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AEBEL

21ST CENTURY BROADBAND FOR THE CITY OF CAMBRIDGE

Presentation to Upgrade Cambridge
May 4, 2022

AGENDA

- Study scope overview and timeline (CTC)
- Business model review (Rebel)
- Upgrade Cambridge questions/topics (all)
- Open discussion

PROJECT OVERVIEW

GOAL: Provide Cambridge the necessary tools, data, and analyses to support informed decision-making on municipal broadband options




- Baseline infrastructure analysis
- Technical analysis and design
- Market analysis
- Financial analysis
- Development of business and ownership models
- Inform process through stakeholder and community input

WHERE WE ARE TODAY

- Site surveys and design/cost estimate underway
- Exploratory business models developed
- Market analysis underway, residential survey launching soon
- Planning engagement with business community
- Coordinating with Cambridge Housing Authority/affordable housing

SCOPE ELEMENTS OF THE BROADBAND NETWORK

Business models distinguished largely by defining the role of parties at each scope element of the network

Passive Infrastructure	Active Infrastructure	Service Provision
		
Building and maintaining the dark fiber network	Setting up and operating the active electronics on the network	Delivering broadband services to subscribers

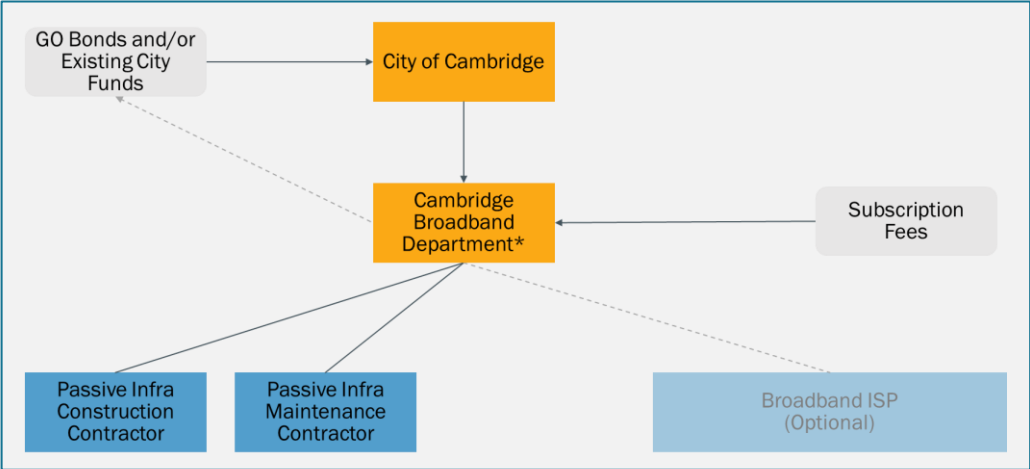
SUMMARY OF BUSINESS MODELS

Model #	Passive Infrastructure	Active Infrastructure	Service Provision
1	City funded/financed and maintained	Muni ISP (Broadband department or outsourced)	
2	City funded/financed and maintained	ISP (one or multiple)	
3	City funded/financed and maintained	Active Infra contractor	Multiple ISPs / open market
4a	Hybrid funded/financed, privately maintained	Multiple ISPs	
4b	Hybrid funded/financed, privately maintained and operated		Multiple ISPs / open market
4c	Hybrid funded/financed, privately maintained and operated		

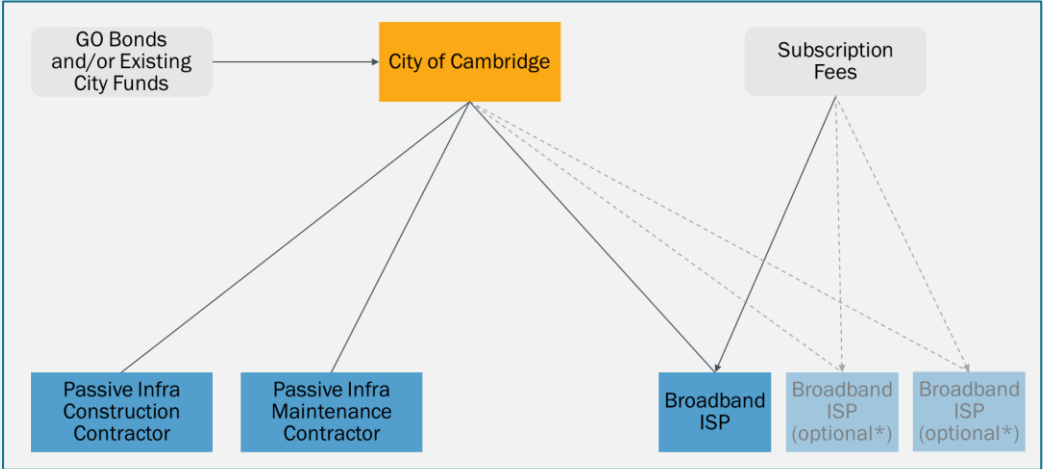
ILLUSTRATION OF BUSINESS MODELS

The following visuals show the entities and contractual relationships for the various business models considered

