can demonstrate the power of the network. This will support marketing, and can potentially help convince consumers to sign up for service, thereby achieving ubiquity in a lower risk fashion.

Risk aversion conflicts with ubiquity, choice, competition, and affordability. As we previously noted, it will be challenging to obtain a ubiquitous build-out at all, and especially not within a few years if the City prioritizes risk aversion as its key objective. Because the network is unlikely to be built out quickly in this case, it also reduces the likelihood of increased competition and choice. As we previously noted, the City’s speed to market is critical to secure its potential competitive edge and take full advantage of its unique niche service offering. Further,

affordability becomes more difficult to achieve because the City must align service fees to support self-sustaining operations. This means the monthly service will be priced higher to avoid City subsidy.

If the community chooses to prioritize risk aversion, it will align with ownership, cash flow, and performance. Ownership of the assets usually means lower risk for the City because it has greater control and flexibility.

2.2.9 Cash Flow

Becoming cash flow positive is a common important goal for any business or entity, and it is also a bit complex to define. Net income is often referred to as “cash flow”, though this is technically incorrect because depreciation is a non-cash expense.

Earnings before interest, taxes, depreciation, and amortization (EBITDA) is the difference between operating revenues and operating expenses; it is a key metric in designing a viable financial model, along with net income. In a capital intensive business such as an FTTP enterprise, EBITDA must become positive quickly to keep the enterprise afloat. When EBITDA becomes positive, the business can be said to be cash flow positive. Net income then deducts interest, taxes, and depreciation.

Revenues are tied to an enterprise’s ability to be sustainable or cash flow positive. Collecting revenues to pay off debt and support business operations bolsters the net income and increases the likelihood that it will become positive.

Several objectives may conflict with cash flow, like affordability, ownership, and ubiquity. As we noted, revenue collection directly impacts cash flow so higher revenues mean a greater likelihood of being cash flow positive. If the service is priced affordably, this may mean lower monthly service fees and a longer path to the enterprise becoming cash flow positive, or self-sustaining.

Ownership may also impact cash flow, especially if the City elects to retain ownership of all network electronics, including CPEs. Depreciation costs are significant, and it is important to reserve funds for equipment and infrastructure replacement. Typically, last mile and CPEs are replaced after approximately five years, core network equipment is replaced after seven years, and outside fiber and facilities are replaced after 20 to 30 years. Because the useful life of fiber is considered to be 20 years or more, our financial analyses do not account for its replacement.

Another element of ownership in the context of cash flow is the need for network maintenance and locating costs. Because the City already owns a fiber network and has experience with locating, these additional costs will likely be incremental and less significant than a startup

enterprise. Yet increased costs associated with serving an increased volume of end users may be significant in terms of both locating and replacing equipment at customer homes and businesses.



3 Potential for Public–Private Partnership

The City is prepared to develop a partnership, and we encourage exploring potential relationships with caution. The best possible outcome is one where the City and a private entity work together to achieve mutual goals for the FTTP network. While this model is newly emerging, we believe that engaging a private partner may enable the City to take advantage of opportunities to mitigate risk and maximize opportunity.

Section 2.2.2 noted that bringing a fiber connection to every home and business in the community (ubiquitous FTTP deployment) is a primary objective for many localities—this may be one of the City’s chief long-term goals. Designing and deploying a network that reaches every area²⁴ of the community accomplishes this common objective, but at a cost. To achieve this and other goals, the public sector is in the early stages of exploring partnerships with private providers to reduce the risk of deploying and operating next-generation broadband networks. This may prove to be an especially useful way to more quickly deploy the network and increase a municipal provider’s speed to market—thus reducing the time competitors have to react negatively.

Broadband networks support 1 Gbps speeds and beyond, setting them apart from the legacy copper networks favored by incumbent providers. Fiber also supports symmetrical speeds—a key differentiator for Internet service from Google Fiber and other innovators compared to incumbent telephone and cable companies where upload speeds lag far behind download speeds.

Many communities and localities are likely aware of Google Fiber and municipal fiber success stories²⁵ such as those EPB and LUS. Yet these are only the highest profile examples of successful FTTP deployment. Many other communities may be unable to allocate other resources or funds to the fiber enterprise, or they may lack the population to attract Google Fiber,²⁶ or the capital and expertise to deploy and operate a network on their own. Because of these and other factors, many communities are turning to unique public–private partnership models.

