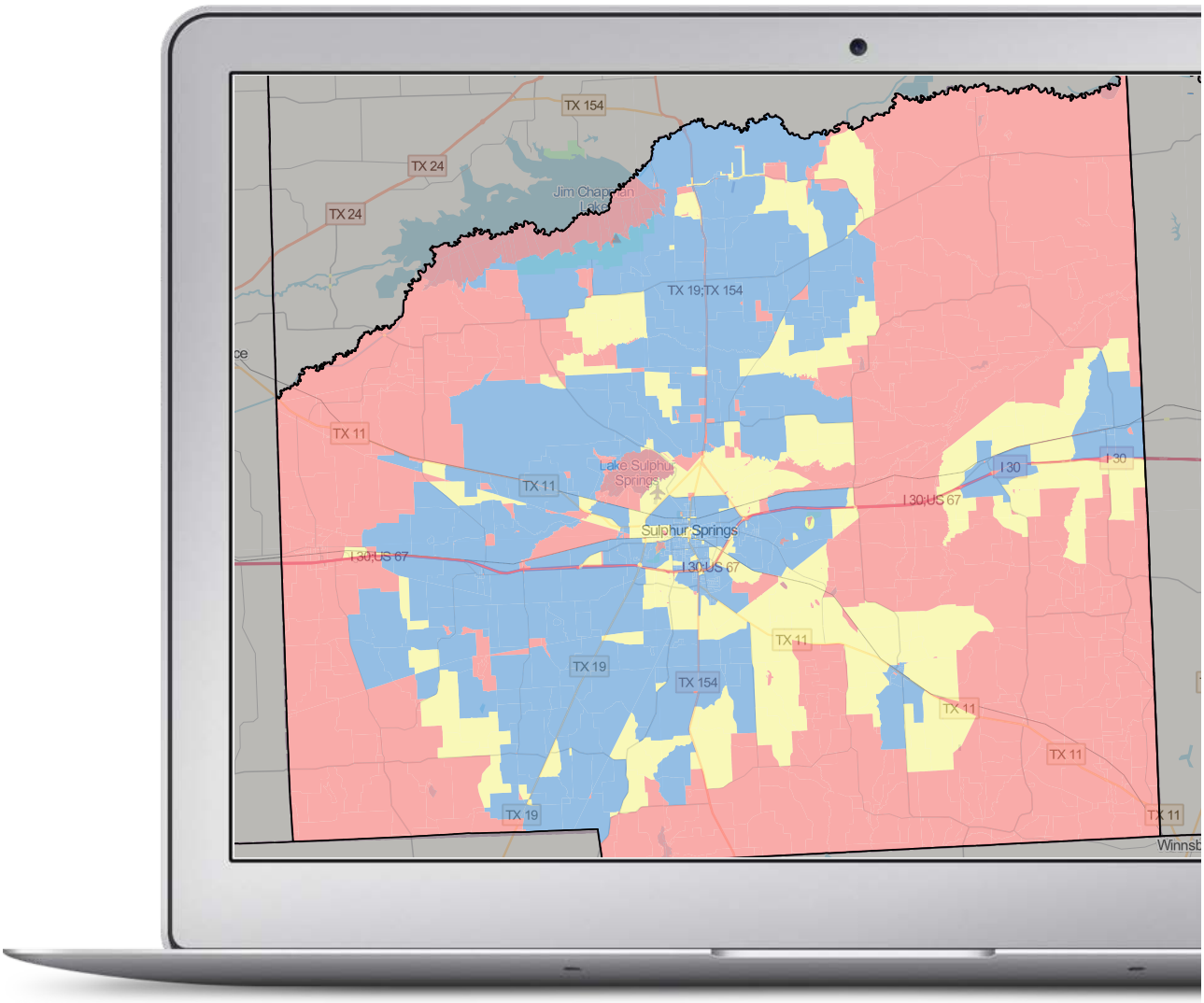
HOPKINS COUNTY
BROADBAND PLANNING STUDY



DESIGN NINE
broadband planners

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1 EXECUTIVE SUMMARY

A broadband study of Hopkins County began in late fall of 2022 and was completed in the spring of 2023. The study included meetings with stakeholders and interested parties in the county, interviews and meetings with businesses, meetings with county officials, and residential and business broadband surveys. The report has several key sections:

- **Telecom Environment**– Demographic data, tower and fiber assets in the county, underserved and unserved areas of the county, and geo-coded survey results.
- **Service Provider Analysis**– A review of current service provider service offerings, speeds, and prices for those services and what bandwidth is available.
- **Connectivity Solutions** – This section provides an overview of various technologies, including both broadband wireless and broadband fiber.
- **Infrastructure Funding and Grant Opportunities** – A discussion of a variety of grant and funding strategies.
- **Partnership Opportunities** – Potential partners for broadband grant opportunities.

FUTURE-ORIENTED INFRASTRUCTURE

Affordable high speed Internet is essential to the future growth and prosperity of Hopkins County. Over the past 20 years, Internet access has evolved from a luxury to a necessity. School students need Internet access to complete homework and to study. Online shopping can save energy and make it easier for the elderly and homebound to obtain the needs of every day life. Telemedicine and tele-health services and applications is revolutionizing health care, reducing costs, and allowing older citizens to live independently longer.

More and more workers and business people are working from home, either on a part-time or a full-time basis, and the Covid crisis has highlighted the critical need for reliable high performance Internet service for work, learning, and access to health services. New work from home job opportunities are growing rapidly, but most of those jobs require reliable, symmetric Internet service to qualify.

Many business employees are already trying to work more from home more often (e.g. one or two days per week) to reduce travel costs. Some major businesses in other parts of the U.S. are actively planning to have 20% of their workforce work full time from home to reduce employee travel costs and office energy costs. Corporate employees working from home require high bandwidth services to be connected to the office network and to use corporate videoconferencing systems. These corporate network services often require 10-50 Megabit ***symmetric*** connections.

Broadband has become essential community infrastructure.

Just as communities had to take on the task of building and maintaining roads in the early twentieth century, communities must now provide digital road systems as a matter of community and business survival. These digital road systems must be designed with certain characteristics:

The communities of Hopkins, with the right broadband infrastructure, can be attractive to an emerging new group of businesspeople and entrepreneurs that typically are well-educated, own their own

businesses or work for large global corporations, and are making choices about where they lived based on family needs and interests, rather than business interests.

This new breed of entrepreneurs and workers place a high value on the kinds of amenities that contribute to a good quality of life–traditional neighborhoods, vibrant downtown areas, a wide range of cultural and recreation opportunities, good schools, and a sense of place. These businesspeople and their families make relocation decisions based on quality of life only where there is abundant and affordable broadband, because broadband is the enabler of this new approach to personal and work life.

Given that the Covid crisis has created increased attention to fiber Internet service, these goals are modest. If Hopkins County can use state and Federal funds, other grant opportunities, and some local funds to make carefully targeted passive infrastructure investments and to develop constructive public/private partnerships, most homes and businesses in Hopkins could have Gigabit fiber service within the next four to six years.

Summary of Findings and Recommendations

Develop a County-wide Broadband Strategy. Use the findings and recommendations in this report to develop a multi-year set of goals that can be realistically achieved using a basket of local, state, and Federal funding. Commit to providing the grant writing resources needed to pursue every possible grant opportunity.

The County government should not become an Internet provider. Instead, it should focus on developing public/private partnerships by making targeted investments in passive broadband infrastructure like towers and dark fiber. These assets have long life spans of forty years or more and can be leased out to private sector Internet Service Providers (ISPs, passive infrastructure leasing is not a telecommunications service). While the revenue from the lease agreements will be modest, the funds generated can be used to support maintenance of this infrastructure.

Improved and Affordable Fiber and Wireless is Needed. Many residents and businesses rely heavily on poor Digital Subscriber Line (DSL) Internet access and need an alternative. Improving service provider access to more towers in the rural and underserved areas of the county will support improved Internet service. Expanded fixed-point broadband wireless service is a critical strategic short term goal in the county, but widespread access to wired fiber access is critical to the long term economic growth of Hopkins County. Some investment in wider access to a middle mile dark fiber network may be needed to accelerate fiber to the home investment by ISPs and to improve performance and availability of fixed-point wireless. Affordable access to a county-wide middle mile dark fiber network can also help accelerate the deployment of improved 4G and 5G cellular services to underserved areas of the county.

Seek Grant Funds. The Federal government has been steadily increasing the amount of grant funding available for broadband infrastructure, with United States Department of Agriculture (USDA) and Housing and Urban Development (HUD) both having programs that are designed to help underserved and unserved areas construct new broadband infrastructure. Some Federal grant applications will be due in mid-spring of 2022, so planning for submitting grant proposals should begin in early January 2022. Covid relief funding (American Rescue Plan Act (ARPA)) should also become available in early 2022. Because BEAD (Broadband Equity, Access, and Deployment) funding is expected to exceed the previous Covid funding program (ARPA, CARES), Hopkins County's share of Federal funds could be substantial and a portion of it could cover a large part of the needed broadband infrastructure improvements.

Manage Expectations. The current deficiencies in Internet access in the county took decades to develop, and the proposed improvements should be approached as a multi-year process, with an expectation of substantial improvements in access and availability in twelve to eighteen months.

Develop partnerships with WISPs and ISPs. Wireless Internet Service Providers (WISPs) and ISPs should be provided a copy of this report, and then be invited to meet to provide input on what infrastructure investments would enable them to expand service most efficiently. Local and regional WISPs may be able to provide insight into where towers are most needed and what they are willing to pay for tower space. WISP and ISP suggestions should help inform the broadband strategy for the County, noting that ISP/WISP demands may not always match the long term broadband needs of businesses and residents.

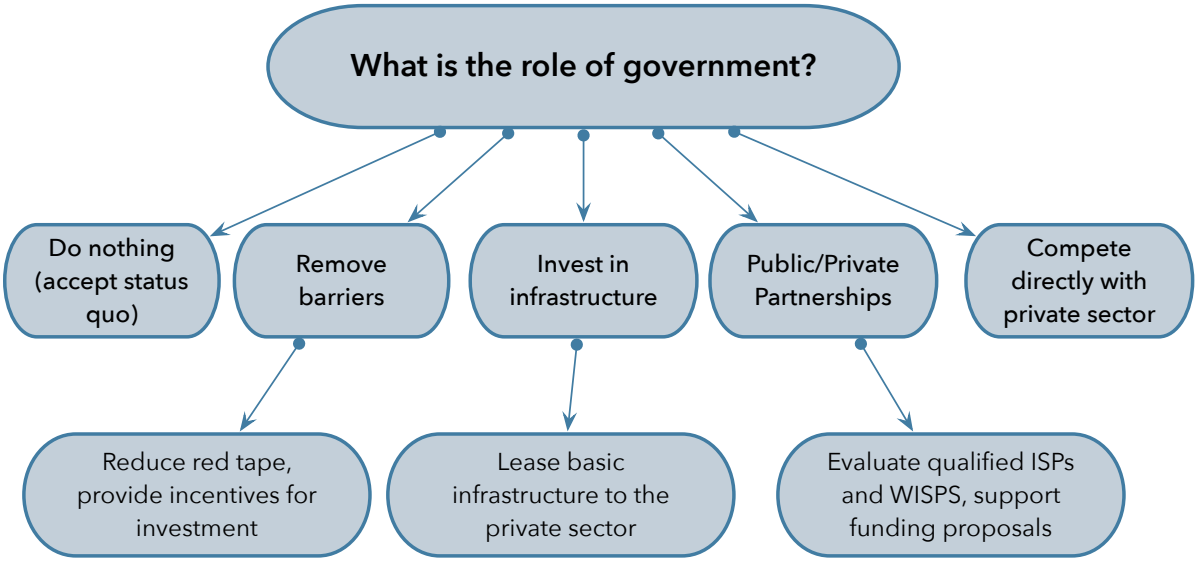
Develop a long term funding strategy. Grants may not provide sufficient funds to reach the County's long-term goals. The County should evaluate longer term funding strategies, like using a special

assessment, or implementing a very small increase in property taxes. Revenue would be earmarked exclusively for broadband improvements. Expansion of broadband in Hopkins County will be most successful by recognizing that funding will come from a range of funding sources rather than a single source. Grants, public/private partnerships, some local funds, and other sources may all be needed to achieve success.

Grants can be extremely important in the early stages of an effort to support planning activities and/or to fund a first-phase build-out initiative. However, grants rarely allow spending on operational expenses. Grants should be used carefully as one-time cash injections to support very specific goals. Communities that have relied too heavily on "the next grant" as a key source of expansion or operational funding usually experience severe financial problems.

2 WHAT IS GOVERNMENT'S ROLE?

Successful improvements in broadband access, affordability, and reliability for Hopkins involves several decision points, as outlined in the illustration below. Government has several "first choice" options.



Do nothing is to accept that businesses and residents in the County will have to continue to use whatever is available, despite the cost and bandwidth limitations that limit what many are able to do online.

Government can **remove barriers** to private sector investment. This can be an effective and low cost strategy. Possibilities include reducing permit fees for fiber construction and tower installation, incentives to developers to install conduit and meet-me boxes in new residential and commercial construction, simplified permit requirements for utility pole installation on private property, and identifying areas of residential and business demand and sharing that information with providers.