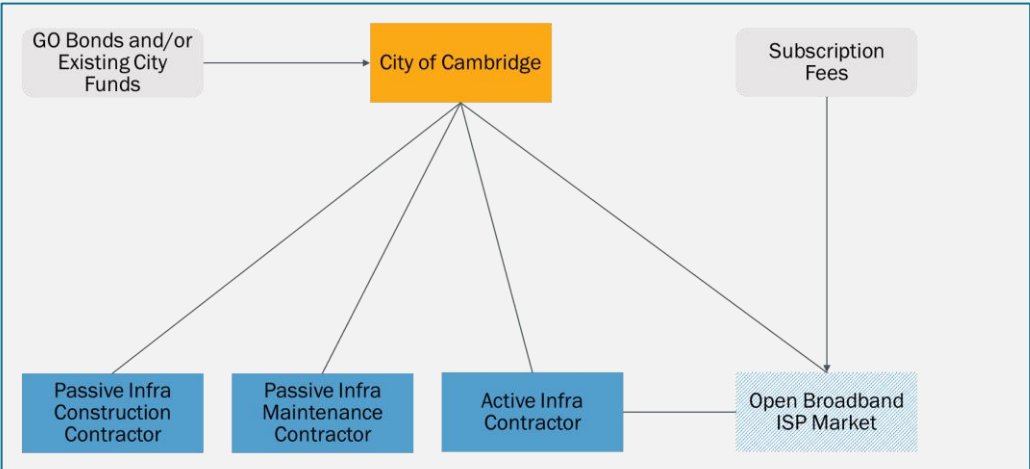
#1



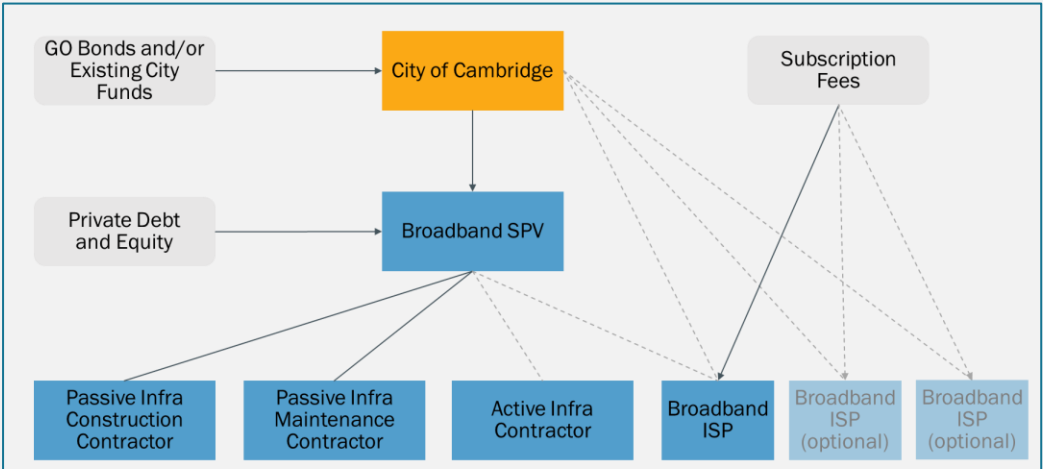
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#3



#4



COMPARING BUSINESS MODELS TO OBJECTIVES

We revisited the specific goals developed by the City's Broadband Task Force and assessed how the choice of business model affects meeting those goals.

- We concluded that three of the City's goals (#1, #3 and #4) can be achieved regardless of the business model chosen.
- Equity is one of the City's most important policy objectives. Extending high speed affordable broadband to all can be achieved through means testing, which can be incorporated into contractual provisions even in models with private investment.
- Irrespective of the business model chosen, entrepreneurs and small businesses will benefit greatly from symmetrical gigabit connectivity, and the project will spur innovation and excellence.
- In addition to the Broadband Task Force's goals, we found it necessary to add two additional goals that are important to the City: Public ownership and minimizing (the City's) financial risk.