²⁴ Given the scope of construction, the network will be deployed in stages, and some neighborhoods will necessarily be served before others.

²⁵ In many cases, the FTTP network implementation was funded with reserves or other sources, and the operation of the FTTP network is supported with subscriber revenues.

²⁶ Please note that all of the City’s objectives might not be reached in partnership. For example, with Google Fiber the ubiquity goal is not necessarily achieved. It is important for the City to determine which objectives are its priority.

These partnerships are often tailored to the communities that develop them and entail specific parameters that directly benefit both the community and the chosen private partner. Some examples are traditional public–private partnerships that resemble highway and toll-road construction projects. In other cases, public entities may encourage new investment through economic development incentives and other measures to reduce costs for infrastructure deployment. Finally, there are hybrid models where a locality and private entity share the capital costs, operation, and maintenance of a broadband network.

Here we provide an overview of three models for public–private partnerships, including examples of some that have been recently developed. We further offer a framework for the City to consider as it evaluates potential models and attempts to determine which—if any—are best suited to its needs. A successful partnership must consider tradeoffs in risk, benefit, and control to help maximize benefits for the public and private partners.

3.1 Broadband Public–Private Partnership Framework

As the City evaluates broadband public–private partnership models, it should focus on opportunities and potential pitfalls, and consider the following key factors:

- Risk
- Benefit
- Control

These factors are important considerations for both the City and its potential service provider and/or vendor partner(s). A successful partnership must consider tradeoffs in risk-benefit-control to help maximize benefits for public and private partners, and there will inevitably be some tradeoff within this framework for each model.

For example, the higher the public investment, the higher the City's risk. Aside from fortunate communities that won the "Google lottery" or attracted another private partner willing to invest its own capital, most public–private partnerships will require some public investment, which involves risk for a community. But as public funding increases, so does public control over the project itself, including the ability to focus on specific outcomes. The investment in infrastructure and network maintenance and operation that the City is prepared to take allow it a great degree of control in its partnership relationship.

Contrast this with a private investment model where the public sector may be focused solely on engagement and planning. Such a model entails lower public cost and reduced public risk, but it also means the City's benefits are more modest and the private sector partner(s) completely control infrastructure deployment.

Finally, a model designed around shared investment and risk can yield opportunity and benefits both for the City and its partner(s). In such a model, each side of the public–private partnership focuses on its unique strengths while relinquishing other responsibilities and duties to the other partner. For example, the City may opt to fund the construction and deployment of the physical network and preliminary messaging to the public while the partner(s) is tasked with actual deployment and eventual operation overseeing the relationship with end users.

It is important to note that we have only a handful of data points on different models for broadband public–private partnerships. Google has, through its pilot deployments, alerted other companies that there is a business opportunity in community broadband and an increasing number are emerging as potential investors and partners. As a result, there is a range of opportunities for the public sector, but no clear-cut strategy. This is new territory and any community that opts to proceed is necessarily taking on some risk. However, the potential benefits are considerable and the opportunity for public sector innovation and creativity has never been higher. Further, the City is in a particularly favorable position because it has already identified a viable private partner willing to make its own investment and take risks alongside the public entity.

3.1.1 Risk

There is simply no way to altogether avoid risk if the City chooses to proceed with some level of municipal involvement in deploying a broadband network. But calculated risk can and often does yield benefits that would otherwise have been unattainable. One of the most enticing components of a public–private partnership is that it can considerably reduce a locality’s risk while helping achieve a community’s broadband goals.

Public funding to support the partnership will likely be one of the City’s greatest risks. It will likely entail some risk for the City to retain a level of ownership and control of the assets because it will likely require public funding—either through municipal bonds or leveraging tax or other funds.

