

# Report on Fiber Network Proposals

Cedar Hills Fiber Committee

## Executive Summary

The committee recommends that the city enter into a contract with UTOPIA to build and operate a fiber optic network in Cedar Hills. UTOPIA came out ahead or even on all criteria the committee examined. The committee prefers the UTOPIA model because:

- UTOPIA uses a subscription model, so only residents who use the network pay for it,
- UTOPIA arranges for financing through UIA, and subscription rates in nearby cities are exceeding expectations, meaning there is low risk that subscriber fees will be unable to pay for network costs,
- UTOPIA pays for new subscriber connections from existing fees, so there are no installation fees for the city or residents,
- UTOPIA manages all aspects of the network, including long term network upgrades, and
- UTOPIA has a strong track record of providing fiber services in our area.

Joining UTOPIA would enable the city to offer fiber services to all residents who want it, at no cost to residents who prefer not to use it. UTOPIA will provide residents with faster speeds (both upload and download) at lower cost than current service providers. UTOPIA is also open access, meaning that residents will benefit from competition among Internet Service Providers (ISPs). Joining UTOPIA also enables the city to benefit from the economies of scale afforded by being part of a joint venture with other cities in Utah who provide fiber services to residents.

When financing through UIA, the city will be responsible for debt service payments. Payments are delayed for 2 years to provide time for construction and for customer revenues to build up a reserve to handle shortfalls. Revenues from customers are used to pay the debt service, with any additional shortfall beyond the reserve covered by the city through a short-term loan to UIA. If subsequent revenues are high enough, the city is paid back and the debt is eventually retired. This model carries some risk for the city but experiences with other cities nearby indicate the subscription rate should be high enough to avoid losses, and the risk is lower than the city financing and owning the network itself.

The committee examined all other proposals the city received. The most competitive alternative to UTOPIA, from STRATA, uses an alternative model that has the city owning the network. This could provide the city with additional revenue, but would also incur substantial costs to provide connections to residents who sign up late or who exceed the projected subscription rate. The committee feels the potential benefits of owning the network are outweighed by the risks.

The First Digital proposal requires the city to bond for the network, while First Digital retains ownership, and uses a utility model in which all residents are charged for network construction. The SenaWave proposal uses private financing and the network would be owned and operated by SenaWave, but would not be open access, providing less competition among ISPs for

residents. The BitStream proposal had few details and was considered non-competitive.

## 1. Process

The members of the committee include Ryan Camomile, Keith Irwin, Cyd Tetro, Liam Thraikill, and Daniel Zappala. Daniel Zappala acted as chair and meetings were held on an ad hoc basis. The committee was created in April 2021 and concluded in October 2021.

The committee used the following process to evaluate the proposals:

- Learn some of the basics of how fiber networks work
- Complete an initial comparison of proposals
- Develop criteria to judge the proposals
- View presentations and ask questions of finalists
- Detailed comparison of finalists
- Recommendation to city council

## 2. Fiber Networking Basics

Fiber networks carry information using light signals rather than electrical signals. Fiber cables have lower attenuation as compared to copper cables, meaning light can be carried over relatively large distances while maintaining a strong signal as compared to electrical signals in copper wire. Fiber cables also do not suffer from electromagnetic interference.

One of the primary advantages of fiber optical cables relative to copper is its higher speeds. Current ISPs providing fiber access typically offer symmetrical speeds (both upload and download) of 1 Gbps or 10 Gbps. However, fiber can theoretically go much faster; a recent demonstration in Japan demonstrated speeds of 319 terabits per second (1 terabit is 1,000 gigabits). This positions fiber as a long-term solution for a city-wide fiber network. Copper wires, on the other hand, are typically much slower.

The competitors to fiber offer much slower speeds:

- **Cable:** Xfinity (Comcast) currently offers download speeds up to 1.2 Gbps in Cedar Hills, but the upload speed is typically several orders of magnitude slower (1 to 10 Mbps) with a maximum of 35 Mbps. Faster upload speeds are essential for anyone running a business, using Zoom, or hosting services in their home as a hobby. Xfinity in some markets offers faster speeds where they have laid fiber networks, but there is no indication that they are willing to bring fiber networking to Cedar Hills.
- **DSL:** The latest G.fast standard for DSL is designed for 100 Mbps to 1 Gbps download speeds.
- **5G:** 5G typically offers 50 to 100 Mbps download speeds and 10 to 50 Mbps upload speeds. Theoretically a 5G network can offer 20 Gbps download and 10Gbps upload, but typical speeds quoted above are the result of sharing the wireless network with other

users. Fixed wireless 5G networks can potentially get faster speeds for home users. However, these are currently only being deployed in other countries. The vast size of the U.S. means it takes a long time for telecommunication companies to bring these technology improvements to smaller communities.