The County can choose to **make investments in basic infrastructure** (e.g. a fiber network) and make that infrastructure available to the private sector via revenue-generating lease agreements.

The County can pursue **public/private partnerships** with technically qualified and financially stable ISPs and WISPs. Where appropriate, the County can channel grant funds to providers while using the funds to build and manage new broadband infrastructure. Selected providers should be able to show technical competency and have a demonstrable track record of managing substantial fiber and/or wireless builds on time and within budget.

When communities have chosen the option to **compete directly with the private sector** by offering retail Internet, phone, and TV services lawsuits from incumbents often create difficulty moving forward as well as expensive legal fees.

3 TELECOM ENVIRONMENT ANALYSIS

A wide variety of assets in Hopkins County are identified in the following pages.

The included maps provide detail on the following:

Points of Interest – This information is used to identify key users of Internet services that could benefit from improved broadband infrastructure in the county. K12 schools, public safety facilities, fire and rescue locations, health facilities, and county facilities are included.

LMI/HUD Areas – Low and Moderate Income (LMI) and HUD Grant-eligible areas often qualify for certain kinds of grants not available to other areas.

Towers – Of particular importance are towers, which can be divided approximately into two categories: publicly owned towers and privately owned towers. As a general rule, WISPs (Wireless Internet Service Providers) have found that the lease fees to obtain space on cellular towers is too high to justify the expected revenue from broadband Internet customers in the area around that tower. To improve broadband Internet coverage in rural areas of the county, some new towers are going to be needed, with very modest lease fees—to attract WISPs onto those towers.

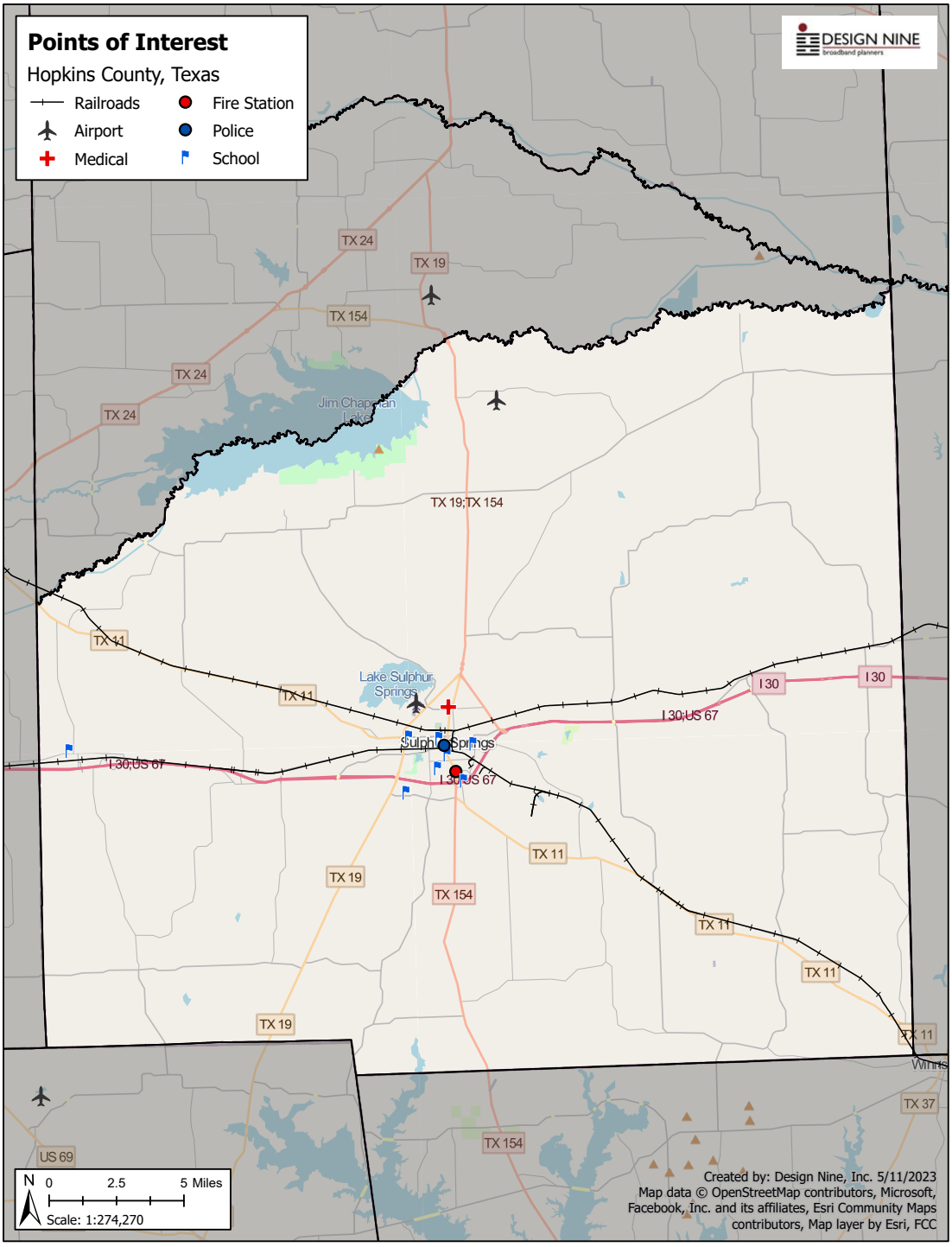
The fixed-point wireless network designs make the assumption that as a general rule, access to space on the cellular towers is too expensive, and so some new towers will be needed even where there may be an existing privately owned tower. If funding is developed for one or more of the county-wide wireless networks (or a portion of one of the county-wide networks), an early and important step would be to assess space availability on existing towers where the design has specified a tower. If some existing towers can be used rather than building a new tower, there would be significant cost savings.

Service Levels – This map illustrates information on served, underserved, and unserved areas in the county obtained from FCC 477 reports. The data is self-reported by the service providers.

Cellular Coverage in the County – This data has been developed from data provided to the FCC by the cellular companies.

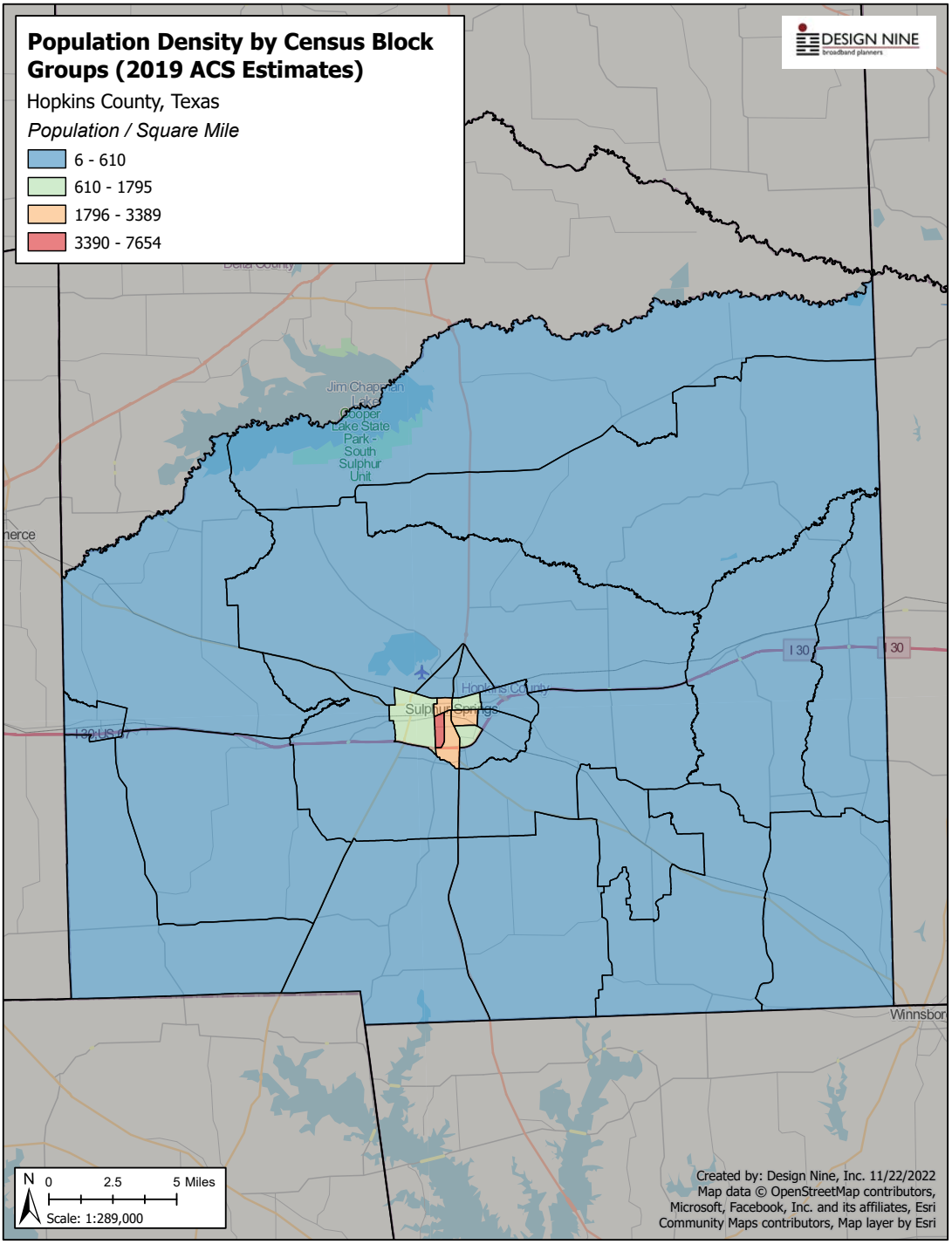
3.1 POINTS OF INTEREST

County facilities, municipal facilities, libraries, K12 and higher education facilities, fire and rescue stations, and public safety locations are all candidates to be anchor tenants for fixed-point wireless and/or fiber services.



3.2 POPULATION AND DENSITY DISTRIBUTION

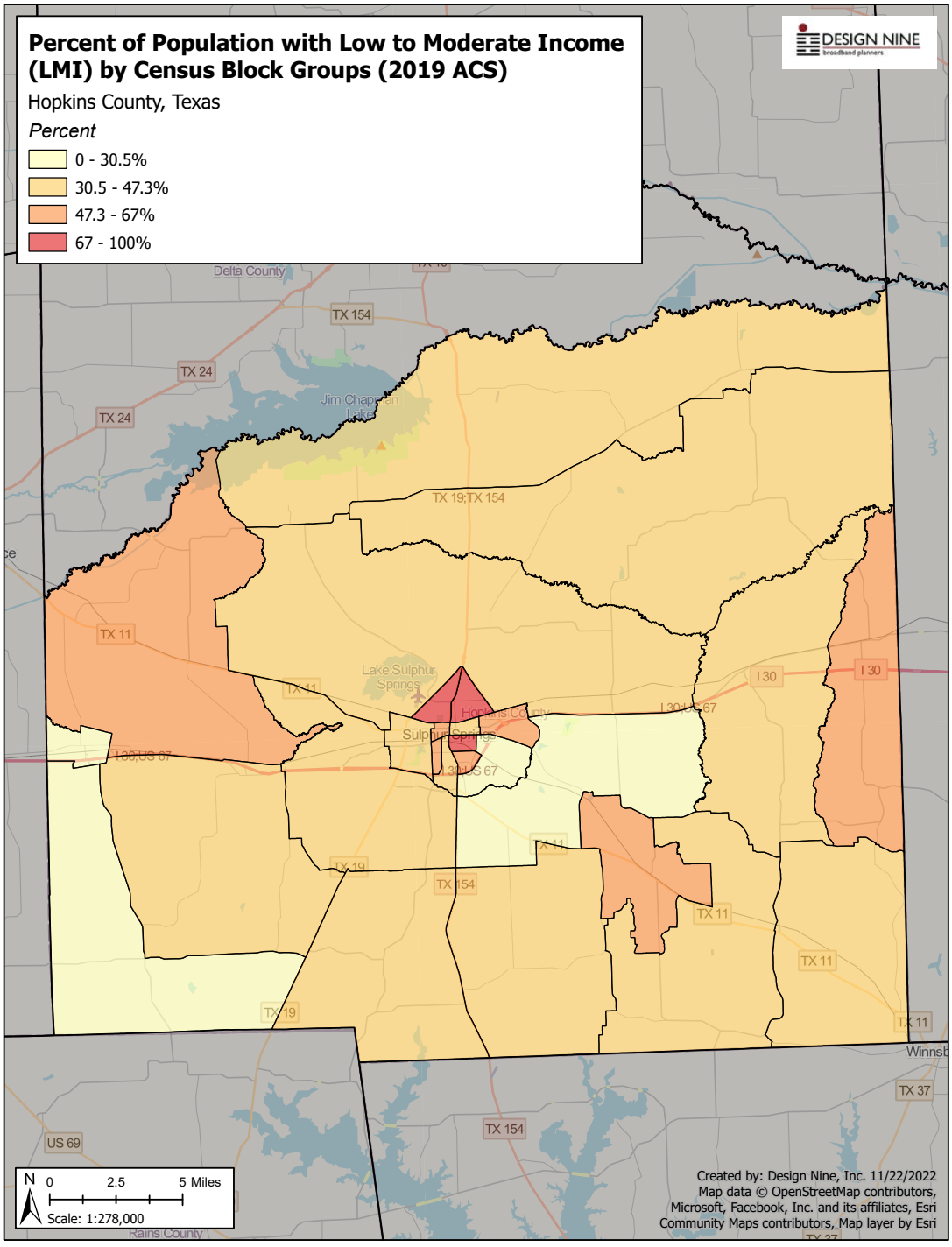
This map shows the population and density distribution in the county, by census block. This information can be helpful when working with service providers and when trying to identify what technologies are most appropriate for various areas of the county.