The City may enter into an agreement that requires it to directly seek bonding for capital investment, or it may find a partner that is willing to use its own capital, such as in a concessionaire model (see Section 3.2). It is important to note that even if the City does not directly seek bonds, some partnership models may impact the City’s credit rating and bonding ability, depending on how the private partner secures financing.²⁷

Operations tend to be unpredictable and costly and often represent a great risk for municipal fiber networks. Cities that try to enter the retail market directly are often targeted by hostile

²⁷ This potential is highest in the concessionaire model.

incumbent providers that make it challenging for the municipality to compete. This can include difficulties as serious as costly litigation. Part of the attraction to the public–private partnership model is that private entities tend to be equipped to understand the retail business and react to market conditions quicker. This expertise helps the City mitigate its operation risk, though there is no guarantee that either party in a partnership can avoid risk altogether.

3.1.2 Benefit

As the City considers this endeavor, it should continually weigh the benefits it might expect to receive as part of a public–private partnership against its potential risk. One positive component of emerging partnerships nationwide is that there is potential for a great degree of flexibility. That is, the City is in a position to consider its priorities and pursue those benefits on the frontend of a partnership arrangement.

Conversely, although public–private partnership models are relatively new and evolving all the time, there are several recent examples that the City can look to as guidance on how it might want to proceed. Not enough time has elapsed to fully map what long-term benefits of partnership might look like, but there are some lessons that can be picked up from some communities that have sought various degrees of partnership.

Although benefits cannot be adequately calculated at this stage, the City can potentially look to other communities to get a sense of the goals other partnerships prioritized for the public entity’s benefit. This may help the City determine how to balance its risks, and which areas to focus on in its pursuit of a partner.

3.1.3 Control

Because this is the start of the City’s endeavor, it can choose in the negotiation process its desired level of involvement in infrastructure deployment, network maintenance, and operations. That is, the City can essentially determine from the outset what level of involvement it would like to have at every stage and in every arena of the public–private partnership process.

There are numerous ways that the City can retain some control within the public–private partnership, and perhaps the most important is through retaining ownership of the physical assets. Again, there is a balance to be struck with risk—it is likely that the City will be required to fund at least part of the capital investment in assets if it hopes to retain control of these.

The flip side of this is the more ownership the City has, the greater degree of control it can maintain. This enables the City to make decisions about placement of the assets, rate of deployment, and the network’s overall footprint. Further, it ensures that if the partnership does

not succeed, the City still has a physical asset that it can use to deliver services directly or to negotiate a new partnership.

Ownership of assets is an important way the City can retain control. There are also other potential mechanisms that enable the City to retain some control over the network and enterprise, and to ensure that the partnership consistently works in its favor. For example, the City may negotiate certain contractual provisions that provide it with some amount of control.²⁸

3.2 Model 1 – Public Investment with Private Partners

One public–private partnership model involves substantial public investment. It is a variation on the traditional municipal ownership model for broadband infrastructure, in which a public entity takes on all the risk, but also has full control of the project.

The emerging innovation makes use of the traditional public–private partnership structure used in Europe and increasingly in the U.S. for infrastructure projects such as highways, toll roads, and bridges, where a private partner takes responsibility for design, construction, financing, operations, and maintenance.²⁹ The model seeks to leverage the strengths of the private sector to deliver turnkey services and solutions over an extended time of 20 to 40 years.

For example, the state of Maryland is pursuing private companies to design, build, operate, and help pay for a light-rail project to serve the Washington metro area suburbs.³⁰ Under the proposed public–private partnership, Maryland and private partners would split the construction costs for the project and the state would later reimburse the private construction costs over five years. The private sector would assume the financial risks of any construction delays or cost overruns. The state would then pay the private partners a concessionaire to operate and maintain the line for 30 to 35 years.

We are now seeing the public–private partnership model applied to broadband in the U.S. market. Though, we have seen it in other construction projects, broadband is new because unlike transportation infrastructure, broadband is to a certain extent a competitive marketplace. Thus, applying it to broadband is new and innovative, but also creates a political and financial risk for the public sector, given that public–private partnerships often provide a guaranteed revenue stream to a private partner.

²⁸ The City’s legal counsel can determine the best contractual mechanisms to consider in the context of a public–private partnership; CTC cannot provide legal guidance.

²⁹ “Financial Structuring of Public–Private Partnerships (P3s),” U.S. Department of Transportation, 2013, http://www.fhwa.dot.gov/ipd/pdfs/p3/factsheet_04_financialstructuring.pdf (Accessed April, 2015).