Broadband Objectives:

1. Affordability and Equity
2. Choice and Competition
3. Supporting Entrepreneurs & Small Business
4. Innovation & Excellence
5. Local Control

















CRITERIA FOR EVALUATION OF BUSINESS MODELS

Based on the Cambridge Broadband Objectives, we developed the following criteria to evaluate the various business models proposed

- **Public Ownership:** Does the business model allow the public sector to retain long-term ownership of (at minimum) the Passive Infrastructure?
- **Local Control:** Does the business model allow the City to incorporate key public policy goals into contracts with private partners (e.g., price benchmarking rather than setting rates)?
- **Choice & Competition:** Does the business model lend itself to increased choice and competition for subscribers?
- **Minimizing Financial Risk:** Does the business model serve to minimize the long-term financial risk to the City as the owner of (at minimum) the Passive Infrastructure?

BUSINESS MODELS: QUALITATIVE ASSESSMENT

A comparative evaluation based on Cambridge's broadband objectives

Model #	Passive Infra	Active Infra	Service Provision	Public Ownership	Local Control	Choice / Competition	Minimize Financial Risk
1	City	Muni ISP					
2	City	Private ISP(s)					
3	City	Active Infra	Open Market				
4	Hybrid						

Fails to meet criteria      *Meets criteria*

BUSINESS MODELS: RISK ALLOCATION OVERVIEW

A comparative risk allocation of the business models

Model #	Passive Infra	Active Infra	Service Provision	Construction Risk	Maintenance Risk	Operating Risk	Revenue Risk
1	City	Muni ISP		Traditional	Traditional	Retained by City	Retained by City
2	City	Private ISP(s)		Traditional	Traditional	Transferred to ISP(s)	Transferred to ISP(s)
3	City	Contractor	Open Market	Traditional	Traditional	Transferred to Active Infra contractor & ISPs	Transferred to ISPs
4	Hybrid*			Enhanced through long-term private financing	Enhanced through long-term private financing	Transferred to private sector	Transferred to private sector

PUBLIC FUNDING OPTIONS

Municipal broadband networks have been funded and financed in many different ways across the U.S. and internationally.

Some networks may be able to be funded entirely through subscription fees (revenue collected from subscribers), but public funding is often required to make the project financially feasible. Some common public funding sources for municipal broadband include:

- General property tax
- Dedicated sales tax or sales tax increment
- Utility fee (charge for services)
- Special assessment districts
- Existing budget/capital funds
- “In-kind” support (e.g., access to rights-of-way, data, or tax breaks)
- Grant funding (federal/state)

Some of these sources can be used to repay financing for the upfront capital investment.

QUESTIONS FROM UPGRADE CAMBRIDGE – FOR DISCUSSION

- What is the status and timeline for feasibility study?
- Can you share study's preliminary financial analysis?
- How will study account for the benefits, both financial and non-financial, of municipal broadband?
- How do you propose to address digital equity in a financially sustainable manner?
- Issues with Municipal Light Plant structure? E.g. timing of City Council and public voting
- How about a Joint Powers Entity?
- Describe outreach efforts (aside from surveys and some stakeholder meetings like this one)?
- How can Upgrade Cambridge help?

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THANK YOU!