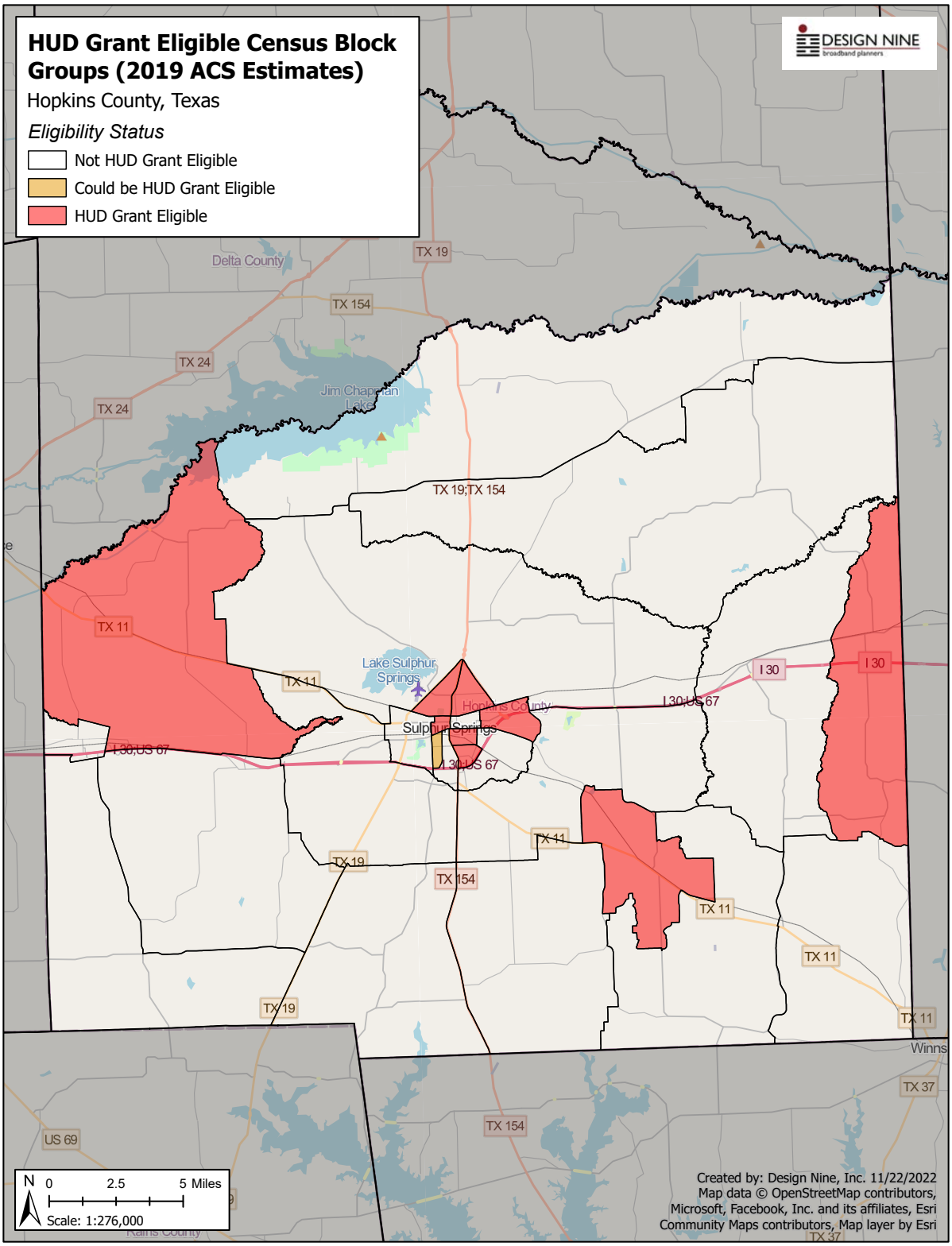


3.3 LMI AND HUD ELIGIBLE AREAS

HUD-eligible areas are determined by Low and Moderate Income (LMI) statistics–but can be different from census blocks in the county that meet LMI thresholds.

HUD-eligible census blocks can qualify for Community Development Block Grant(CDBG) funding for telecom infrastructure projects.




HUD Grant Eligible Census Block Groups (2019 ACS Estimates)
Hopkins County, Texas
Eligibility Status
Not HUD Grant Eligible
Could be HUD Grant Eligible
HUD Grant Eligible
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Delta County
TX 19
TX 154
TX 24
TX 24
Jim Chapman Lake
TX 19;TX 154
TX 11
Lake Sulphur Springs
TX 11
Hopkins County
Sulphur Springs
I 30;US 67
I 30;US 67
I 30
I 30
I 30;US 67
TX 11
TX 19
TX 154
TX 11
TX 11
TX 19
TX 11
Winns
TX 37
US 69
TX 154
N
0
2.5
5 Miles
Scale: 1:276,000
Created by: Design Nine, Inc. 11/22/2022
Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri
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3.4 TOWERS IN THE COUNTY

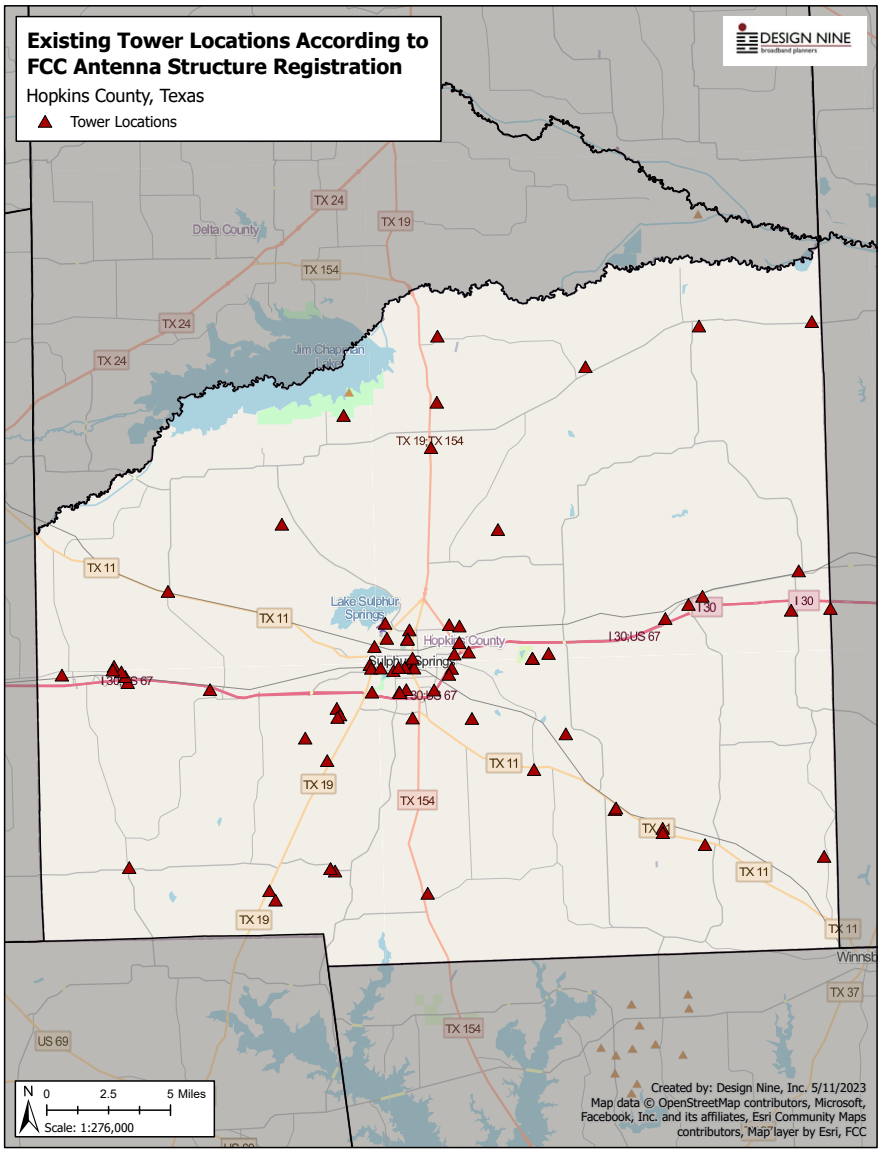
A variety of publicly-owned and privately owned towers are shown here. Tower data is collected from an FCC database, County data, and other public and commercial data sources. The FCC database usually includes most towers that are in a locality, and generally includes all or nearly all cellular towers. Tower ownership data is not always updated in a timely manner in the FCC database.

Towers can be divided approximately into two categories: publicly owned towers and privately owned towers. Publicly owned towers can be owned by local government, by regional authorities, or by the state. In the county, privately owned cellular towers are the most common type of tower, and are generally clustered along major roadways and higher density population areas.

Many commercial towers, especially cellular towers, may have tower lease fees that are too high for a Wireless Internet Service Provider (WISP) to make a business case for putting fixed-point broadband equipment on the tower. The cost to a WISP for getting on a privately owned tower often has to be checked on a case-by-case (tower-by-tower) basis.

To improve broadband Internet coverage in rural areas of the county, some new towers are going to be needed, with very modest lease fees—to attract WISPs onto those towers.

A second consideration for placing WISP equipment on a cellular tower is where space is available—that is, at what height? Space may be available at an affordable price, but the location on the tower may not be high enough to cover an area large enough for a decent number of customers.



This table provides additional detail on tower owners and tower locations. **Height of the towers is in meters**, as that is the way the Federal Communications Commission (FCC) requires towers to be registered in their database. Not all companies provide the height of their tower when registering it.

FCC Registration Number	Tower Owner	Height	Street Address	City	Latitude	Longitude
1047033	E RADIO NETWORK, LLC	131	9 KM FM 2285 INT HWY 19 & 2285	SULPHUR SPRINGS	33.221111	-95.689167
1047216	TEXAS RSA 7B1 TOWER HOLDINGS, L.P.	103.9	WEST LP 301/CR 3503	SULPHUR SPRINGS	33.159472	-95.574333
1048488	Inter-County Communications, Inc.	103.8	0.37 miles SW of intersecting Hwy #'s 154 & 11, ~ 2 MI S of	SULPHUR SPRINGS	33.105333	-95.601639
1049342	Crossroad Communications, Inc.	91.5	FM 499 1.8 MI E	CUMBY	33.140278	-95.808889
1049934	Texas, State of	91	1701 EAST SHANNON ROAD	SULPHUR SPRINGS	33.143111	-95.561278
1051262	Texas, State of, Texas Dept. of Transportation	32	SH19 LOOP 301 724 M W OF SH2285 INT	SULPHUR SPRINGS	33.1525	-95.618056
1052580	SBA Infrastructures, LLC	106.7	105 McKinzey Dr. (TX13444-A)	Sulphur Springs	33.148833	-95.567639
1053211	Cebridge Acquisition, L.P.	91.7	Approx. 3 MI SW of	SULPHUR SPRINGS	33.081694	-95.661972
1053589	Oncor License Holdings Company, LLC	64	1100 COMO ST	SULPHUR SPRINGS	33.121389	-95.586111
1054923	The Kansas City Southern Railway Company	88.4	2 MILES EAST OF	CUMBY	33.134139	-95.801111
1056090	GTE SOUTHWEST INCORPORATED	48.7	224 OAK AVENUE	SULPHUR SPRINGS	33.135	-95.600278
1058881	East Texas Broadcasting, Inc.	85	300 GLOVER ST	SULPHUR SPRINGS	33.151944	-95.603611
1058885	SBA Structures, LLC	146.3	9459 State Hwy 154 South (TX21019-A)	Sulphur Springs	33.00225	-95.5945
1200008	UNION PACIFIC RAILROAD COMPANY	113.6	NR HWY #67 4.7 MI E OF	SULPHUR SPRINGS	33.138389	-95.516944
1200869	City of Sulphur Springs	24	825 Hillcrest	Sulphur Springs	33.147889	-95.626889
1200961	SBA Towers II LLC	91.4	354 Franklin County Rd, SW 3050 (TX13924-A)	Mt. Vernon	33.1625	-95.308056
1201040	UNION PACIFIC RAILROAD	113.7	NR HWY#67 4.7 MILES EAST OF	SULPHUR SPRINGS	33.138167	-95.516917
1202037	UNION PACIFIC RAILROAD COMPANY	113.7	NR HW#67 4.7 MI E OF	SULPHUR SPRINGS	33.138389	-95.516944
1204011	Frontier Southwest Incorporated	55.5	1121 SHANNON RD E	SULPHUR SPRINGS	33.130361	-95.575444
1207467	STC Five, LLC	76.2	Rt 2 Box 191 (DA33XC047)	Sulphur Springs	33.093528	-95.495139
1207557	STC Five, LLC	76.2	Rt 4 Box 288 DA33XC171	Sulphur Springs	33.183444	-95.769889
1208839	SBA Towers II LLC	61.6	224 Kirskey (TX13915-A)	Sulphur Springs	33.134611	-95.599583
1209843	Sprint Spectrum, L.P.	76.2	3/8 mi S of FM 1567 (DA33XC051)	Arbala	33.018194	-95.661694
1210969	Crown Castle Towers 05 LLC	76.2	F-M 1567	Arabala	33.018194	-95.661694
1210972	Crown Castle Towers 05 LLC	76.2	1 CR 2396	Winnsboro	33.017167	-95.317694
1211059	STC Five, LLC	75.3	Rt 7, Box 277 (DA33XC168)	Sulphur Springs	33.263667	-95.583556
1212765	RAYBURN COUNTRY ELECTRIC COOPERATIVE, INC.	91.4	0.65 M west of FM 2297 & FM 1567 Intersection on FM1567 & 600 Ft S., Hopkins Cty	Sulphur Springs	33.016778	-95.658556
1215042	Crown Communication Inc.	114.3	02 miles S. of CR3354 on CR3385	Saltillo	33.162139	-95.3355