³⁰ Katherine Shave, “Maryland gets approval to seek public–private partnership to build, operate Purple Line,” *Washington Post*, Nov. 6, 2013, http://www.washingtonpost.com/local/trafficandcommuting/maryland-transportation-officials-get-approval-to-pursue-private-partners-for-purple-line-deal/2013/11/06/93c1546a-470b-11e3-bf0c-cebf37c6f484_story.html (Accessed April, 2015).

If the broadband network is unsuccessful at generating revenues the public sector remains on the hook for those payments. Despite these risks, the model offers considerable benefits to the public sector by removing significant financial and logistical barriers to large-scale public broadband projects.

Macquarie Capital and partner companies have pioneered the model in the U.S. Macquarie is an Australian investment firm that provides advisory and capital raising services to corporate and government clients in areas such as infrastructure, utilities, telecommunications, media, entertainment and technology.³¹ They are currently in the midst of a complex process with localities that are members of the UTOPIA Network, a fiber-to-the-home (FTTH) network in Utah that is owned by 15 member communities.³² Following a 6-5 split among the 11 member cities, the UTOPIA board voted in 2014 to turn over operation and management of the network to Macquarie.³³ The private company will finish construction of the network and provide Internet service to all residents for 30 years in exchange for a monthly utility fee paid by the residents of the member communities.

The proposal is attractive given the turnkey private financing, deployment, operations, and revenue-sharing solutions that Macquarie can deliver. However, the requirement of guaranteed public funding in the form of a utility fee to all residents is not politically viable for some communities. As a result, a small handful of UTOPIA member communities have dropped out of the proposal. The City may find that because of the strong libertarian presence, it could struggle to gain public approval of any additional utility fees or taxes, and this may make the Macquarie model especially challenging to pursue.

Macquarie is also working with the Commonwealth of Kentucky on a private-public partnership to build an open-access, middle-mile broadband network across the state.³⁴ Under the partnership, the Commonwealth will own the network and contribute some funding for construction. Macquarie will finance the bulk of construction and have a 30-year contract to operate and maintain the network. Revenues generated by leasing the network to Internet providers will be split between the Commonwealth and Macquarie.

³¹ <http://www.macquarie.com/us/about/company/macquarie-capital#> (accessed April 2015).

³² <http://www.utopianet.org/about-utopia/> (accessed Apr. 24, 2015).

³³ Benjamin Wood, "UTOPIA board votes to move forward with Macquarie deal," *Desert News*, June 30, 2014, <http://www.deseretnews.com/article/865606086/UTOPIA-board-votes-to-move-forward-with-Macquarie-deal.html?pg=all> (accessed April 2015).

³⁴ Rachel Aretakis, "Partnership to build high-speed broadband network in Kentucky," *Louisville Business First*, Dec. 23, 2014, <http://www.bizjournals.com/louisville/news/2014/12/23/partnership-to-build-high-speed-broadband-network.html?page=all> (accessed April 2015).

The public sector is not dependent solely on private parties like Macquarie to develop similar projects. There are likely other entities that would engage in this type of arrangement that leverages private sectors strengths while recognizing that some public funding is necessary to enable next generation connectivity. Public investment and public-private partnership models that leverage private partners with turnkey solutions are attractive because they remove significant challenges from public sector, but also require a community to take on some risk. As a result, the model will appeal to some communities, but not to others.

3.3 Model 2 – Public Sector Incenting Private Investment

In another model of public-private partnership, the cost to the public sector is significantly reduced. The model focuses on more modest measures by the public sector to enable or encourage greater private sector investment. The most prominent example of the model is Google Fiber, including its deployments in Kansas City and Austin.

The model is seen as the ideal for many communities given that public cost is minimized and Google's requirements have largely focused on engagement with the company and making local government processes more efficient. In return, communities fortunate enough to attract Google's investment not only benefit from the company's own deployment of FTTP infrastructure, but also upgrades from the incumbent cable and telephone companies. The model relies on the private companies to make the investment, while partner communities take certain steps to enable them come into the market to build in an expeditious, efficient, low-cost manner. Though Google Fiber is the most prominent example, there is significant interest by smaller companies as well who may not be able to deploy FTTP but deliver next-generation broadband to businesses and intuitions on a more targeted basis.