- **Satellite:** The new Starlink service provides Internet access using low-earth orbit satellites. The service currently offers speeds of 100 Mbps download and 20 Mbps upload now, with promises of 1Gbps download speeds in the future. Users performing speed tests currently report download speeds of 50 to 100 Mbps. The satellites are low to the horizon, so line of sight to your house is needed, and the signal is easily blocked by trees. In addition, latency may be higher due to using satellites, which affects the interactivity of online services.

Fiber networks can be built using active or passive ethernet. Active ethernet provides point-to-point connectivity and thus can offer bandwidth guarantees for individual homes. Passive ethernet is shared among homes and has somewhat lower cost as compared to active ethernet. Sharing bandwidth allows the network provider to oversubscribe the service. For example, if 1 Gbps is shared among 3 homes, but only one of those homes is currently using the network, then the home using the network is able to download or upload content at 1 Gbps, while all three homes are charged for the monthly service. If all three homes use the network simultaneously, then they share the total 1 Gbps. A hybrid network combines these technologies. In a hybrid network, the provider can adjust how homes are connected, so that more bandwidth is added where it is needed, and “heavy” users can get non-shared connections if needed.

### 3. Initial Comparison of Proposals

At our first meetings, the committee discussed and compared each of the proposals. The following table includes all of the proposals the city received and some of the features we reviewed:

Respondent	Network Owned By	Type of Network	Financing	Features
SenaWave Communications	SenaWave	not clear, but have built active ethernet in the past	private financing arranged and paid for by Senawave	not open access
UTOPIA Fiber	UTOPIA	active ethernet	UTAH Infrastructure Agency provides financing, subscriber	fiber huts have redundant cooling + battery backup + natural gas generators, discusses long-term upgrades (refreshes)

			fees (\$30/month) + city backstop	
STRATA Networks	Cedar Hills	hybrid active/passive network	subscriber fees or utility fees	open access, discusses long-term upgrades
First Digital	First Digital	passive ethernet for residents, active ethernet for businesses	\$7 million bond, paid with \$45/month utility fee	open access with \$30 per subscriber going to First Digital
Bit Stream Communications	Multiple models	hybrid fiber (using UTOPIA) and wireless (using Facebook Terragraph)	private financing, backed by municipal bonds	few details in the proposal

The committee chose the following as the top two proposals: UTOPIA and STRATA. UTOPIA is well established in the area, has recovered from its early financial difficulties, and continues to expand the cities it is serving. STRATA provides a unique opportunity for the city to own the network and has a compelling proposal that provides for multiple funding models and open access. Both of these proposals also discussed funding models for upgrading the network in future years. The First Digital proposal uses a bond for financing backed by utility fees. The committee feels this funding model could be opposed by numerous residents given our own history and the response to this funding model by residents of other cities in Utah. The Senawave proposal was received by the city two hours after the deadline. Furthermore the Senawave proposal is for a privately-owned network without open access (competition among ISPs providing services to residents), creating higher risk that the venture may fail or may fail to provide cost-effective services to residents. The Bit Stream proposal was light on details and was considered not competitive.

#### 4. Criteria

The committee considered the following criteria when evaluating the proposals from UTOPIA and STRATA:

- Financing — The committee prefers financing that does not require a municipal bond. The committee recognizes some funding models require the city to be responsible for debt service payments (e.g. with UTOPIA/UIA) and is willing to take on that obligation if it provides additional benefits (such as open access, covering maintenance and upgrades) and there is a strong track record of success. The committee prefers a subscriber model for paying debt service, where the only residents that pay are the ones using the service.

- Network ownership — The committee prefers a model where the city does not own the network, in order to reduce costs and risk but is open to considering alternatives.
- Network architecture — The committee prefers a network that uses active ethernet technology, to ensure each resident has full, unshared access to the provided bandwidth.
- Maintenance — The committee prefers that network maintenance be handled entirely by the network provider, with a detailed plan for financing of upgrades in subsequent years.
- Operations — The committee prefers that network operations be handled entirely by the network provider, with a demonstrated track record of providing 24/7 service.
- Resident access — The committee prefers that all residences are provided fiber to the curb. This committee also prefers that the city or residents don't have to pay extra to connect a home to the network in subsequent years after construction (e.g. due to a sale or a resident changing their mind and wanting to connect to the service).
- Resident pricing and service — The committee prefers an open access model, since this has the potential to provide lower pricing and better service to residents due to competition. The committee prefers a partner with a history of working with multiple ISPs on its networks. The committee expects that all fiber services will provide residents with symmetric downstream and upstream bandwidth with no monthly data caps.
- Risk — The committee prefers lowering risk to the city, particularly with respect to financing but also including reducing risk that the venture will fail or that not all residents will be connected.
- Project timeline — The committee prefers a timeline that provides all residents services within three years of completing the agreement.