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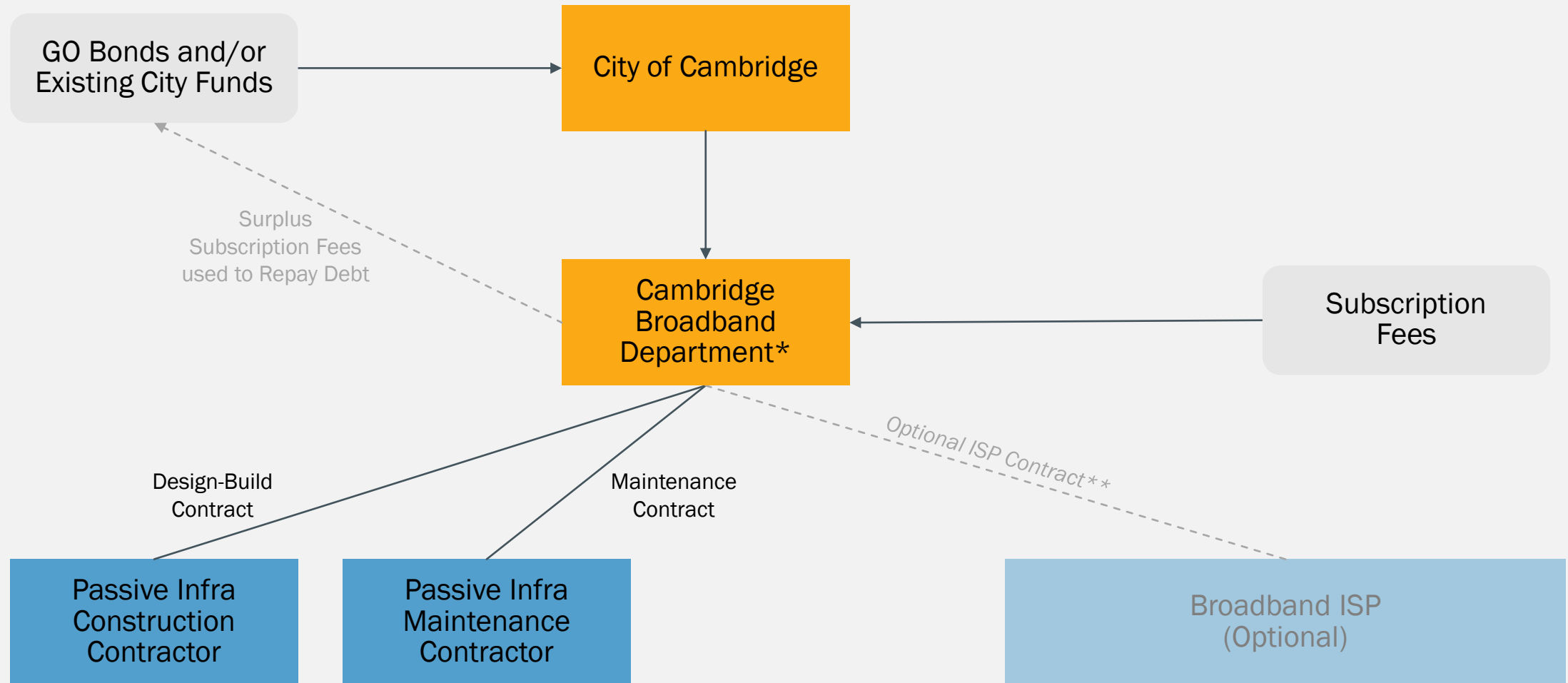
APPENDIX

COMPETITION

The City should create competition *for* or *on* each of the various scope elements to maximize value for taxpayers and subscribers

Passive Infrastructure	Active Infrastructure	Service Provision
		
Competition <i>for</i> scope element	Competition <i>for</i> scope element	Competition <i>for</i> or <i>on</i> scope element
	Competition <i>for</i> combined scope elements	





MODEL 1: OVERVIEW



* New City broadband entity to develop FTTP network, light fiber, and provide broadband services to end users.

** ISP (optional) receives payment from City Broadband Department for Active Infrastructure and Service Provision.

MODEL 1: PROS, CONS & OPTIONS

Model #	Passive Infra	Active Infra	Service Provision	Public Ownership	Local Control	Choice / Competition	Minimize Financial Risk
1	City	Muni ISP					