FCC Registration Number	Tower Owner	Height	Street Address	City	Latitude	Longitude
1215333	American Towers LLC	67.1	6462 CR 1100 (035907)	Sulphur Springs	33.112167	-95.654306
1215619	American Towers LLC	76.2	38 County Rd. 4112 (Cumby #35775)	CUMBY	33.130583	-95.799611
1216606	Crown Communications LLC	97.5	280 Co. Rd 4720	Sulphur Springs	33.138167	-95.809778
1216633	Crown Communications LLC	97.5	375 CR3311	Sulphur Spring	33.140972	-95.505583
1217551	American Towers LLC	76.2	66 County Road 3531 (035777)	Como	33.1595	-95.423444
1219000	Crown Communication Inc.	97.5	Highway 19	New Birthright	33.290194	-95.578639
1219002	Crown Communication Inc.	97.5	Highway 19	Greenview	33.00625	-95.704639
1219040	American Towers, LLC	103.9	540 Cr 1109 (Sulphur Springs #309140)	Sulphar Springs	33.09525	-95.676861
1219047	American Towers, LLC	103	9614 US Highway 67 (Weaver 6 #309124)	Salito	33.171889	-95.397083
1220202	C&L TOWERS, LLC	124.7	1.1 km NW of the community of Brashear, TX	Cumby	33.125167	-95.742333
1225037	HOPKINS COUNTY MEMORIAL HOSPITAL DISTRICT	48.8	115 AIRPORT RD	SULPUR SPRINGS	33.157056	-95.602167
1234491	Hopkins, County of	85	Hopkins County Road 2307 @ the old Martin Springs landfill	Sulphur Springs	33.104083	-95.560306
1236646	HOPKINS, COUNTY OF	125	.4 MILE N ON COUNTY ROAD 4772	COOPER	33.283944	-95.644
1238305	SULPHUR SPRINGS, CITY OF	36.5	125 S DAVIS STREET	SULPHUR SPRINGS	33.136889	-95.603222
1238465	American Towers LLC	91.4	DIKE STREET (204572)	Sulphur Springs	33.151528	-95.603722
1241934	Sulphur Springs I S D	35	829 Bell St	Sulphur Springs	33.120806	-95.610389
1243233	Sulphur Springs, City of	13.7	Sulphur Springs Municipal Airport	Sulphur Springs	33.161333	-95.618944
1245923	TEXAS RSA 7B1 LIMITED PARTNERSHIP	82.3	95 County Road 3573	Dike	33.308528	-95.474083
1246952	Region 8 Education Service Center	35	Sulphur Springs Middle School Campus	Sulphur Springs	33.120417	-95.610167
1256707	American Towers LLC	91.4	15040 Hwy 11 (#272415)	Pickton	33.026139	-95.400389
1260189	Dallas MTA, LP	76.2	751 FM 1536	Sulpher Springs	33.328972	-95.576917
1260557	North Hopkins ISD	36.5	100 Craig Street	Sulphur Springs	33.133333	-95.614111
1262232	Region 8 Education Service Center	42.7	Como Pickton, 13017 Tx Hwy 11 E.	Como	33.036444	-95.429583
1262234	Region 8 Education Service Center	36.6	Cumby School, 101 Sayle St.	Cumby	33.135944	-95.845361
1262251	Affiniti, LLC	33.5	7154 Hwy 11 East	Sulpher Springs	33.073083	-95.518
1262266	Region 8 Education Service Center	30.5	Miller Grove School, 7819 FM 275 S.	Cumby	33.022028	-95.801861
1262286	Region 8 Education Service Center	42.7	Saltillo School, 150 CR 3534	Saltillo	33.185111	-95.329417
1262289	Region 8 Education Service Center	36.6	Sulphur Bluff School, FM 71	Sulphur Bluff	33.3305	-95.393917
1266021	The Kansas City Southern Railway Company	15.2	TX19 Crossing	Sulphur Springs	33.135194	-95.629444
1271764	The Kansas City Southern Railway Company	15.2	Texas Street and KCS Track	Sulphur Springs	33.135111	-95.606111

FCC Registration Number	Tower Owner	Height	Street Address	City	Latitude	Longitude
1271765	The Kansas City Southern Railway Company	15.2	Loop 313 Main Street	Sulphur Springs	33.135222	-95.610444
1275806	American Towers LLC	91.4	9481 Hwy 19 (#274647)	Brashear	33.000667	-95.700583
1275939	Alltel Corporation	91.7	8892 US Hwy 67 East	Saltillo	33.167361	-95.406972
1292425	WWC Texas RSA LLC	79.2	State Hwy 11	Como	33.048139	-95.462556
1294009	Templo De Dios Inc 1	50	1024 Texas St.	Sulphur Springs	33.122056	-95.6055
1298594	Farmers Electric Cooperative Inc.	27.4	301 N. Hillcrest	Sulphur Springs	33.137361	-95.630444
1299853	ACME Commercial Properties L.L.C.	60.6	1150 Shannon Road East	Sulpher Springs	33.133833	-95.573389
1300985	The Kansas City Southern Railway Company	11.8	Signal 1415-1416	Sulphur Springs	33.135139	-95.622917
1301116	ACME Commercial Properties L.L.C.	60.6	Raw Land .29 miles NE of xroads CR2333, Hwy 11	como	33.033944	-95.429528
1301218	ACME Commercial Properties L.L.C.	60.6	2467 CR 3511	Sulphur Springs	33.2145	-95.538444
1304488	Tillman Infrastructure, LLC	79.2	38 CR 4112	Cumby	33.136944	-95.803833
1304564	Alltel Corporation	79.5	10900 Hwy 11 East (2395866)	Como	33.049111	-95.461611
1306463	Brazos TV Inc	106	5.3 miles east of Sulphur Bluff, TX on FM-71	Sulphur Bluff	33.331111	-95.315
1308475	Tillman Infrastructure, LLC	73.1	CR 1100	Sulphur Springs	33.108333	-95.652139
1308946	VB BTS, LLC	76.2	TBD / US-TX-5562	Sulphur Springs	33.106889	-95.653917
1311227	Tillman Infrastructure, LLC	109.7	595 CR 3502	Sulphur Springs	33.158528	-95.567222
1311304	Tillman Infrastructure, LLC	95.1	1244 Jefferson Street	Sulphur Springs	33.142194	-95.571306
1314848	Community Internet Providers LLC	6.1	402 Church Street	Sulphur Springs	33.140444	-95.600528
1317314	Vertical Bridge 500, LLC	42.6	1212 W. Industrial Dr.	Sulphur Springs	33.121167	-95.629444

3.5 SERVED, UNDERSERVED, AND UNSERVED AREAS

The areas on the map below have been identified using Federal Communications Commission (FCC) 477 data. The map also shows the three areas (outlined in red) where fiber pilot studies were done as part of this work (see Section 7). Service providers, including incumbent telephone and cable companies, file a 477 report with the FCC to identify where their service is available and at what speed, using the FCC designations :

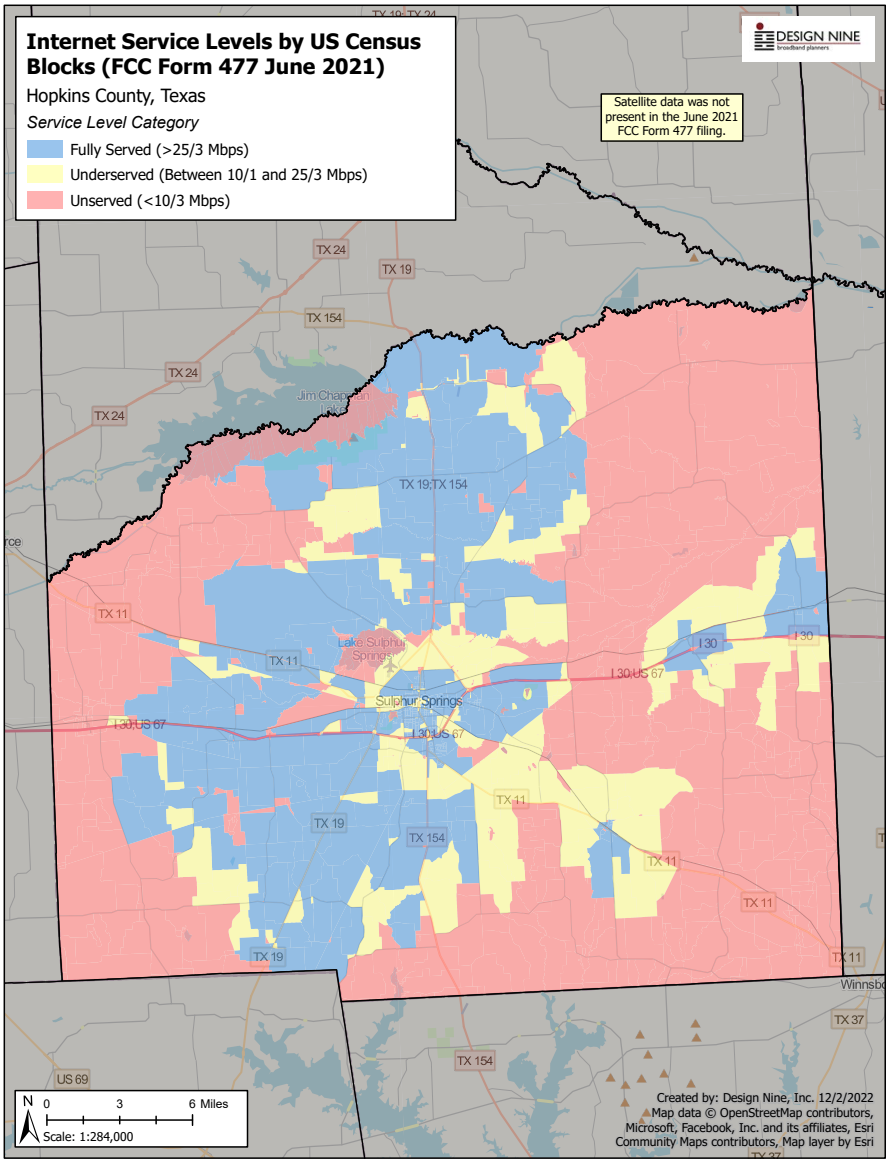
Unserved – Less than 10 Megabits down/1 Megabit up

Underserved – At least 10 Megabits down/1 Megabit up and less than 25 Megabits down/3 Megabits up