## **5. Presentations and Q&A**

Both STRATA and UTOPIA gave presentations to the committee. The committee also sent an extensive list of questions to both UTOPIA and STRATA. A summary of their responses is below. Note that some questions were specific to just one organization.

### **5.1 Network Q&A**

*Can you provide a proposed network architecture map for the network?*

- STRATA: See Appendix A from their response.
- UTOPIA: See their response for a map. Their map shows the difference between an active vs passive/hybrid ethernet architecture.

*Can you address how the proposed system includes redundancy in case of outages? What kinds of failures can occur that are handled by redundancy in the network? What kind of failures can occur that will result in network-wide outages? How are these risks minimized?*

- STRATA: They will design the network to include redundancy, including with equipment, routing, and points of presence.
- UTOPIA: All fiber huts have redundant connections so that if a single fiber is cut it does not interrupt connectivity. Each hut also includes battery backup, redundant cooling, and generator backup. The huts can run on natural gas as a backup in case of power outage. They report no fiber outages over a span of 10 years.

*What will be the impact on streets? What kinds of trenching methods do you use?*

- STRATA: They use directional drilling, open trenching, plowing, micro-trenching, and aerial. They typically use micro-trenching due to lower impact, fast installation, and economy, but will work with the city to determine the best methods.
- UTOPIA: They use a combination of directional boring for the main lines and missile boring for connections to a home. Directional boring minimizes impact to streets, typically only where crossing other utilities.

*What is the proposed network's connectivity to the broader Internet? How do you ensure this is sufficient to handle different levels of subscriber take rates (subscription rates)?*

- STRATA: They will provide redundant transport paths to multiple points of presence in the area and will monitor them to provide adequate service levels.
- UTOPIA: They provide connections to ISPs, which manage their own Internet connectivity. UTOPIA also operates a wholesale service, which some ISPs utilize. They monitor the network and upgrade connections when utilization reaches 60% or more.

*Does the project include public WiFi in parks? City buildings?*

- STRATA: No, but this could be added and they have partners they work with.
- UTOPIA: Yes. Fiber will be built to parks and city buildings. There will be some negotiation with the city regarding service and number of WiFi access points, but cost installation of these are included in the agreement with the city. The city will only pay the wholesale cost of services.

*Will residents have public IP addresses?*

- STRATA: Yes
- UTOPIA: This depends on the ISP a customer chooses, but most providers give public/dynamic IP addresses by default. Static IP addresses are available on request.

## 5.2 Operations and Maintenance Q&A

*How are operations and maintenance funded?*

- STRATA: Revenue paid by each subscriber will be allocated between the city's debt payment, the network operator fee, and network upgrades. For example, with a subscriber model, the fees would be \$25/month for city debt service, \$20/month for the network operator, and \$7/month for network upgrades (refreshes). See the proposal pages 28 and 29.
- UTOPIA: These are funded through fees charged to ISPs (and passed along to customers). The amount varies by service tier. These fees are used for all operations and maintenance, including future upgrades.

*What levels of staffing do you have in our market for operations and maintenance?*

- STRATA: They will establish an operations center in or near Cedar Hills for local technicians. They will use their Network Operations Center in Roosevelt to operate and monitor the network 24/7.
- UTOPIA: 6 full-time customer service employees, 5 full-time network engineers, 4 full-time IT personnel, 5 employees that monitor the network operations center 24/7, 11 full-time utility locators, 3 full-time FTEs for GIS, 5 FTEs for accounting, and 11 other FTEs for a variety of functions.

*How are refreshes (long term network upgrades) handled? Over what timelines?*

- STRATA: Refreshes are funded as described above with a timeline of 5 to 8 years. Costs to upgrade are estimated at \$185 to \$400 per subscriber. See appendix C in their response for details estimating how these funds would accrue over time.
- UTOPIA: The network is constantly being upgraded. See their response for details.

*How is the project timeline affected by other nearby cities starting projects with UTOPIA?*

- UTOPIA: *Immediate timing is ideal. UTOPIA Fiber is currently in the process of building out Pleasant Grove and Cedar Hills could be built concurrently if executed soon. If a partnership is approved after December 1, the project cost estimate and corresponding city guarantee will need to be updated (higher) due to increasing material/labor costs in 2022. The timeline is expected to take 12 months or less, but UTOPIA will provide a guarantee of 24 months so that any unexpected problems can still be handled within the contract terms. (copied verbatim)*

*The proposal mentions the entire network will be point-to-point active Ethernet vs GPON. Is there a difference in maintenance costs between the two?*

- Day-to-day maintenance is the same. Repairs are slightly higher for active ethernet, but these costs are included and are less than 1% difference in the overall costs between the two types of networks.