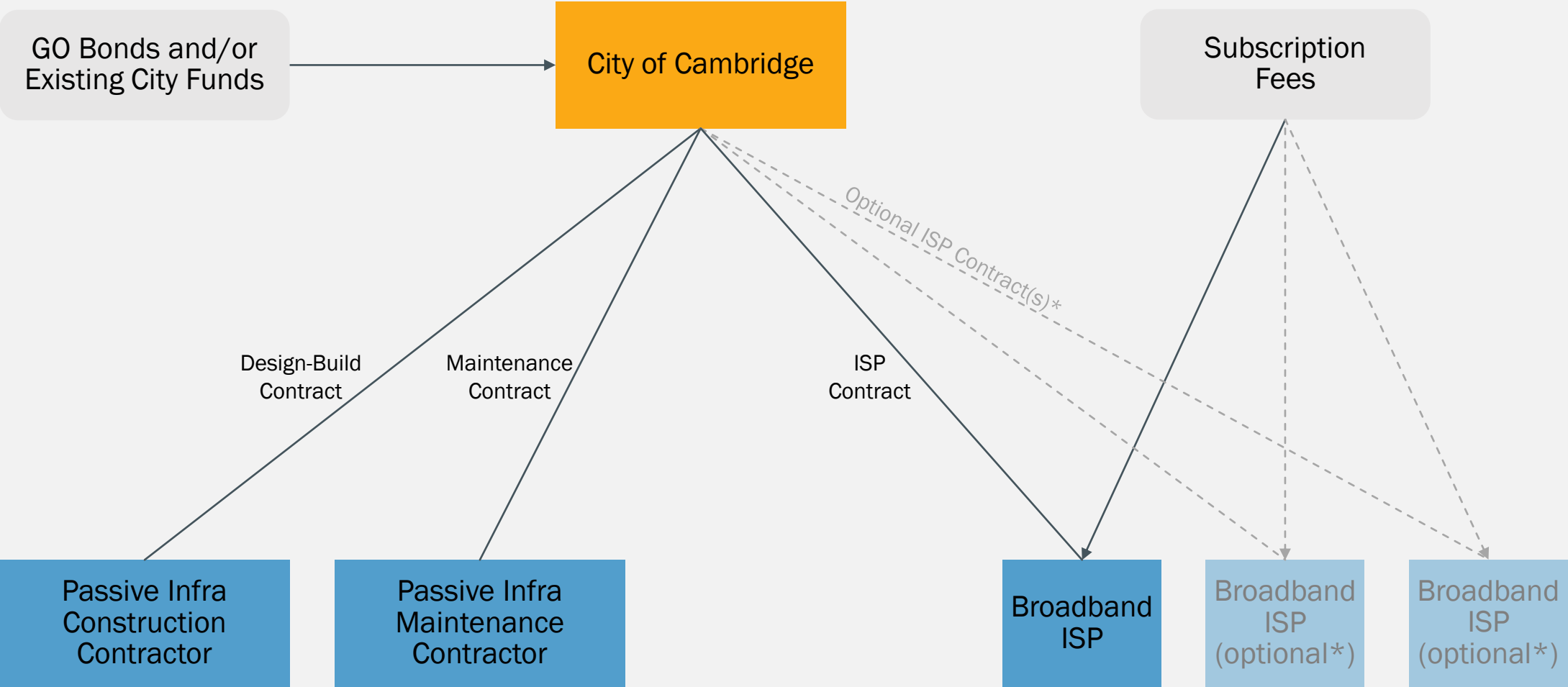
- ❑ Pros: A City funded and operated network is the only business model in which the City will have full control over all aspects of the broadband network construction and operations, including the phasing and prioritization of digital equity sites. A municipally-owned and operated fiber to the premises network will provide a meaningful alternative to Comcast.
- ❑ Cons: The City is missing out on opportunities to transfer risks to a private sector party that may be better equipped to manage those risks (including interfaces between scope elements). The City is fully retaining the risk on subscriber take rates and long-term subscriber revenues. In addition, the City is responsible for the day-to-day operations and retains the risk associated with operation and maintenance costs.
- ❑ Options/Alternatives: The City could decide to outsource Active Infrastructure and Service Provision to a private company, without transferring revenue risk to that entity. Under this model, the City would not be responsible for day-to-day operations of the network although it would continue to be exposed to long-term risks associated with operation and maintenance costs.

CASE STUDY: WHIP CITY FIBER

This case study highlights an example of a municipally-run ISP delivering services on municipally-funded/financed infrastructure, right in Cambridge's backyard





- Whip City Fiber is an ISP operated by Westfield Gas & Electric (WG+E), providing symmetrical 1GB service to homes and businesses in 20 communities in western MA through a municipal utility structure called a Municipal Light Plant (MLP).
- Under this model, the local municipalities fund and finance the construction of passive infrastructure, and Whip City Fiber provides the active infrastructure and services to end users.
- This case demonstrates how a municipal utility with existing experience in delivering services to customers can expand into the broadband sector.
- This example is also unique in that WG+E is serving as ISP for many municipalities.
- Some other notable examples of municipal broadband networks delivered under a similar model include LUS Fiber in Lafayette, LA, Chattanooga, TN, and Deerfield Valley, CO.

MODEL 2: OVERVIEW



*Option for one or multiple ISPs. Contract(s) may include lease fee to City for use of dark fiber and/or revenue sharing agreement.