Served – Equal to or better than 25 Megabits down/3 Megabits up

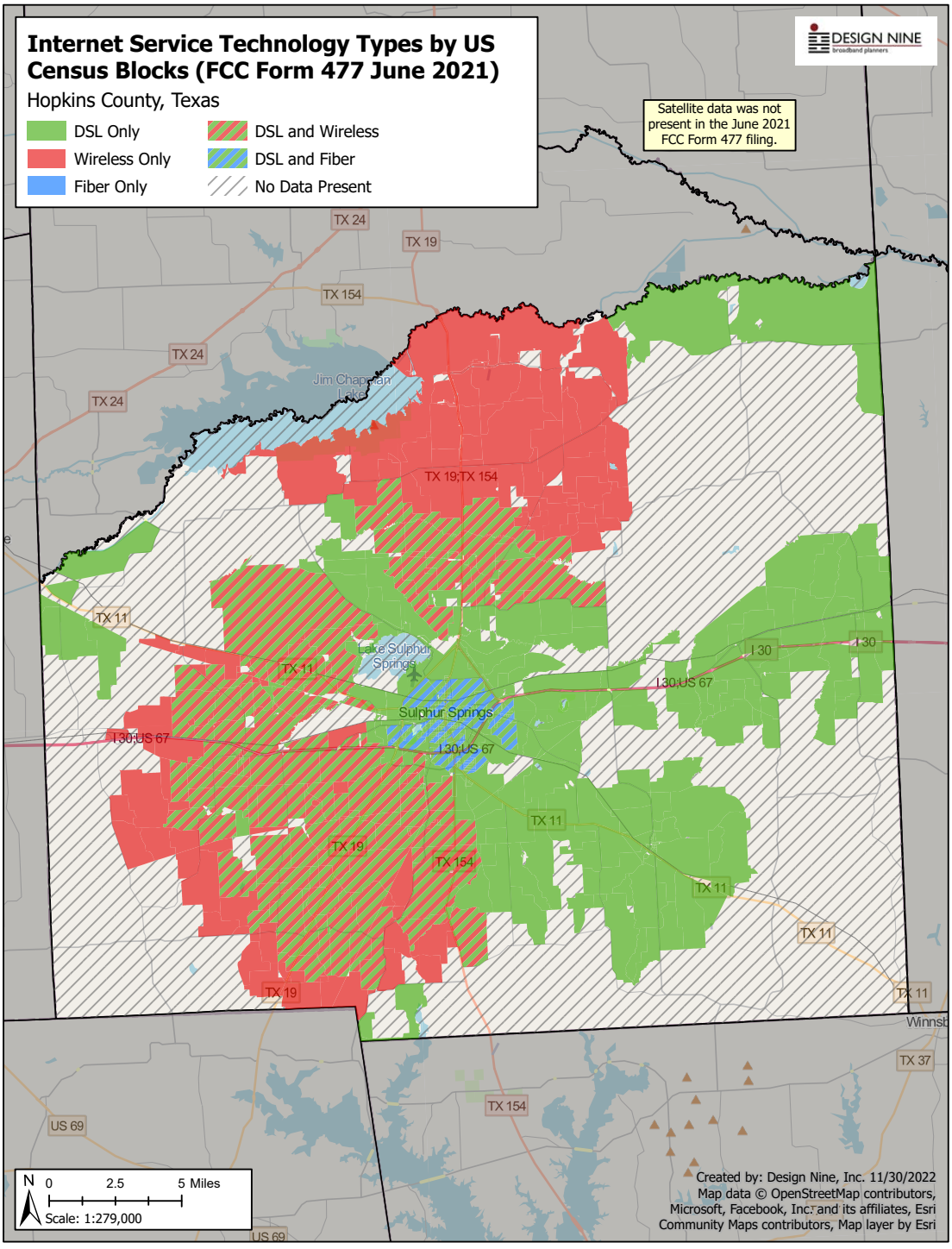
There are two problems with the 477 data:

- The data is self-reported by the providers, who typically report their most optimistic Internet speeds. In practice, customers may not always get the reported speeds.
- A single customer receiving service in a census block means that the provider can indicate that the entire census block is counted. So if one household receives 25/3 service, all households in that census block are counted as receiving that level of service.



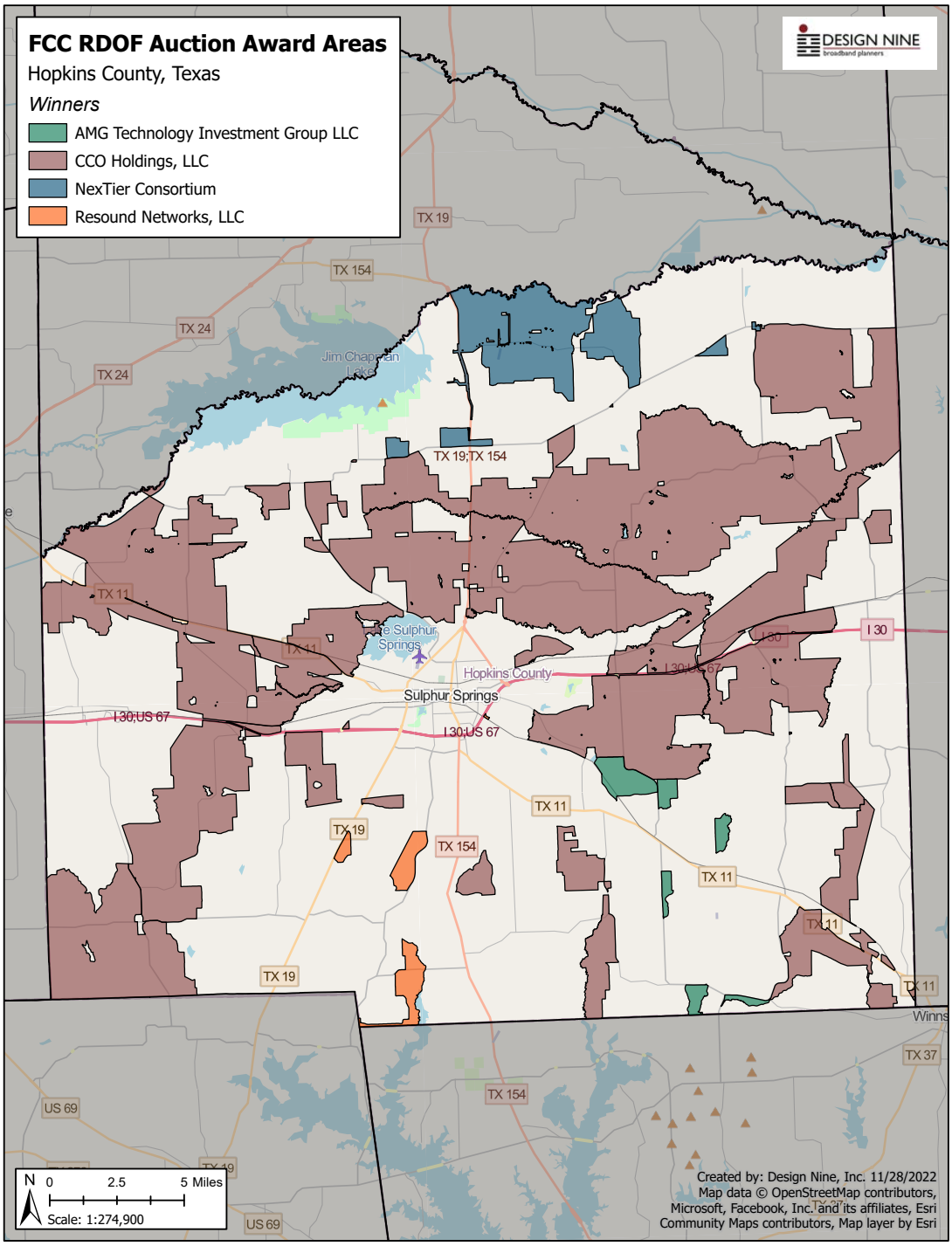
3.6 FCC TECHNOLOGY TYPES

While the FCC data indicates that the most of the county is fully served, there is wide variance in the kind and type of service available to households in the county. Fixed-point wireless Internet is not widely available, and DSL (relatively slow) is the dominant technology. There is very little fiber infrastructure in Hopkins County.



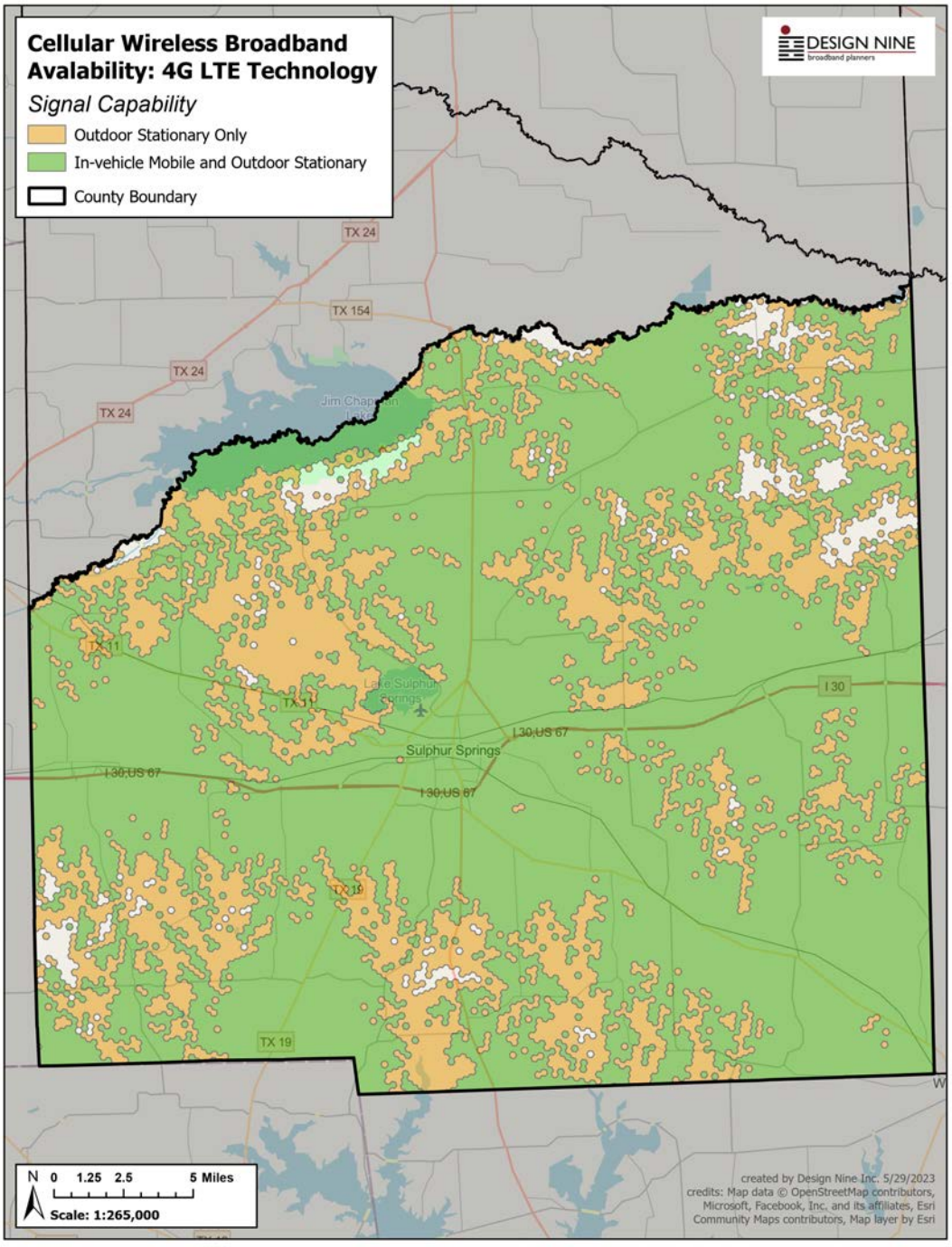
3.7 RDOF AWARD AREAS

The map below shows the FCC Rural Digital Opportunity Fund (RDOF) award areas that have been made in the county. RDOF grant awards can be substantial, but the funds can be spent over a ten year period. Some RDOF awardees are having the grant funds rescinded because little or no progress has been made making the promised investments in improved broadband infrastructure. The county should request quarterly RDOF progress reports from all awardees.

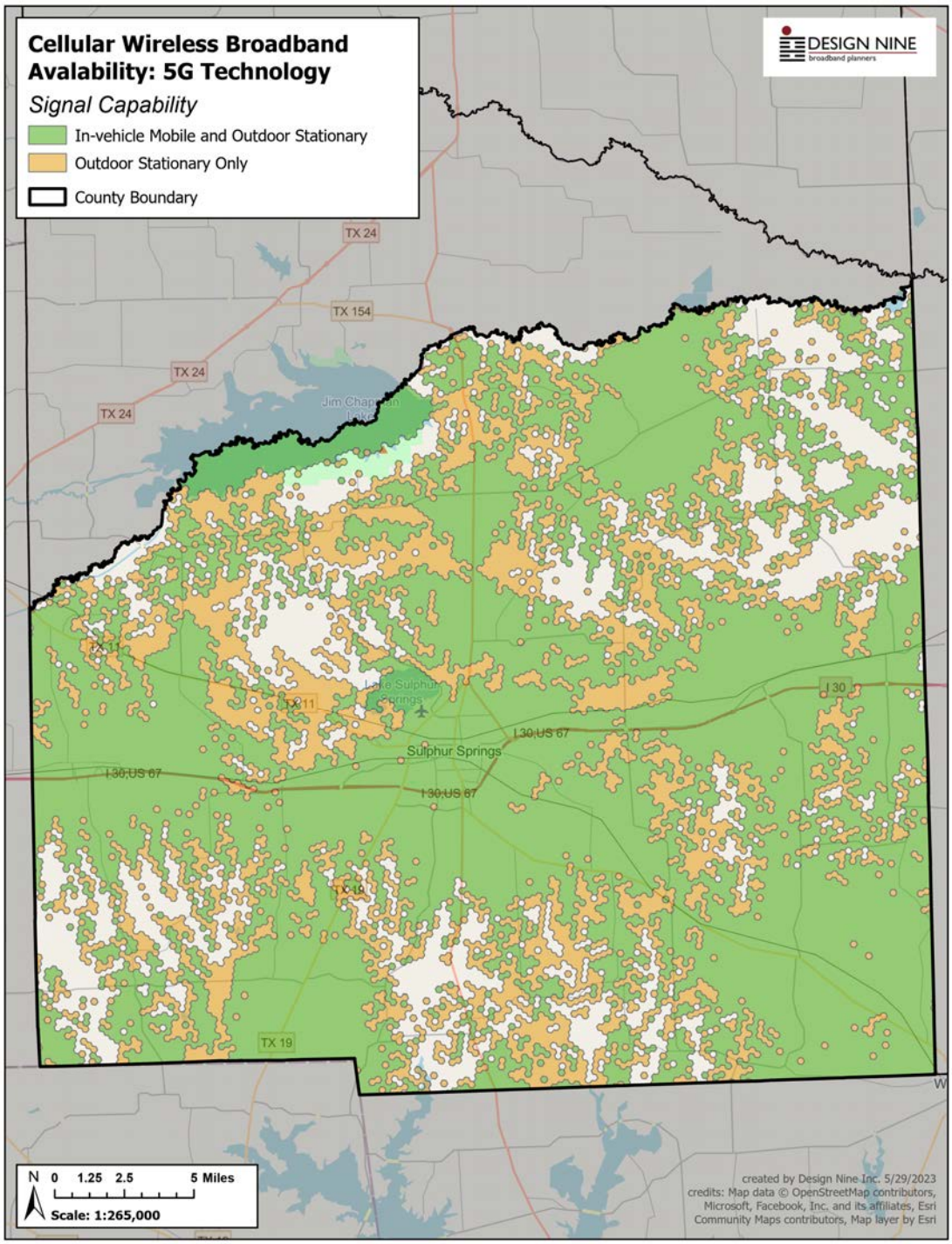


3.8 CELLULAR COVERAGE MAPS

The following maps show cellular broadband coverage data taken from the FCC's new Broadband Data Collection (BDC) System. Cellular coverage is broken down into categories based on the technology of transmission. The map below shows 4G LTE coverage level and the map on the following page shows the coverage levels for 5G. Additionally the cellular coverage in each area is sorted into two levels of quality. "Outdoor stationary only" represents areas where the given service is