### 5.3 Connectivity Q&A

*Does the proposal include building fiber to the entire city? Even for homeowners who choose not to subscribe (assuming a subscriber model, not a utility model)?*

- STRATA: Under the subscription model, fiber will be deployed to the curb throughout the city, but fiber drops into each home will occur only for subscribers. The proposal covers the cost of home drops for an estimated subscription rate. The cost of adding a new subscriber after initial network construction is not covered in the proposal and would need to be paid by the customer or the city or some combination.
- UTOPIA: They will build fiber to the curb to the entire city. They will perform installations for the number of customers needed to break even with financing. UIA will finance all additional installations at no cost to the city. Any time any customer signs up, they pay a \$30/month infrastructure fee with whatever ISP they choose, with no long-term commitment required and no installation fees.

*Does the 10TB limit go up over time? (40 years is a long time)*

- UTOPIA: The limit is not monitored or enforced and is only there to protect against abuse (e.g. operating a data center, reselling services as an ISP).

*The proposal discusses two fiber huts, which include redundant cooling systems, battery backup, and natural-gas standby generators. Is this a guaranteed part of the contract?*

- UTOPIA: Yes

*The proposal states: "No aerial infrastructure is currently planned and would only be used as a last resort if easement or other reasonable pathway cannot be utilized." — How likely is this to occur?*

- UTOPIA: Very unlikely

*What are the Data Delivery Ratio (DDR), availability, one-way latency to the Internet backbone, and jitter that current customers receive from UTOPIA? Are these guaranteed to our residents and the city via SLAs?*

- UTOPIA: UTOPIA Fiber guarantees 6ms or less round trip latency (3ms one-way) to Internet exchange points or service provider interconnects in Salt Lake City. From there, it depends on the ISPs specific routing and the destination. Jitter on UTOPIA Fiber is

*guaranteed at 3ms or less. These are guaranteed to our service providers in SLA.  
(copied verbatim)*

*How can a buildout plan incorporate future 5G deployment and small cell wireless facilities?*

- UTOPIA: They include 10% excess capacity to handle these needs.

*What is the “last mile” expectation for 100% buildout of the network?*

- UTOPIA: This will be active ethernet over fiber inside of 1/4” conduit in public utility easements (“behind the curb to the side of the road”).

*If the City wanted to work with carriers to roll out 5G technology, how would those agreements work with a UTOPIA network.*

- UTOPIA: Carriers purchase service from UTOPIA.

#### **5.4(a) Financing Q&A — STRATA**

*What risks are there for the city with respect to financing the project?*

- Risks include:
  - Having insufficient subscribers to pay for city construction debt. This risk can be mitigated with a utility model. This risk can be lessened for a subscriber model by performing a survey in advance to identify the estimated number of subscribers.
  - Choosing a partner who does not perform as expected.
  - Selecting a model that does not lead to the best outcomes. STRATA believes that if the city takes the risk to bond for the network then it should also benefit from potential revenues if the subscription rate is high.

*The subscription model includes service drops (connections from a curb into a home) “for an assumed take rate (subscription rate) of 35% of locations.” If the take rate is higher, how are additional service drops funded?*

- They have made a conservative estimate of the number of subscribers to ensure the project can be adequately funded. Additional drops higher than the 35% take rate need to be funded by subscribers or the city. STRATA recommends obtaining additional funding to cover this cost in advance.

*A figure on page 24 of the proposal shows some funds in the infrastructure bill going to network operations (provided by STRATA) and some funds going to future network refreshes (network upgrades). What do funds for network operations cover? How can the city be sure the proposed bill for network refreshes will be sufficient?*

- Network operations include monitoring and the 24/7 network operations center, GIS and network documentation, management, and field technicians. Unplanned maintenance and refreshes are handled by the \$7 monthly subscriber fee as described above. This amount is based on STRATA's past experience.

*What can the City expect for power charges for housing fiber equipment?*

- Assuming a 40% subscription rate, they estimate power consumption of 2400 watts with a bill of \$140/month.

*How would the bid change if the City wanted to have the work done through directional boring vs. micro-trenching?*

- They estimate this would add 60% to costs. This would require an increase in the number of subscribers needed to fund the project.

*What are the projected positive margins for long-term ownership at 5/10/20 years?*

- See Appendix C in their response. For the utility model they estimate 5, 10, and 20-year margins of approximately \$1 million, \$1.9 million, and \$4.5 million. For the subscription model these margins are approximately \$3.8K, \$6.5K, and \$2.1 million. These margins are after costs for long-term network upgrades are accounted for.