MODEL 2: PROS, CONS & OPTIONS

Model #	Passive Infra	Active Infra	Service Provision	Public Ownership	Local Control	Choice / Competition	Minimize Financial Risk
2	City	Private ISP(s)					

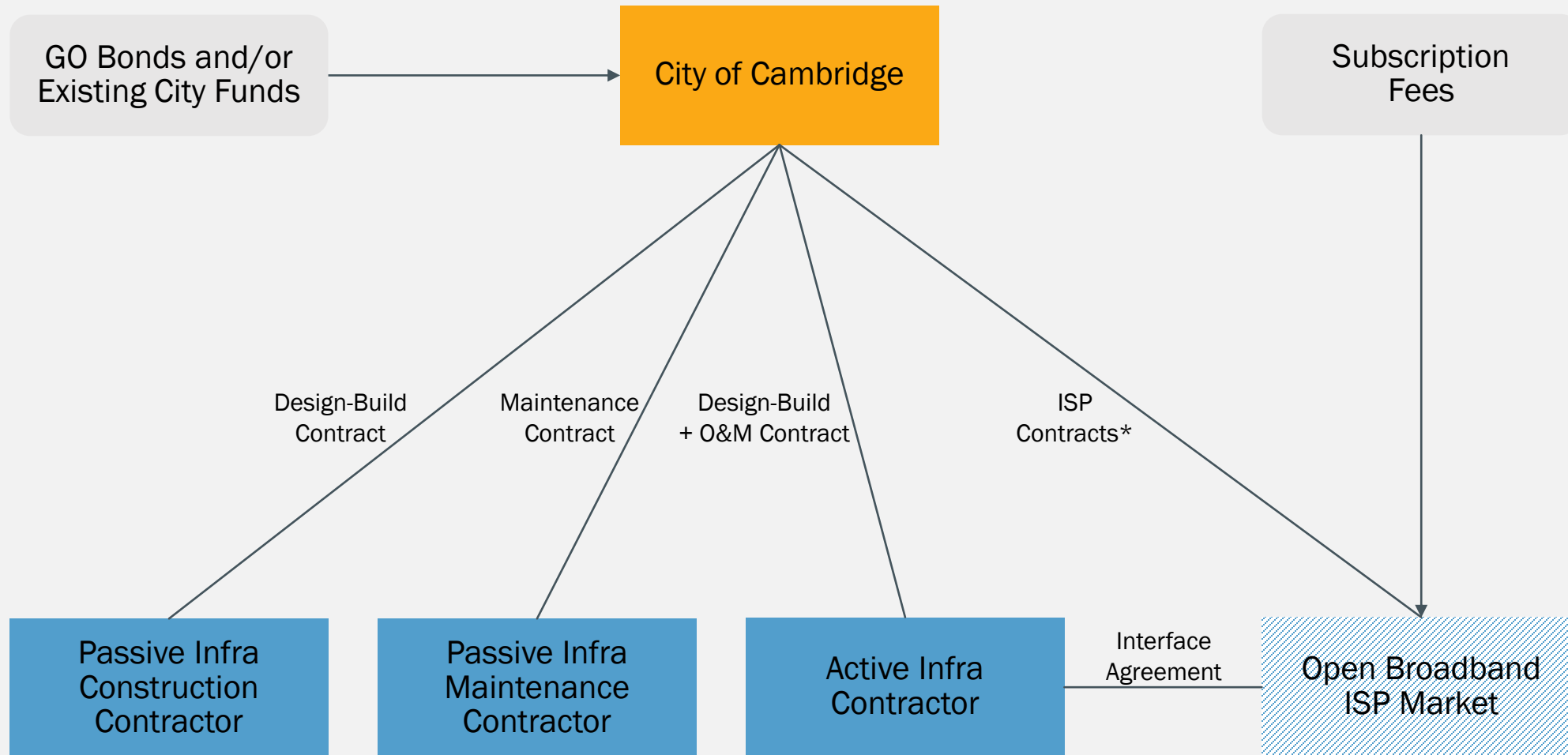
- ❑ Pros: The City controls the dark fiber and given market characteristics/conditions, can be confident there will be private ISPs interested in leasing the dark fiber network and providing Active Infrastructure and Service Provision. City has flexibility to structure combination of lease fees and revenue sharing to potentially partake in revenue upside scenarios. Private ISP takes revenue risk and is therefore incentivized to provide high quality service.
- ❑ Cons: Determining a fair market value for the lease fee can be challenging. ISP(s) may resist constraints on pricing, thus limiting the City's influence over affordability. If there is only one private ISP, as opposed to multiple ISPs (see below), competition/choice will be limited.
- ❑ Options/Alternatives: Instead of a single ISP for Active Infrastructure and Service Provision, multiple ISPs could be invited to provide the same. The size of the City's network could potentially limit the interest of competing ISPs to operate in the City.