only attainable when outside and stationary. This can be considered a less reliable level of cellular coverage. The "In-vehicle and outdoor stationary" is a service level which can be considered more reliable and capable by comparison. 5G cellular service generally provides higher bandwidth data/ Internet access (i.e. faster speeds) than 4G, but each cellular company has its own 5G technology and systems. The speeds available from 5G cell sites vary with the frequency being used. 5G systems require more cell sites because of limited distance (typically a maximum range of about 1,000 feet from a cell site for good service). However, the towers are smaller and less obtrusive.



4 HOW MUCH BROADBAND IS ENOUGH?

Bandwidth needs for the past several years have been growing by an estimated 30% per year and show no sign of slowing.

This means residential and business bandwidth needs are doubling every three years.

As computers and associated hardware (e.g. video cameras, audio equipment, and VoIP phones) become more powerful and less expensive, new applications and services are continually emerging that drive demand for more bandwidth.

"Next-generation" is the term used to describe future planning for network connectivity and infrastructure. Next-generation broadband reaps substantial benefits. There are several key benefits of next-generation broadband:

- Dramatically faster file transfer speeds for both uploads and downloads.
- The ability to transmit streaming video, transforming the Internet into a more visual medium.
- The means to engage in true-real time collaboration.
- The ability to use many applications simultaneously.
- The ability to maintain flexible work schedules by being able to work from home on a part-time or full-time basis.
- The ability to obtain health-related services for an occasional illness and/or long term medical services for chronic illnesses.

Clearly, consumers have a strong interest in a visual medium from when and wherever they are. YouTube is the second most popular search engine after Google, which demonstrates the need to support the infrastructure to transmit streaming video. In addition to video streaming, true real-time collaboration also provides an effective way for people to interact from wherever they are. People can engage in a two-way real-time collaboration so that fruitful, visual conversations can be held between friends, family, business associates from the state, country, or internationally.

Because of fiber networks, employees have the capability of working from home. Findings suggest that if all Americans had fiber to the home, this would lead to a 5% reduction in gasoline use, a 4% reduction in carbon dioxide emissions, $5B in lower road expenditures, and $1.5B commute hours recaptured.

In Hopkins County today, many residents and businesses are still relying on copper-based services. The bandwidth tables on the following pages show what is likely to be needed over the the next several years in terms of bandwidth. The existing copper infrastructure is going to become a limiting factor in economic development.

4.1 JOB AND WORKFORCE CHALLENGES

There are many areas and communities in the county that can be attractive to an emerging new group of businesspeople and entrepreneurs that typically are well-educated, own their own businesses or work for large global corporations, and are making choices about where they live based on family needs and interests rather than business interests.

This new breed of entrepreneurs and workers places a high value on the kinds of amenities that contribute to a good quality of life, such as traditional neighborhoods, vibrant downtown areas, a wide range of cultural and recreation opportunities, good schools, and a sense of place.

These businesspeople and their families make relocation decisions based on quality of life only where there is abundant and affordable broadband, because broadband enables this new approach to personal and work life. Most residents and businesses in Hopkins currently have, at best, Internet service that meets the FCC definition of "fully served," which is 25 Megabits down/3 Megabits up bandwidth. Some more recent grant programs are finally pushing higher speeds, with 100 Mbps down, 20 Mbps up as a more realistic target.

However, what has become painfully clear during the Covid pandemic is that this definition of "fully served" is not adequate to support many kinds of work from home activities. During the Covid lockdown, it was common to have both spouses trying to work from home while K12 and/or college age children were also trying to use video-heavy distance learning resources.

When home-based workers need to connect to a corporate Virtual Private Network (VPN), bandwidth requirements can increase even more. Work from home and business from home activities should have, at a minimum, a symmetric service of at least 10 Megabits download and 10 Megabits upload speeds. Higher speed service could include service levels like 25 Megabits down/10 Megabits up. The critical requirement is an upload speed that supports work from home.

If the goal is to enhance business access to broadband, there can be no upper limit on the definition of broadband. Saying that broadband (as an example) is 5 Megabits/second of bandwidth or 10 Megabits/second is to tell the residents and businesses in the Hopkins that there will be limits on their work and job opportunities.

Broadband is a community and economic development issue, not a technology issue. The essential question is not, "What system should we buy?" or "Is 5G wireless better or cheaper than fiber?" Instead, the question is:

"What do businesses of and home-based workers of Hopkins County need to be able to compete globally over the next thirty years?"

In short, the county today has "little broadband" in the form of DSL and cable modem service, along with a very limited amount of "big broadband" in the form of fiber to some businesses and residents. If the County makes investments in broadband and telecommunications infrastructure, it is absolutely critical that those investments are able to scale gracefully to meet business and economic development needs for decades.

Two key concepts that should drive County activities in telecom are:

"Broadband" is not the Internet

Bandwidth is not a fixed number

Broadband and "the Internet" are often used interchangeably, but this has led to much confusion. Broadband refers to a delivery system, while "the Internet" is just one of many services that can be carried on a broadband network. The challenge for the County is to ensure that businesses and homes have a broadband network with sufficient bandwidth to deliver all the services that will be needed and expected within the next three to four years, including but not limited to "the Internet."

The economic impact can include the following effects:

- Difficulty retaining some existing businesses. As business bandwidth needs continue to increase over the next several years, some businesses may need to move out of the area to ensure that they have the right bandwidth to support their business operations.
- Difficulty attracting new businesses. New businesses interested in some of the advantages of the county, like low cost of living, good recreational opportunities, and good workforce ethic, may be deterred by the cost and limited bandwidth available, and therefore choose other areas to locate.
- Difficulty keeping younger workers and families in the county. Younger workers and families tend to be heavy users of Internet services, and real-estate agents are reporting that younger house buyers are reluctant to live in areas with poor Internet service.
- Reductions in real estate value. Homes with poor Internet service are more difficult to sell, leading to lower prices and negatively impacting county income from property taxes.

4.2 BUSINESS BANDWIDTH NEEDS

The table below shows bandwidth consumption for several types of businesses and a projection of the bandwidth needed five and ten years out. The Covid pandemic has had the effect of dramatically increasing the number of home-based works and has also affected business travel decisions. More and more businesses will invest in high definition (HD) quality business videoconference systems to reduce the need for travel and to maintain high quality communications with a dispersed workforce. These HD systems require substantial bandwidth; a two-way HD video conference requires 20-25 Mbps during the conference, and a three-way conference requires 30-35 Mbps during the conference.

Business Bandwidth Needs

	LARGE BUSINESS		SMALL BUSINESS		HOME BASED WORKER	
DESCRIPTION	A larger business with about 50 workstations		A small business with 10 to 15 employees, and 7-10 workstations		One or two people working from home	
	Concurrent Use	Mbps	Concurrent Use	Mbps	Concurrent Use	Mbps
Telephone	20	5	5	1.5	2	0.5
Credit Card Validation	4	4	1	1		0
Security System	1	5	1	2	2	2
Internet	50	500	7	10.5	2	20
VPN Connection	20	100	5	50	2	5
Data Backup	5	7.5	1	10	2	10
Web Hosting	1	2		0		0
Workforce Training (online classes)	5	20	1	10	2	10
HD Video-conferencing	20	125	2	20	2	10
Totals		**768.5**		**105.0**		**57.5**

	LARGE BUSINESS	SMALL BUSINESS	HOME BASED WORKER
FIVE YEARS FROM NOW	3-10 Gbps	250-500 Mbps	100-200 Mbps
TEN YEARS FROM NOW	10 + Gbps	2-4 Gbps	500-750 Mbps

As more workers are moved to home-based offices, the business location must provide network access (Virtual Private Network (VPN)) to employees working from home. These home-based workers will make extensive use of videoconferencing to attend routine office meetings remotely and to enhance communications with co-workers, including videoconferences with other home-based workers in the company. A VPN network providing remote access to just two or three home-based employees could require 50 Mbps of bandwidth during normal work hours.

4.3 RESIDENTIAL BANDWIDTH NEEDS

The table below depicts the bandwidth needed for typical residential services which are available now or will be available in the near future. The Covid pandemic has illustrated the shortcomings of cable Internet services, in which the upload and download speeds are highly asymmetric.

For home-based workers, upload speeds need to be equal to or nearly equal to download speeds. Current cable Internet systems are not able to deliver symmetric or near symmetric service. Today's shared networks (cable and wireless in particular) rely on the "bursty" nature of traffic to provide services to end users. If all end users were consuming their advertised maximum bandwidth, today's cable and DSL networks would grind to a halt.

Residential Bandwidth Needs

	RESIDENTIAL DAYTIME		EARLY EVENING		EVENING & LATE NIGHT	
DESCRIPTION	Work from home, K12 distance learning and home schooling, telemedicine, streaming video		Increased Internet use as children arrive home from school and employees from work		Peak television and Internet use. Multiple TV's are on, phone and computer being used	
	Concurrent Use	Mbps	Concurrent Use	Mbps	Concurrent Use	Mbps
Telephone	1	0.25	1	0.25	1	0.25
Work From Home	1	10	1	10	1	10
Streaming TV	1	4	2	8	2	8
Security System	1	2	1	2	1	2
Internet	1	1.5	1	1.5	2	3
Online Gaming	0	0.25	1	5	2	10
VPN Connection	0	0	1	2	1	2
Data Backup		0	1	5	1	5
Telehealth	1	4	1	4	1	4
Distance Learning/ home schooling		0	1	10	1	10

	RESIDENTIAL DAYTIME		EARLY EVENING		EVENING & LATE NIGHT	
Videoconferencing		0		0		0
Average needed bandwidth		**15-25**		**25-35**		**20-35**
Five years from now	50-75 Mbps		60-90 Mbps		50-100 Mbps	
Ten years from now	150-300 Mbps		200-350 Mbps		175-250 Mbps	

Existing cable modem network users are overwhelming the digital cable networks that were upgraded as little as three or four years ago, and the firms have had to artificially reduce the bandwidth available for certain kinds of high bandwidth services (e.g. peer to peer file sharing). Some cable providers have even run into capacity issues with the TV portion of their networks, and some consumers have observed that some HD TV channels have been so highly compressed that picture quality has been noticeably degraded.

4.4 CURRENT AND FUTURE USES AND SERVICES

When analyzing future service needs, it is important to take into account ALL services that may be delivered over a broadband connection. Broadband is not a service – it is a delivery medium. Using roads as an analogy, broadband is the road, not the trucks that use the road. Internet access is a service delivered by a broadband "road," and that Internet service is just one of many services that are in demand. Today, congestion on broadband networks is not due just to increased use of email and Web surfing, but many other services.

This means that current DSL, wireless, and cable modem services are completely inadequate for future needs. Current DSL offerings are in the range of one Mbps to three Mbps for most residential users, three Mbps to five Mbps for business DSL users, and there are severe distance limitations on DSL. Higher bandwidth is possible, but as the DSL bandwidth goes up, the distance it can be delivered goes down.

Typical wireless broadband (not cellular data service) offerings are in the range of 5 Mbps to 20 Mbps download speeds, and some providers do advertise higher speeds. In practice the actual upload and download speeds can vary substantially, depending on tree cover, terrain, and distance from the tower. Some wireless providers are rolling out advertised 20-40 Mbps services (download) and 3-5 Mbps upload to meet the required FCC 25/3 minimums.