#### **5.4(b) Financing Q&A (UTOPIA)**

*What risks are there for the city with respect to financing the project?*

- *The city provides a revenue pledge guarantee to UIA of approximately \$29,250/mo beginning after 2 years. If UTOPIA Fiber achieves less than \$29,250/mo combined revenues from \$30/mo residential subscriber infrastructure fees and 50% of the business wholesale fees, then the city would need to loan the difference to UIA until revenues are sufficient to cover the obligations. The relative take-rates (subscription rates) and revenues of all UIA projects since 2009 have exceeded the rate needed for Cedar Hills to avoid any exposure. Other protections to prevent a cost to the city include:*
  - *Each \$30/mo infrastructure fee from residential subscribers counts towards the revenue obligation.*
  - *50% of new business revenues (that are installed after the date of the agreement) count towards the revenue obligation.*
  - *100% of any services purchased by the city itself count towards the revenue obligation.*
  - *The revenue obligation begins after the ~2 year capitalized interest period to give time for construction, marketing, and installations.*

- *All revenues during the capitalized interest period are accumulated and act as a buffer against the obligation, effectively covering an additional 1-2 years before monthly revenues need to cover revenue obligations.*
- *In the event that the accumulated revenue balance is depleted and there is a revenue shortfall, any shortfall paid by the city is done in the form of a loan and is paid back when revenues exceed the debt obligations.*
- *Subscribers from all new development in the city count towards the obligation, effectively reducing the risk over time.*
- *The potential of the city guarantee being impacted is tied to the actual financing terms at closing, which will be less than the agreement terms that provide a buffer for financing purposes.*

(copied verbatim)

*What happens once the financing is paid off? Do residents stop paying a \$30/month fee?*

- The UIA board determines the level of the fee needed to pay off financing. UIA has \$330 million in bonds that will be paid off before any Cedar Hills bonds, so it's possible fees could be reduced.

*How does UTOPIA fee structure (\$30 per subscriber) compare to a city-funded model (per resident pricing)?*

- Typical city-funded models exclude some costs such as handling churn or new users signing up beyond a fixed amount. There are also additional liabilities placed on the city.

*Are there any advantages of the UTOPIA financing model compared to the city financing the project on its own?*

- UIA can retire bonds and reduce fees sooner than a city-funded project because they collect revenues from partnerships and services outside the city. UIA also takes into account costs that would otherwise fall to the city, including (a) installations beyond the amount needed to cover financing, (b) construction and installation for new developments, (c) expenses to handle churn (subscribers coming/going), (d) insurance, (e) repairs, and (f) other ownership expenses.

*Can additional revenues above the needed subscription rate be used as principal payments on the bond?*

- The project is initially in a deficit due to construction costs, until enough customers join. They expect that it will take 8 to 10 years before revenues cover the costs of additional installations without financing. Surplus revenues after that time can be used to pay off debts and maintain and upgrade the system.

## **5.5 Customer Service Q&A**

*How is customer service handled?*

- STRATA: They will provide customer service to the city and to ISPs. ISPs will provide the first line of customer service to subscribers and they can escalate to STRATA.
- UTOPIA: Most issues are handled by the ISPs. If needed, issues can be escalated to UTOPIA, which has staff to handle this.

*What levels of staffing do you have for customers in our city?*

- STRATA: They have a 24/7 network operations center in Roosevelt. Local technicians will be available during business hours and on call during other days and times.
- UTOPIA: They have 85 FTEs that cover issues from construction to customer service. See the list above under Operations and Maintenance.

*How is customer service handled for connectivity problems? What is the anticipated service time when someone reports an outage? Do you have data on existing customer service times? Customer satisfaction scores?*

- STRATA: They proactively monitor the network for outages and handle escalated issues from ISPs. STRATA will arrange for a site visit from a local technician if needed. They estimate that typical disruptions are handled within 1 or 2 hours. STRATA is rated A+ by the Better Business Bureau and has 4.4 star rating with Google comprising nearly 700 reviews.
- UTOPIA: They provide ISPs a tool they can use to diagnose the status of a connection in a home. If the fiber switch is not responding they escalate the issue to UTOPIA. If the device in the home is reachable and responding, it is the ISPs job to troubleshoot the issue.

*What is your churn rate?*

- STRATA: 1.37%
- UTOPIA: About 3.5% annually. The cost of this is covered by UTOPIA.

*Does STRATA have resources to make quick repairs locally when a problem occurs?*

- STRATA: Yes. They will establish an operations center in or near Cedar Hills for local technicians.

*What is the anticipated service time when someone reports an outage?*

- UTOPIA: For residential or small businesses, same or next business day, for large business or the city 1 hour response and 4 hour resolution 24/7.