Even as the cost/risk for public sector is largely reduced compared to other models, there is a potential public relations risk. Public expectations can get very high with the announcement of new fiber deployment. If the community is strongly identified as a partner, when something goes wrong with private sector business plan or deployment, the public sector may held accountable for the private sector failure.

There are a number of strategies localities can take to encourage new private investment and reduce some of the costs and time for private sector entities to deploy advanced broadband services. They can take the form of specific economic development incentives such as tax benefits to encourage providers to build new infrastructure. For example, MetroNet, a small Midwest Internet provider, developed a partnership with the City of Crawfordsville, Indiana to

purchase the municipal utility's fiber network. The city is assisting MetroNet with financing the purchase and expanding the footprint of the fiber network.³⁵

MetroNet has entered other communities where they did not purchase existing infrastructure, but where the municipality has provided other tax benefits, and modified permitting process to allow for ease of access. Again, a major consideration for a partner like this is the high likelihood that the private entity will *not* build to all areas of the community. If a private company is not beholden to the City via a clearly articulate partner relationship, it is unlikely that the private company will build to areas of the community where it does not anticipate easily recovering its costs.

Another key strategy is to develop and strengthen the local infrastructure assets that enable the deployment of broadband.³⁶ These include public assets such as fiber, conduit, and real estate. For example, new network deployments can benefit enormously from access to existing government fiber strands, underground communications conduit in which fiber is placed, or real estate where equipment or exterior huts can be located. The City's existing fiber network and infrastructure may be usable to some degree to incent private investment—for example, a private entity may need access to only a small amount of dark fiber to serve certain areas.³⁷

Communities can further facilitate the underground construction of conduit and fiber by implementing a “dig-once” policy for all road and related transportation projects, and facilitating in-building access for new providers through construction specifications for new buildings. These policies are generally implemented through revisions to existing municipal codes or by developing new ordinances.

Building and expanding your broadband assets over time is a low-cost, low-risk strategy that will have real impact and expand options down the road. For example, Mesa, Arizona began a dig-once initiative in the early 2000s to install its own rings of conduit during private sector construction projects, and then to sell access back to the private sector. Anytime the city was required to open up a street, such as to install water or sewer utilities, it also put in conduit.³⁸ In some instances, the City also added fiber to empty conduit for city purposes or to potentially

³⁵ “MetroNet plans to expand current fiber optic system,” “The Paper of Montgomery County Online, Mar. 18, 2014, <http://thepaper24-7.com/Content/News/Local-News/Article/MetroNet-plans-to-expand-current-fiber-optic-system/23/22/44447> (Accessed May 2015).

³⁶ “Gigabit Communities: Technical Strategies for Facilitating Public or Private Broadband Construction in Your Community,” CTC Technology & Energy, Inc., Jan. 2014, p. 6 – 12, <http://www.ctcnet.us/wp-content/uploads/2014/01/GigabitCommunities.pdf> (Accessed May 2015).

³⁷ As we previously noted, the City's existing dark fiber infrastructure must be fully evaluated to determine what, if any, portion of it is usable for the FTTP network.

³⁸ “Transcript: Community Broadband Bits Episode 139,” Institute for Local Self-Reliance, Feb. 26. 2015, <http://muninetworks.org/content/transcript-community-broadband-bits-episode-139> (Accessed April, 2015).

lease out to private providers. In total, the city installed 150 to 200 miles of conduit. The City in particular targeted four economic development areas, including developing redundant conduit, fiber, and electric infrastructure. Among those areas was land around the Phoenix-Mesa Gateway Airport, where Apple recently announced that it would invest \$2 billion to build a data center for the company's global networks investment.³⁹

A second important strategy is to improve access to information—an asset that communities might not have considered. Sharing information demonstrates a willingness to engage with the private sector to spur investment. Communities should seek to make data available wherever possible both for public and private uses.

GIS or similar databases that hold such information as street centerlines, home, and business locations, demographics, existing utilities, locality infrastructure, rights-of-way, and available easements can be extremely helpful for a locality's own broadband planning, potential public-private partnerships, or a network service provider that is evaluating the deployment of new infrastructure into a community.

Access to this information may attract and speed new construction by private partners, while enabling the community to meet its goals for new, better broadband networks—and potentially to realize revenues for use of the assets.