Across the U.S., current average download bandwidth for cable modem services is typically 25-80 Mbps, with cable companies promising much more using the phrase "up to..." to obscure actual bandwidth being delivered. Download speeds on cable Internet systems continue to be much lower, with speed tests regularly showing highly asymmetric upload speeds as much as 10-20 times lower than the download speeds.

The highly asymmetric bandwidth (unequal download/upload speeds) of copper-based cable and DSL as well as fixed-point wireless continues to highlight the long-term superiority of fiber connections, which can and do deliver symmetric bandwidth (equal upload/download speeds). Another key advantage of fiber networks is the ability to upgrade capacity simply by replacing the equipment– properly installed fiber has a useful life span of 50 years or more.

The challenge for the area is to ensure that the businesses, residents, and institutions have a telecommunications infrastructure in place that will meet future needs.

Distance learning, entertainment, and video conferencing are three major applications of Internet video. Distance learning from home with live video feeds requires high-performance two to five Mbps connections in the near term, the next two to four years. Over the next four to seven years, there will be many distance-learning courses that will incorporate live HD two-way video feeds, enabling students to participate in classroom discussions at a much higher quality level. Distance learning could be an important home-based application for workforce training and retraining.

U.S. homes now have more than half a billion devices connected to the Internet, according to a study by the NPD Group. Furthermore, the average number of connected devices per household is ten and growing rapidly. This is more than three times the average number of people per household.

5 SERVICE PROVIDER ANALYSIS

This report section includes information which shows what Internet services are available to Hopkins County residents and how much Hopkins County citizens pay for the services they chose. Pricing information is often deliberately difficult to obtain because many providers do not want consumers doing comparison shopping. Real pricing is often hidden behind promotional pricing that is hard to decipher or requires a phone call to a sales representative.

Our data is assembled from several public sources that provide data on Internet use, including FCC data, social media data, and commercial Web sites that provide Internet use data. The best information utilizes zip codes but those boundaries are not aligned with local government jurisdictions, and some zip code data as we discuss later includes areas outside the county. Adjustments that we make are noted.

The information in these charts and tables is current as of late January 2023, and shows the **areas where service providers claim to provide service**. Percentages of customers being offered different kinds of service do change as equipment is upgraded or new neighborhoods are reached. Because of rapid changes that can take place with pricing and available services, this report should be only viewed as a snapshot of the information when the report was written. It would be very unusual for service provider data to remain the same even one or two months later.

Pricing and actual services and speeds received by households in a particular zip code are more discoverable in survey responses which document what services customers actually have. Wireless Internet Service Providers (WISPs) often claim full coverage in a county but often cannot provide services in some areas because of topography. WISPs usually will not provide pricing without visiting homes.

Nationally, Consumer Reports found in their Summer 2021 Broadband Survey, "Fifteen percent of American households only have access to the internet through their smartphone data plan and one in 20 use DSL or dial-up to access the internet. Three percent of Americans say their household does not have access to the internet."[1] These are good metrics to use in looking at coverage in your county. Census data indicate that 48% of Hopkins County residents access the Internet only with their smartphone and another 8% only have satellite Internet access. These services are more expensive than fixed wireless (FW) or fiber. They also provide slow connections, often with data limits and less reliable connectivity.

Consumer Reports recently stated that 84% of their members in March 2022, agreed that Internet service is "as important as water or electricity." National surveys mirror those numbers with the latest number there being an April 2020 survey showing 80% of all surveyed consumers saying the same thing.[2]

Pew Reach Center reported in September 2021, that during the pandemic, "connection quality has been important for school assignments, meetings and virtual social encounters alike. Pew's survey highlights difficulties for some: Roughly half of those who have a high-speed internet connection at home (48%) say they have problems with the speed, reliability or quality of their home connection

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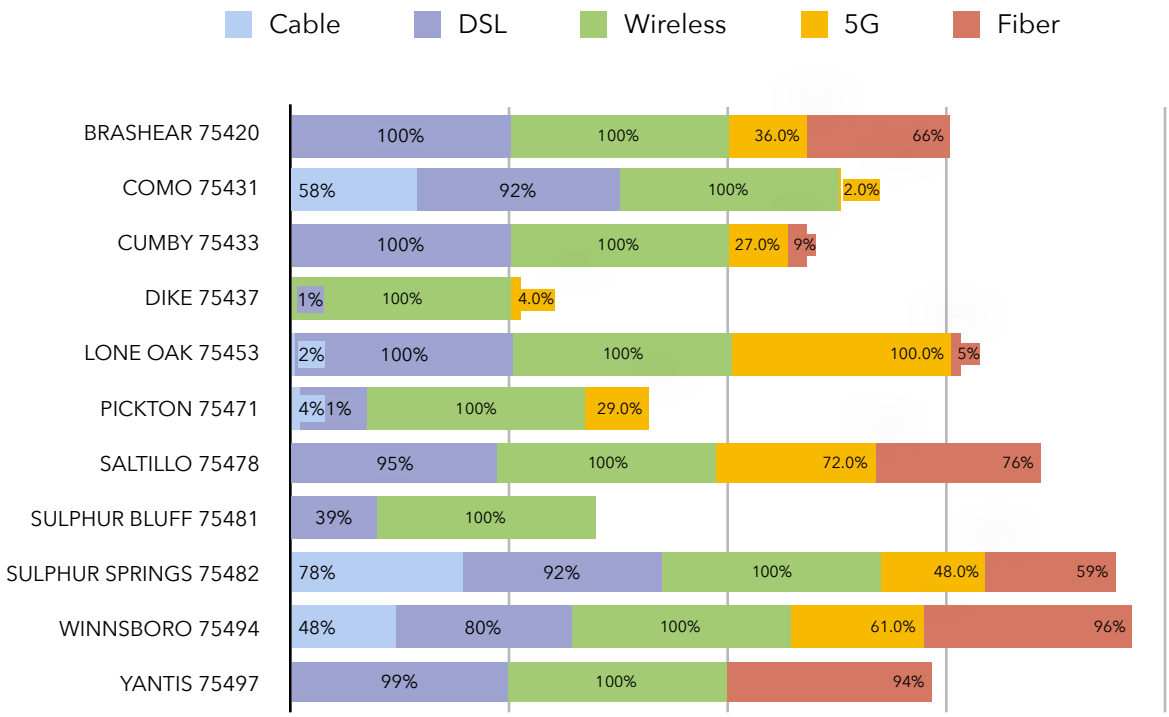
[1] Broadband Survey, Consumer Reports, July 2021

[2] Best and Worst Home Internet Providers of 2022, By James K. Willcox, November 7, 2022, page 1

often or sometimes."[3]

Online estimates of Available Broadband Technology Type in Hopkins County

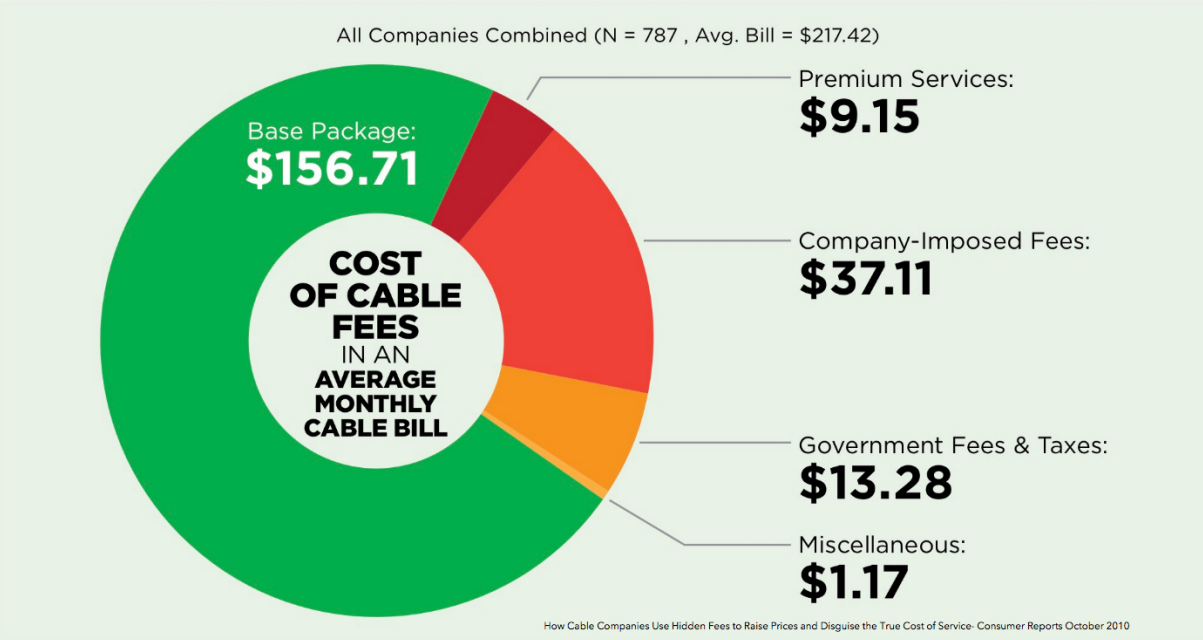


[3] The Internet and the Pandemic, Page 1 https://www.pewresearch.org/internet/2021/09/01/the-internet-and-the-pandemic/

According to a 2019 Consumer Reports study[4], the national average advertised price for standard triple play services of Internet, television, and telephone across the country is $156.17. Because of fees and taxes, the actual national average cable bill was $217.42. Nationally, consumers got an average of 24% added to their bill. Our information shows those prices have not gone down. Data caps which were turned off early in the pandemic are back[5] in many areas.

In their 2022 study of 22,000 bills Consumer Reports found companies imposed "junk fees"—under names such as "network enhancement fee," "internet infrastructure fee," "deregulated administration fee," and "technology service fee." These are not government required fees. They only improve the company's profits and sometimes used to raise costs for customers without breaking contracts.[6] Dealing with data caps can also be expensive for consumers, often adding $30 or more per month.

Figure A: Cost of Cable Fees in an Average Monthly Cable Bill (2018)



[4] Cord Cutting Continues, Fueled By High Cable Pricing, Consumer Reports' Survey Finds 9/17/2019

[5] Consumer Reports -Get Ready for Cable TV and Internet Price Hikes and Data Caps in the New Year 12/21/20

[6] What Consumer Reports Learned From 22,000 Internet Bills.- Dec. 17, 2022, page 4

This rate card is typical of the complexity of fees that consumers face.

Digital Services

All pricing below is monthly unless otherwise indicated

PREMIUM MOVIE SERVICES	
HBO Max, Cinemax, Starz/Encore	$19 each
HBO Stand Alone	$19
Showtime/TMC	$10.99
Add Showtime/TMC to any single Premium service or any two or three Premium services	$10.99
Any two Premium Movie Services	$32
Any three Premium Movie Services	$42
Hispanic Tier	$6
Digital Value Pack	$16
TV Plus	$12

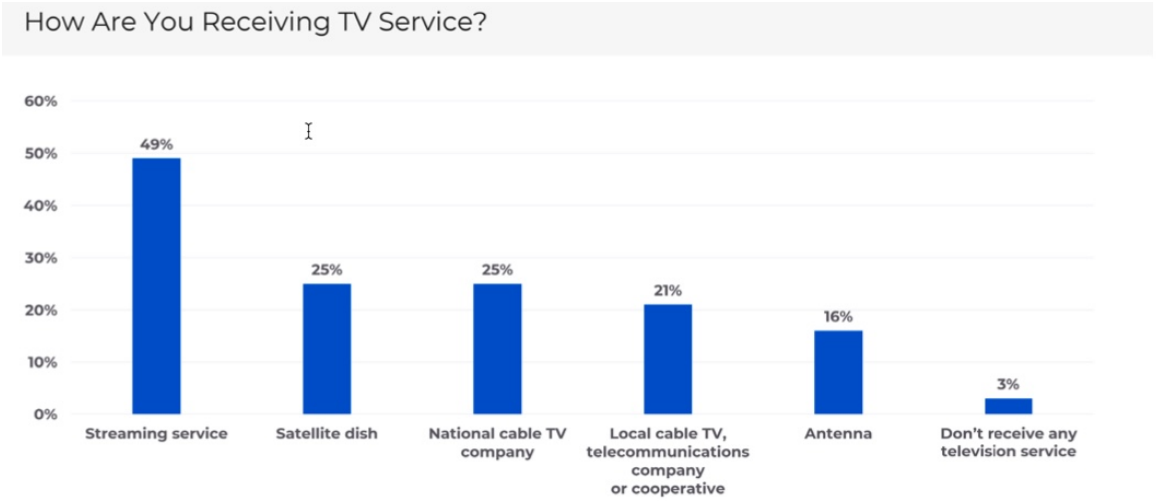
EQUIPMENT RATES	
Wired/Wireless EMTA	$12.50
Wired or Wireless Docsis 3.1 Modem	$12.50
Modem	$10.50

OTHER SERVICES & FEES	
2nd Phone Line	$20
Caller ID, Voice Mail & Voice Mail to Email	$7
International Calling	Varies
Cable Service Guard	$5
Installation (call for details)	$0 - $90
Activation Fees (call for details)	$0 - $100
Equipment Deposits	May apply
Sports Surcharge	$9.20
Broadcast TV Surcharge (varies by area. call for details)	$14.44 - $30.54
Broadcast TV Delivery Surcharge (where applicable, call for details)	$3.95
Internet Surcharge (where applicable, call for details)	$2.75
Unlimited Data	$30
Regulatory Cost Recovery Fee (Phone Customers only)	$5.62

"Nearly half (47 percent) of U.S. TV viewers state they do not subscribe to "traditional cable," and among those that do, 44 percent are planning to drop cable or cut back services over the next year."[7]

This chart from Innovative Systems' study of rural broadband users[8] shows how streaming is becoming an important delivery mechanism even in rural areas. Streaming is just one of the factors that increases the demand for greater bandwidth across the full spectrum of broadband users. Streaming can be problematic with services that have high latency.