*Do you have data on existing customer service times?*

- UTOPIA: *Usually a couple minutes or less hold time with our customer service team.*

*Customer satisfaction scores?*

- UTOPIA: *Net Promoter Score of 63 achieved through survey this last summer, 4.5 Stars on Google Ratings.*

*Many ISPs track customer browsing habits and sell them to marketing companies. As you work with ISP to provide services on the network, will you consider privacy as an important service for our residents?*

- STRATA: STRATA does not sell or provide customer information to third parties. They monitor customer traffic and provide recommendations to customers. They can help the city write service provider agreements that restrict selling customer data to third parties.
- UTOPIA: They do not require this of ISPs but have been an advocate for consumer privacy.

*What network security services are offered by STRATA and what security services are provided by the ISPs that operate on the network built by STRATA? Are businesses and residents protected from Denial of Service Attacks? Phishing websites?*

- STRATA: They monitor connections for Denial of Service attacks. They are able to locate the source of the attack and isolate it. They provide a solution for phishing with a managed gateway that is available to any STRATA subscriber.
- UTOPIA: Attacks on the network happen routinely and they regularly implement detection and a variety of protections, so that these attacks rarely impact service. Home security services have been offered by ISPs previously but don't seem to be marketed currently.

*If STRATA goes out of business or provides an insufficient level of service, can the city contract with another company to provide network operations? What is the procedure for doing this?*

- STRATA: They have been in business for over 70 years. The agreement in Appendix B lists how this is handled in the case they do go out of business. If conditions outlined there are met, the Cedar Hills could contract with another company.

*Where will operations/maintenance crews be located in case of emergency?*

- STRATA: See above answers regarding the local operations center and network operations center.

*Under the subscription model, do residents receive two bills or one consolidated bill from STRATA and the ISP?*

- STRATA: They will receive a single bill.

## **6. Detailed Comparison**

To compare the UTOPIA and STRATA proposals we considered the following issues:

### **6.1 Financing**

The STRATA proposal has the city obtain funding for the network through municipal bonds and the city retains ownership of the network. With UTOPIA, UIA obtains financing and UTOPIA owns the network.

STRATA offers both a utility and a subscriber model, with the city free to choose either. UTOPIA uses only a subscriber model. The subscriber model requires only those who choose to utilize the fiber optic network to pay for it. A portion of their bill is devoted to paying off the debt service. Anyone who chooses not to connect pays nothing. The utility model, on the other hand, requires everyone in the city to pay for the construction of the fiber network. This can be considered reasonable since even those who don't use the network benefit from it in terms of increased home value. A home with fiber to the curb has greater value than one without fiber available in the area.

The committee believes that the subscriber model is more politically acceptable, since those who don't want to use the network can be unhappy with paying a fee for the network construction. The use of utility fees in other cities has led residents to block their use through a referendum.

Under the STRATA proposal, a portion of subscriber fees go to the city to pay for the bond debt. If the subscription rate does not meet expectations, this could lead to the city needing to find other funds or raise taxes to pay for the bond. If the subscription rate exceeds expectations, the city could receive extra revenue after costs of installation for additional subscribers are paid for (these are not covered by the proposal).

Under the UTOPIA proposal, the UIA obtains financing. A portion of subscriber fees are used to pay the debt. If the subscription rate does not meet expectations, the city makes a short term loan to UTOPIA to cover the shortfall. If subscriber revenues increase sufficiently, UTOPIA pays back the city. If the subscription rate exceeds expectations, UTOPIA keeps the extra revenues to pay for the additional subscriber hookups and other costs to maintain and operate the network.

The committee prefers the UTOPIA model because risk is low. Subscription rates in nearby cities are exceeding expectations, and the model does not require the city to obtain its own

bond or to handle revenues and planning for long term upgrades. UIA currently reports \$1.4 million in monthly revenue, covering \$1.1 million in monthly debt. The second half of Layton City's fiber project broke even 6 months early and Morgan City broke even 1 year early.

## **6.2 Network ownership**

As mentioned above, the STRATA proposal has the city owning the network, whereas with UTOPIA, they own the network. The city would have a position (and an accompanying vote) on the board that manages UTOPIA, which is an interlocal agency operated by the member cities. UTOPIA holds public meetings under Utah's Open and Public Meetings Act.