Finally, localities can take steps to make government processes around permitting, rights-of-way access, and inspections more efficient and smooth to help with broadband construction. These actions can signal to private partners that there is an investment opportunity in the jurisdiction and that the locality will not be a bottleneck or create additional costs. These steps should take into consideration the needs of the community, balance public interest and public safety, and account for local resources and capacity. For example, localities should be fully transparent about the range of permitting and rights-of-way processes, including timelines, to enable the communication industry to expeditiously plan and deploy networks.

The above strategies (including assets, data and efficient processes) can make a difference in the economics of build out for a private partner. However, they will not dramatically change the underlying economics of broadband networks construction and service. In a best-case scenario, the public sector can potentially reduce the construction of a broadband network in a way that can be substantial but not transformative for developing next-generation broadband infrastructure.

³⁹ <http://azgovernor.gov/governor/news/governor-doug-ducey-announces-major-apple-expansion-arizona> (Accessed April, 2015).

Indeed, many incumbent providers overstate the extent to which communities and regulation are the problem. If a community is offering the equivalent of economic development or other benefits to a company to entice them to invest in next generation infrastructure that is different than the business relationship a community already has with existing providers and incumbents. Communities can and should offer those benefits to incumbents if they will also invest in the same kind of next-generation infrastructure. Communities should be wary of private sector entities seeking benefits without offering concrete investment proposals. From a business standpoint, incumbents do not need additional benefits to keep maintaining their existing broadband networks and services.

3.4 Model 3 – Shared Investment and Risk

A public–private partnership model based upon shared investment and risk plays to the strengths of both the public and private sector partners. Any locality thinking about an FTTP deployment is not doing so because it is a moneymaker or a good strategy for bringing in new revenues. Rather, it is a powerful strategy for education, healthcare, and economic development. Thus in a shared investment model, from the standpoint of a locality, the risk is shared but the community still receives 100 percent of indirect benefits, even if they all do not all appear on the project’s financial statements. For the private partner, it means less upfront investment and capital (risk), with an opportunity for future revenues.

This model offers an extraordinary opportunity for innovation. However, we are in the early stages of what it looks like—and the model is in no way a sure thing for communities. In 10 years, we may be able to look back and have the data points to develop the best practices necessary for success. At the moment though, early actors are developing new and exciting partnerships to bring next-generation broadband to their communities. In the following case studies, we briefly describe some of those projects.

3.4.1 Case Study: Champaign-Urbana, Illinois

The University of Illinois and the two cities of Champaign and Urbana, Illinois have worked together over the past number of years to expand broadband infrastructure and connectivity across the area. Those efforts included the development of the Urbana-Champaign Big Broadband (UC2B) network, which is now owned and operated by a not-for-profit (NFP) corporation.⁴⁰ Through a range of different strategies and by leveraging local private capital, state funds, and federal funds, UC2B built fiber rings specifically engineered to enable FTTP deployment in the most cost-effective manner. It also built FTTH in select parts of the community with lowest adoption rates on theory that those parts of the community would be the last place private sector would deploy; so the public sector went there first.

⁴⁰ <http://uc2b.net/about/> (Accessed April, 2015).

U2CB leveraged its existing investment to attract a private partner, iTV-3, an Illinois company with FTTH experience. The two partners, entered into an agreement that gives iTV-3 access to U2CB fiber through an indefeasible right of use (IRU) at no cost in return for meeting community's goals of deploying additional FTTH with the following requirements:⁴¹

1. Gigabit service speeds
2. Wholesale access on the network to competing companies
3. No cherry picking – all neighborhoods have equal opportunity to get services if presales reach 50 percent of residents

Under this model, Champaign-Urbana receives 100 percent of economic development and other benefits in return for taking on approximately 30 percent of the (cost) risk. It also means the community can now focus on driving demand and adoption, while relying on an experienced private partner to handle customer service, marketing, and operations.

3.4.2 Case Study: Garret County, MD

Garret County, in far western Maryland, is a relatively remote community in Appalachia surrounded on two sides by West Virginia, on one side by Pennsylvania. The County has struggled to get broadband in a number of remote parts of the community. Where broadband is available, it is inadequate DSL service that does not meet the FCC's minimum definition for broadband, let alone the requirements for home-based businesses. The incumbent provider has not made any plans to expand or upgrade service offerings.