CASE STUDY: COLORADO SPRINGS, CO

This case study highlights a recent example of a private ISP delivering services on municipally-funded/financed infrastructure




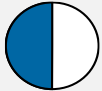
- In Colorado Springs, Ting Internet will provide gigabit Internet service over fiber infrastructure built by Colorado Springs Utilities.
- In this non-exclusive arrangement, Ting Internet will be the initial anchor tenant on a city-wide (not-for-profit) fiber network owned by Colorado Springs Utilities.
- This model leverages the City's experience in building and managing utilities with Ting's expertise in provisioning and marketing fiber services to customers.
- Construction on the fiber network will begin by Q3 2022 and is expected to surpass more than 200,000 addresses.
- Other notable examples of municipal networks delivered under a similar model include Westminster, MD, Huntsville, AL, Breckenridge, CO and Fort Morgan, CO

MODEL 3: OVERVIEW



* Contracts may include lease fee and/or revenue sharing agreement.

MODEL 3: PROS, CONS & OPTIONS

Model #	Passive Infra	Active Infra	Service Provision	Public Ownership	Local Control	Choice / Competition	Minimize Financial Risk
3	City	Active Infra	Open Market				

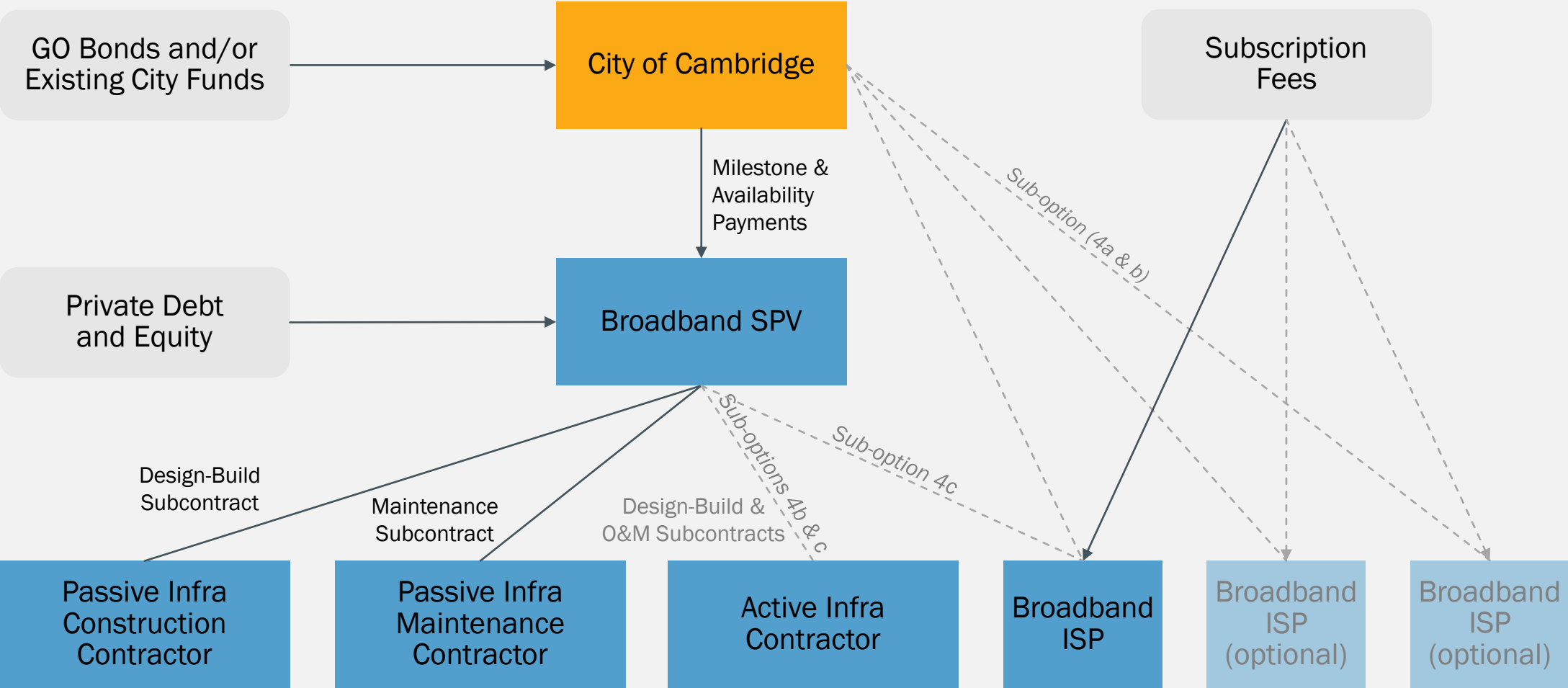
- ❑ Pros: This model allows the City to transfer revenue risk while achieving meaningful competition for both Active Infrastructure and Service Provision, even within a small-scale market. Competition for Active Infrastructure will be achieved through a competitive procurement process; a single Active Infrastructure contractor reduces redundant cost, reducing overall costs. An open market for Service Provision maximizes potential for competition, driving affordability.
- ❑ Cons: Similar to prior model, it may be challenging to determining fair market value for the lease fees and level of pricing control City can exercise over ISPs can be limited. Interface between Active Infrastructure contractor and ISPs can be challenging to define.
- ❑ Options/Alternatives: Competitive selection of, and strict performance requirement regime for Active Infrastructure contractor is critical for success. There are various options for ensuring competitive tension and incentivizing performance. There are also various ways to structure the revenue risk allocation between the Active Infrastructure contractor and ISPS through lease fees or other mechanisms if desired.