Network ownership carries both costs and benefits. If the city owns the network, it is responsible for network upgrades over time. The STRATA proposal allocates \$7/month of each subscriber bill to handle this cost. The city needs to manage that money and contract with a network provider to assess network and equipment status and provide upgrades. The city or subscribers are also responsible for connections of new customers after the initial construction period. That cost is estimated by STRATA at \$500 to \$1,000 per subscriber. STRATA estimates some benefits to the city that come from owning the network, approximated at \$3.8K, \$6.5K, and \$2.1 million at 5, 10, and 20 years after construction. The benefits are larger if the city uses a utility model because it can count on an ongoing revenue stream from all residents — this raises the question of whether the city wants to use a fiber network as an asset to derive revenue from its residents.

The committee feels like the potential benefits of network ownership do not outweigh the costs. Projected revenues are not guaranteed, and unexpected costs (e.g. unplanned maintenance or damage due to fire) could substantially erode these projections. In the UTOPIA model, the member cities collectively pool the costs to maintain the network, spreading risk among them. Excess revenues in this case go to UTOPIA rather than individual cities.

## **6.3 Network Architecture**

STRATA proposes a hybrid active/passive fiber network, whereas UTOPIA builds active fiber networks. Representatives from STRATA ran through an example of how this works. If a given interconnect serves 864 customers, then with active fiber the hut to the interconnect will run 864 separate fibers, so that each customer has dedicated upload and download bandwidth. With a passive network, the fiber from the hut to the interconnect might have only 288 fibers, which is less costly but still has enough capacity to serve customer needs, without guaranteeing the full bandwidth to each one at all times. The network provider runs an oversubscription calculation to try to serve the greatest number of customers at the least cost while still providing good service. They run enough fibers to the interconnect so that if some customers need their own fiber they can do that, for example if someone runs a server from their home. As needs expand, extra fibers can be run using open conduit. STRATA representatives also stated that the monitoring software for fiber networks is usually first deployed to passive networks.

STRATA estimates that creating a fully active fiber network would add about 5% to 10% to the overall cost of their proposal.

The committee prefers a fully active network to ensure that all residents are able to have guaranteed upload and download speeds, but is willing to consider a hybrid network if other factors weigh in favor of STRATA.

#### **6.4 Maintenance**

Both proposals will allow the city to ensure that network maintenance is handled by the network provider and both proposals indicate how long term network upgrades are handled. With STRATA, the city will collect \$7 per month per subscriber and will need to manage those funds and contract out for network assessment and upgrades. With UTOPIA, \$30 per month of subscriber infrastructure fees go to UTOPIA to handle a combination of financing, additional installations, churn expenses, and a portion of the \$35/month ISP fee goes to UTOPIA for operations and maintenance. These fees vary depending on the package. Essentially, UTOPIA handles all network maintenance, upgrades, and operations from their revenues and has flexibility to move those funds around as necessary. The city does not need to handle any fees or plan for upgrades.

The committee prefers the UTOPIA model to avoid the extra cost of paying for additional subscribers and managing upgrades.

#### **6.5 Operations**

Both proposals have solid plans for operations. STRATA will establish an operations center in or near Cedar Hills for local technicians, who will be available during business hours and on call during other days and times. They will use their Network Operations Center in Roosevelt to operate and monitor the network 24/7. UTOPIA already has two teams of ~9 technicians, plus staff that handle customer service and a 24/7 network operations center. They also have 4 full-time network engineers, 3 full-time IT staff, and 10 full-time utility locators.

The committee feels that both organizations are capable of delivering on network operations, with track records of good service. UTOPIA has a small edge for already having local technicians and serving other communities in our area.

#### **6.6 Resident Access**

Both proposals will provide fiber to the curb for all homes.

In the STRATA proposal, funds are only allocated for connecting about 35% of residents (a conservative estimate of the subscription rate). If more people subscribe, then the city or residents need to pay extra for these connections, estimated at \$500 to \$1,000 per subscriber. STRATA recommends obtaining additional funding to cover this cost in advance. Additional

subscribers in subsequent years will also need to be covered through city revenues or resident fees. Because the city owns the network in this proposal, the responsibility for new subscribers beyond the estimated subscription rate falls to the city.

In the UTOPIA proposal, subscriber fees cover the additional costs to connect residents who don't initially subscribe. In this case, UTOPIA owns the network and keeps additional revenue beyond what is needed for financing, maintenance, and operations, so it handles new subscriber connections as well.

The committee prefers the UTOPIA model due to its lower risk to the city and the assurance that subscribers can be connected using subscriber fees rather than additional revenues or fees.

### **6.7 Resident Pricing and Service**

Both STRATA and UTOPIA will use an open access model. UTOPIA has a strong history of working with multiple ISPs — they currently partner with 14 residential ISPs and 25 business ISPs. STRATA has less experience in this area, but shows some promise. Representatives indicate they have signed contracts with 6 ISPs to serve the network they are building in Providence, Utah.