Though mobile broadband is available, bandwidth caps mean that it is not viable for economic or educational activities. For example, parents who home-school their children can run through their bandwidth cap in one day of downloading educational videos. Beyond these challenges for residents, the County has struggled to attract and retain businesses.

In response, the County has gradually and incrementally built out fiber in some areas, with a focus on connecting specific institutions. It is now in negotiations with a viable private partner to leverage some of that fiber and additional public funding to support the deployment a fixed wireless broadband network that will serve up to 3,000 homes in the most remote parts of the county. The private partner will also put its own capital toward the construction of the network, along with its technical and operational capabilities to manage the network. The partnership may involve significant cost to the County, but also massive benefit for residents and business in the newly served areas.

⁴¹ <http://uc2b.net/wordpress/wp-content/uploads/2014/05/UC2B-iTV3-Press-Packet.pdf> (Accessed April, 2015).

3.4.3 Case Study: Westminster, MD

Westminster is a bedroom community of both Baltimore and Washington, D.C., where currently 60 percent of the working population leaves in the morning to commute to work elsewhere. The area has no major highways and thus, from an economic development perspective, has limited options for creating new jobs. Incumbents have also traditionally underserved the area with broadband.

The City began an initiative 12 years ago to bring better fiber connectivity to community anchor institutions through a middle-mile fiber network. In 2010, the State of Maryland received a large award from the federal government to deploy a regional fiber network called the Inter-County Broadband Network (ICBN) that included infrastructure in Westminster.

Westminster saw an opportunity to finish the goal of the network by expanding the last-mile of the network.

At the time, though, it did not have any clear paths to accomplish the goal. City leaders looked around at other communities and realized quickly that they would have to do something unique. Unlike FTTH success stories such as Chattanooga, Tennessee they did not have a municipal electric utility to tackle the challenge. They also did not have the resources, expertise, or political will to develop from scratch, a municipal fiber service provider to compete with the incumbents. As a result, they needed to find a hybrid model.

As the community evaluated its options, it became clear that the fiber infrastructure itself was the City's most durable asset. All local governments spend money on durable assets with long lifespans, such as roads, water, and sewer lines, and other infrastructure that is used for the public good. The leaders asked, why not think of fiber in the same way? The challenge then was to determine the breakdown of the network: What part would the private sector partner handle and what part could the City take responsibility for?

The hybrid model that made the most sense required the city to build, own, and maintain the dark fiber⁴², and to look to partners who would light the fiber and handle the customer service relationship with residents and businesses.

The model would keep the city out of operational aspects where a considerable amount of the risk lies in terms of managing the technological and customer service aspects of a network. The City solicited responses from potential private partners through a request for proposal (RFP). Its goal was to determine who was interested in the project, and who shared the City's vision.

⁴² Fiber configured to support a GPON architecture.

It was challenging to find partners who were willing to share infrastructure and operations. Eventually the City selected an upstart ISP called Ting, with a strong track record of customer service as a mobile operator. Ting shared Westminster's vision of a true public-private partnership and of maintaining an open access network.

Under the terms of the partnership, the City is building and financing all of the fiber (including drops to customer premises) through a bond offering and tax dollars from the property tax base. Ting is leasing fiber with a two-tiered lease payment. One fee is based upon the number of premises the fiber passes (as the network grows both in size and customers there is an upside for the community) and the second fee is based on number of subscribers they enroll.

As the network grows, Ting will help fund the network capital expenditures, which will lessen the financial burden on Westminster. In the future, additional operators may become partners on the network as well, opening the door to additional services for the community and revenues for the city.

3.5 Define the City's Objectives

As the City considers its roles and responsibilities in a public-private partnership, it is important for its key goals or objectives to be clearly defined. This will help City officials and staff articulate priorities in advance of a potential partnership negotiation, which should in turn help the City manage its potential risks by identifying strengths and vulnerabilities ahead of time.

Ubiquity is often a top priority for public entities, and one that officials and staff can easily identify—bringing fiber to every resident and business in a community is can significantly increase quality of life and economic development opportunities. It is also politically palatable and can help incite the public to support a locality's FTTP project. This is one of the City's stated goals: it will not cherry pick, but will prioritize building to every area of the community.