CASE STUDY: AMMON, ID

This case study highlights a useful example of the “open access” model layered onto municipally-funded dark fiber infrastructure





- The township of Ammon, ID constructed a dark fiber network, paid for through a combination of federal grants, and funds raised through Local Improvement Districts. Under this model, the network is not built all at once, but is phased with demand; dark fiber is deployed to a neighborhood only when a sufficient percentage of residents “opt in” and agree to be part of a new Local Improvement District.
- Ammon partnered with EntryPoint Networks to pilot and launch network virtualization software, which includes an online portal allowing four different ISPs to lease bandwidth on the network and offer retail services to customers. This network design is highly automated and allows for new ISPs to be added to the network, and for customers to switch ISPs seamlessly.
- This general model is prevalent in Sweden. Another similar, notable US example is UTOPIA (UT), although here the active infrastructure is provided by the public sector.

MODEL 4: OVERVIEW



Sub-option 4a: SPV to provide Passive Infra; SPV takes no revenue risk. City contracts one/multiple ISPs for Active Infra and Service Provision.
Sub-option 4b: SPV to provide Passive/Active Infra; SPV takes no/limited revenue risk. City contracts one/multiple ISPs/open market for Service Provision.
Sub-option 4c: SPV to provide Passive and Active Infra and Service Provision; SPV takes on revenue risk.

MODEL 4: PROS, CONS & OPTIONS

Model #	Passive Infra	Active Infra	Service Provision	Public Ownership	Local Control	Choice / Competition	Minimize Financial Risk
4	Hybrid*						

- ❑ Pros: The City is maximizing its potential for long-term risk transfer through a Project Agreement with a P3 Partner. The P3 Partner has rights of use to the network during the Project Agreement, subject to terms and conditions imposed by the City (e.g., the City can step in if the P3 Partner consistently fails to deliver quality service). The City is also leveraging private financing to reduce (but not eliminate) the upfront public contribution needed to build the network.
- ❑ Cons: Complexity of P3 procurement and contracting process. Higher cost of private financing relative to public financing may not create value for money for an asset with limited lifecycle optimization potential.
- ❑ Options/Alternatives: As illustrated on the prior slide, there are various sub-options for structuring the contracting and risk allocation of a P3. Each sub-option also has its own pros and cons:
 - ❑ Sub-option 4a: City to procure separate ISP (Active Infra + Service Provision) contract(s). Challenging to estimate fair market value for lease fees from ISP(s) to City.
 - ❑ Sub-option 4b: City to procure separate ISP (Service Provision only) contract(s)/create open market for ISPs. Challenging to estimate fair market value for lease fees from ISP(s) to City. Interface between broadband SPV (who is also responsible for Active Infra) and ISPs can be challenging to define.
 - ❑ Sub-option 4c: Single integrated contractor for all scope elements reduces choice for consumers.

CASE STUDY: DUBLIN, NH

This case study highlights a useful example of hybrid financing paired with long-term public ownership of the network

- Consolidated Communications Holdings Inc (CCI) has partnered with several small, rural towns in Cheshire County, New Hampshire including Dublin, NH to build out fiber-to-the-premises networks.
- Under these agreements, Dublin and the other towns will sign 20-year contracts with CCI to run the network (active infrastructure and services), but the towns will retain ownership of the fiber networks.
- Dublin will finance the construction of the dark fiber with municipal bonds, which will be repaid through subscriber fees charged by CCI, who will also cover the costs in any shortfalls in subscriber revenue needed to cover the town's debt service payments.
- CCI in exchange for its contribution in financing the network will have sole ISP rights.