The committee feels UTOPIA has an edge here, due to their longer experience providing services to subscribers through partner ISPs. The committee feels it would be difficult for Cedar Hills to attract ISPs due to the relatively small number of residents that would be serviced on a network the city owned. With UTOPIA, Cedar Hills benefits from the economies of scale offered by UTOPIA.

### **6.8 Risk**

As mentioned above, the committee prefers the UTOPIA financing model due to low risk to city finances and the fact that financing is obtained through UIA. The committee also prefers the subscriber connection model that UTOPIA offers, lowering the risk of extra costs when connecting residents in subsequent years after construction or if the subscription rate exceeds expectations. Both UTOPIA and STRATA present low risk that the venture will fail, because STRATA has been in business for a long time and UTOPIA has a history of success with their model in our area. Overall, UTOPIA's proposal provides somewhat lower risk to the city.

### **6.9 Project timeline**

Both projects provide reasonable timelines for project completion. STRATA projects the network being built and operational within 2 years or less. UTOPIA expects construction to be complete after 14 months and contractually guarantees 90% completion within 24 months.

The committee sees no substantial difference between the proposals on this criteria.

## 7. Recommendation

The committee recommends that the city enter into a contract with UTOPIA to build and operate a fiber optic network in Cedar Hills. UTOPIA came out ahead or even on all criteria. The committee prefers UTOPIA for the following reasons, as documented above:

- The UTOPIA financial model does not require the city to directly bond for construction, though it is responsible for debt service payments. Subscription rates in nearby cities are exceeding expectations, meaning there is low risk that subscriber fees will be unable to pay for construction costs.
- The UTOPIA model pays for new subscriber connections from existing fees, avoiding the need for the city or residents to pay for new connections, either when a resident joins late or when the subscription rate is higher than expected.
- The city prefers that UTOPIA owns the network. The projected revenues from owning a fiber network are not guaranteed nor significant, and the city would rather not have to manage any aspect of the network, such as connecting customers (who didn't connect originally), planning and managing funds for long-term network upgrades, and employing anyone to handle these items. The committee prefers the UTOPIA model in which the member cities collectively pool the costs to maintain the network, spreading risk among them. The UTOPIA model provides less control (we have one seat on the board) in return for less work and no ownership risks.
- UTOPIA has a strong track record of providing operations and maintenance for municipal fiber networks, as well as providing well-regarded service for residents in our area. Cedar Hills would benefit from the economy of scale when joining with UTOPIA and its contracted ISPs rather than having to attract these services on its own.

The committee appreciates the chance to examine two different models. In the case of UTOPIA, the city does not own the network, but also does not incur extra fees for subscriber connections, offloads all work to UTOPIA, and gets a proven solution for our area. With STRATA, the city would own the network but would have to incur additional costs for additional subscriber connections, with fairly small revenues and a large asset to manage.

It is also important to recognize the context within which the city is pursuing a fiber network for its residents. Current services offered by incumbent providers cannot compete with the speed of fiber, and competing technologies are unlikely to offer similar speeds. A fiber network provides high symmetric bandwidth (both upload and download); upload bandwidth is particularly helpful for video calls, uploading YouTube videos, backing up files online, or running servers at home. Fiber thus offers significant opportunities to residents. Finally, the experience of many years in the city has shown that there has been no investment from incumbent providers in higher speed Internet services, with current services capped at lower speeds than fiber for significantly higher cost than what UTOPIA ISPs provide.

Finally, a survey conducted by UTOPIA indicates that residents are supportive of this plan. Most residents are dissatisfied with their current Internet service providers, as indicated by a Net

Promoter Score of -61 (compared to +63 for UTOPIA). Approximately 90% of residents support the city pursuing broadband options. Approximately 83% support a fiber-to-the-home plan that uses a subscriber model, versus 68% supporting a utility model. In a direct comparison, about 47% support the subscriber model and 42% support the utility model.

## Resources

### Xfinity

- Services and pricing vary substantially by region. Details can be obtained only by shopping for service in a given area. Services and pricing taken from offerings in Cedar Hills in October 2021.

### DSL

- <https://www.pcmag.com/news/what-is-gfast-and-will-it-save-dsl>

### 5G

- <https://www.tomsguide.com/features/5g-vs-4g>
- <https://www.telecompetitor.com/report-5g-upload-speeds-face-challenges-phone-does-the-heavy-lifting/>
- <https://www.fiercewireless.com/5g/5g-download-speeds-u-s-at-meager-47-58-mbps-range-per-opensignal>
- <https://www.lifewire.com/5g-speed-4180992>

### Starlink

- <https://www.cnbc.com/2021/04/15/spacexs-starlink-early-users-review-service-internet-speed-price.html>
- <https://www.theverge.com/22435030/starlink-satellite-internet-spacex-review>