Another important objective that may be more difficult to identify and especially challenging to define in the context of a public-private partnership is ownership and control of assets. Precisely what it means to own and control assets may vary from one community to another, and it is important for each locality to determine where on the spectrum its priorities lie.

3.6 City and Partner Responsibilities

The City should determine what role it expects to take on in design, deployment, and operation of the FTTP network before it moves forward with any type of relationship with the private sector. While this can and should be flexible, the City should have some sense of what it is absolutely *not* willing or able to do, and what functions it *must* retain in-house. For example, the City may be unable to turn over some aspects of fiber maintenance to a private provider.

Various partners bring different skillsets and experience to the potential relationship, and the City should remain open to all the potential functions a partner can perform. For example, the City may initially expect that it will perform all network maintenance on the new FTTP network, but ultimately finds that a partner wishes to take on some or all of these duties. The City can expect that each potential partner will possess its own unique approach to FTTP deployment and operation, and there may be minimal flexibility on some aspects of a partner's business model.

It is our understanding that the City aims to retain ownership and control of the fiber assets, and responsibility for network maintenance, while engaging a private partner to manage retail service. Effective customer acquisition, marketing, and sales campaigns are generally expensive and require a skill set that public entities may not possess without hiring additional staff and/or contracting services with a third party. Because the City does not have experience with marketing and advertising an FTTP network or a similar undertaking, it may be prudent to consider leaving this task to the private partner. A partnership should allow for both the public and the private entity to capitalize on their strengths and shift other responsibilities to the other partner. As Section 1.2 noted, the public and private sectors each have unique advantages and disadvantages to bring to a partnership.

3.7 Additional Considerations for Public-Private Partnerships

It is important to approach various models and proposals for public-private partnership with common sense and skepticism as public sector entities of all sizes and capacities evaluate them. Next-generation fiber deployment, particularly on a large scale to reach all residents and businesses in a community, is a valuable and potentially future-proof investment. But it will not be cheap or easy. The City should ask any private provider that claims otherwise or asserts that it will deliver enormous benefits or revenues at no cost should for examples of projects where it has accomplished what it is promising. If it were easy, there would be enormous private investment in FTTP across the country. Unfortunately, there will always be entities trying to sell snake oil with unrealistic business plans. Communities should be wary of rosy projections.

There are several examples of municipal or public fiber endeavors that may have started strong but have struggled to stay afloat, or have even had to sell assets or otherwise enter into agreements in which they are forced to relinquish a great deal of control. Tacoma Click! is an example of a public network that consistently struggled to become viable, and ultimately

entered into discussions with two separate private entities to essentially “take over” network operations.⁴³

Further, some supposed success stories leave out special circumstances that enabled the enterprise to prosper. For example, a municipal provider that enters a market where there is little or no competition has an advantage that often cannot be replicated. Other fiber endeavors may have been heavily subsidized through funding sources that are not available in all communities.

It is also critical for the City to seek private sector partners that are interested in developing meaningful partnerships to deploy next-generation infrastructure. For example, a significant risk around economic development incentives and other measures to facilitate private investment is that companies will request that localities take on certain costs; for example, a private partner might ask the local government to hire dedicated inspectors and provide free access to real estate—and provide in return only tacit commitments for new services or technological upgrades. If a company is a true partner, it will be willing to make firm commitments in return for the actions the locality takes to lower infrastructure deployment costs. The goal of these partnerships is not simply to shift private sector costs to the public sector.

In addition, partners and partnerships will differ in different parts of company, and with the size of community. A primary challenge for localities seeking to build to every residence and business is that the larger the community, the more difficult it may be for a private partner to deploy its service universally. By taking on the risk of fiber construction and finding a partner to light the network and provide service, a locality can increase the potential for ubiquitous build-out to every location.

Finally, do not underestimate the importance of the political element in tackling these challenges. Political concerns will play a huge role in finding solutions, regardless of the size of the community. Community and political leaders must jointly decide to pursue a project of this scope, to solve the problems that may arise along the way, and to bring fiber and its benefits to the community.

⁴³ <http://www.thenewstribune.com/2015/04/22/3754054/tacomass-rainier-connect-makes.html>, accessed June 2015.