OpenVault recently reported "The monthly weighted average data consumed by subscribers in 3Q22 was 495.5 GB, up 13.9% from 3Q21. Close to 16% of all subscribers in 3Q22 consumed 1 TB or more of data. They also reported average speeds for US household was 347.8 Mbps down and 23.5 Mbps up. "[9] It would be exceedingly expensive to use this much data via satellite or cell phone Internet connections that are heavily used in Hopkins County.



- Just about half of rural residents identify streaming as a source for video.
- DBS satellite accounts for 25% of rural TV subscribers, and another 25% subscribe to a national cable TV provider.
- Just about 1 in 5 households (21%) get TV from a local provider or cooperative.
- Local broadcast television via an antenna reaches 16% of rural residents.

[7] July 20, 2021, The Future of TV Report: Connected TV and Linear TV Move Closer Together

[8] Rural Video and Broadband Industry Study - 2021, page 4, by Innovative Systems

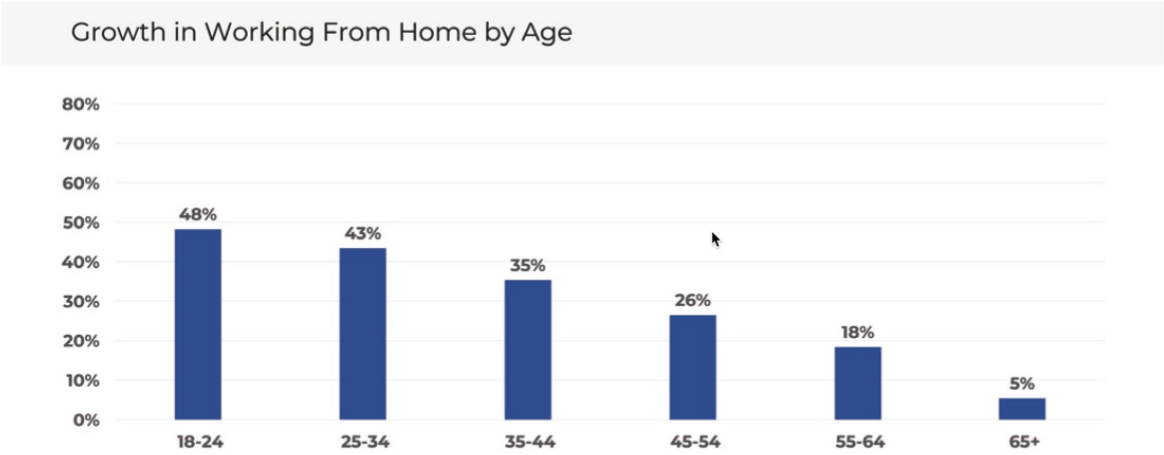
[9] OpenVault, Broadband Insights Report (OVBI) 3Q22, page 13, fall 2022

The Pandemic has also had a major impact on the amount of work done from home even in rural areas.[10]

Pandemic Impact

The pandemic impacted just about every aspect of life, including video and internet usage. The following data reveals some of that impact on rural consumers.

Does someone in your household work from home who did not prior to the pandemic? (n=726)
Note: Represents those answering yes.



- **For rural consumers, the younger you are, the more apt you are to have been working from home as a direct result of the pandemic.**

Survey results presented in November 2021, by Kyle Rosner, Deputy Broadband Advisor for the Commonwealth of Virginia, indicate that the number of people working from home (among those who can) has jumped from a pre-pandemic level of 20% to 71% who are currently working from home. Those who would like to work from home after the pandemic now stand at 54%.[11]

Hopkins County's heavy reliance on DSL, Satellite, and fixed Wireless means that residents pay more for slower and less reliable connections to the Internet. It also means that working from home in a job that required Internet access would be very difficult in Hopkins County.

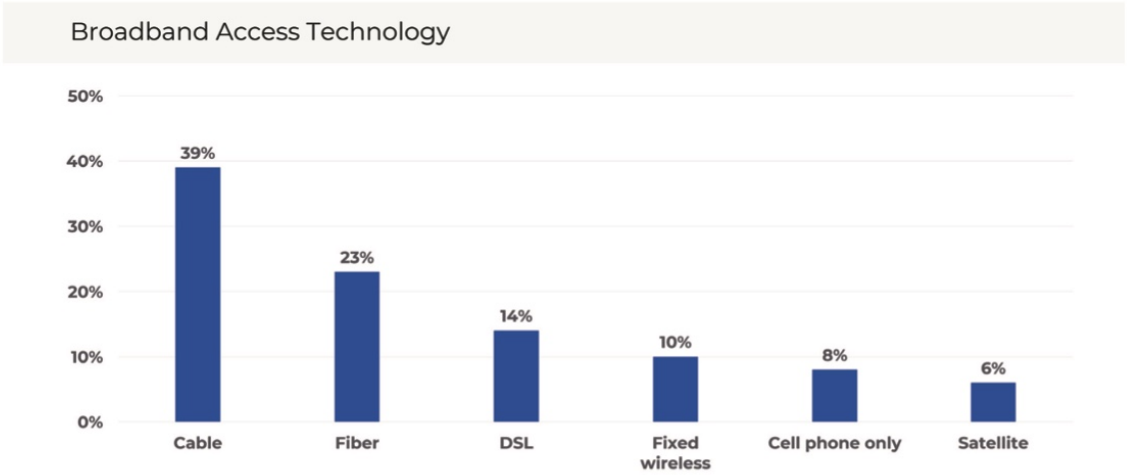
[10] Rural Video and Broadband Industry Study - 2021, page 13, by Innovative Systems

[11] Connect Commonwealth Presentation by Kyle Rosner to NC Broadband Matters, November 15, 2021, slide 16

Broadband Access and Satisfaction

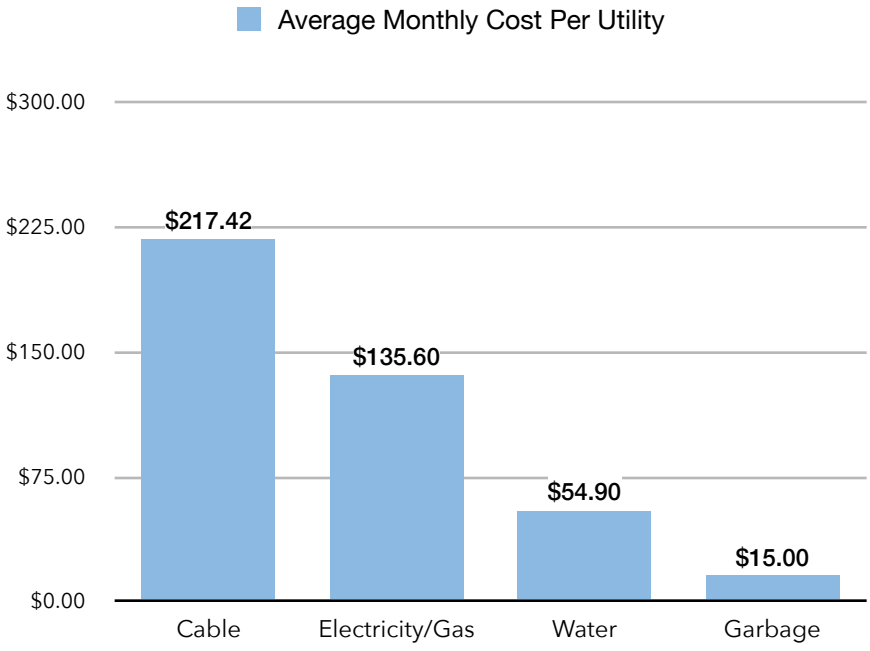
The following data explores how rural subscribers receive internet service and their overall satisfaction with it.

Which of the following best describes how internet is delivered to your home? (n=756)



- Cable broadband takes the lead for rural broadband access at 39%.
- Fiber broadband penetration for rural America stands at 23%.

It is important to understand how significant broadband bills have been become for all households. When faced with limited broadband choices driven by lack of competition there are few ways for a household, especially a small one, to lower broadband costs significantly. The increasing dependence of households on broadband services makes this even more critical.



Those houses purchasing a traditional cable package at or above average national costs now find that their cable package costs more than all their other utilities put together.

"One important thing we found in our research was how relatively expensive a cable bill is compared to other utilities for smaller households. The average cable bill stays relatively similar across household sizes, whether it's one person living in a small apartment or a family of ten living in a large house. This is not true of utilities like electricity or water, with much wider scales for their average bill size depending on household size."[12]

Our pricing information includes all the service providers that have been discovered with services offered to 5% or more residents living in zip codes with at least 5% or more of their population in Hopkins County. Hopkins County had no zip codes that were eliminated for this reason.

We cannot analyze zip codes which are just post office boxes because there is no way to accurately determine where those people using the post office boxes receive their Internet services. Hopkins County had three zip codes that were just post office boxes, Chico, zip code 75425, Cunningham, zip code 75434, and Paris, zip code 75461 were all post office only zip codes and were not examined.

We do not include services in the pricing comparisons when we estimate the service is available to less than 5% of the County's population. Satellite prices are also not considered in median cost calculations since they are available everywhere and would distort local pricing. We exclude Earthlink 5G and T-Mobile 5G home Internet services for the same reason

Normally we compare bundled triple-play Internet pricing meeting the minimum of 25/3 speeds. However, Hopkins County has only triple-play cable provider, Optimum Cable. The median price of a triple play package with speeds greater than 25/3 in our last five 2022 studies is $139.07.

That is only an advertised price and does not include "hidden fees, junk fees and taxes." However, Optimum's price of $105 for 300 Mbps /20 Mbps with basic TV and telephone (non-promo pricing seems to vary between $100 and $110 depending on address) compares very favorably with the that median price ($139.07) from our recent studies. According to Optimum there service is available to 10,626 household or 77% of the County.

The median price of a 25/3 Internet connection in Hopkins County is $79.95. That matches the median price of 25/3 broadband across all the nine Ark-Tex Counties we studied. However, Hopkins median price 25/3 Internet connectivity is $19.96 or 33% higher than the lowest County median price ($59.99) which we discovered in the nine counties. Monthly, Hopkins County Internet households pay $208,821.52 more than citizens paying the lowest median for all Ark-Tex Counties. That translates into $2,505,858 in annual extra costs.

Some Hopkins County citizens are paying much more for basic Internet service than their neighbors. Others have limited access to more advanced Internet services which are very expensive compared to other places we have studied. Over 52% of Hopkins County residents receive the Internet through their cell phones, satellites, or fixed wireless. Those are the most expensive ways to get data and often not as reliable as other services. It is also not a sustainable model if you want to work from home using a computer.

Our estimates show that Hopkins County has a higher percentage (10%) of residents using fiber than either cable (9%) or DSL services (7%). That is a positive direction for increased availability of higher performing services than enable work and education activities from home.

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[12] Report: The average cable bill now exceeds all other household utility bills combined, AllConnect 6/22/2020

5.1 Local Pricing Data

This information provides pricing data and services available from providers in Hopkins County. Prices, availability and promotional offers change frequently, sometimes weekly and sometimes vary depending on street address. This is a snapshot of prices from the end of January 2023.

Exact availability often requires customer names and specific street addresses. Unless previously discovered in a nearby by study, pricing for services offered to less than 5% residents in a zip code is not shown unless previously discovered in a nearby county. Exceptions are noted. All the information available at the time of the report is included in this table. The abbreviation, "FWA," is used below, it stands for fixed wireless access

Summary of Service Provider Data - Hopkins County, TX

	Least Expensive Internet Only Service	Least Expensive Internet Only Service Meeting 25/3	Least Expensive Triple Pay Package Meeting 25/3
Etex DSL	$35	$79.95	N/A
Frontier DSL	$54.99	N/A	N/A
Peoples Tel Coop DSL	$74.95	$134.95	N/A
Personal Touch DSL	$74.95	$134.95	N/A
Windstream DSL	$54.99	Unable to verify higher speeds	N/A
Optimum Cable	$55	$55	$105
Etex Fiber	$62.95	$62.95	$235.75
Frontier Fiber	$54.99	$54.99	N/A
inTouch Fiber	$79.95	$79.95	$183.90
Peoples ILEC Fiber	$87.95	$87.95	N/A
Argon Tech FW	$44.95	N/A	N/A
CIP Community FW	$49.95	$69.95	N/A
HallsNet FW	$99	$99	N/A
NextLink FW	$69.95	$99.95	$194.89
People's Tel Coop FW	$54.95	$104.95	N/A
Rise Broadband FW	$40	$40	N/A
T-Mobile Lite Home Internet	$50	$50	N/A
903 Broadband FW	$46.95	$86.95	N/A

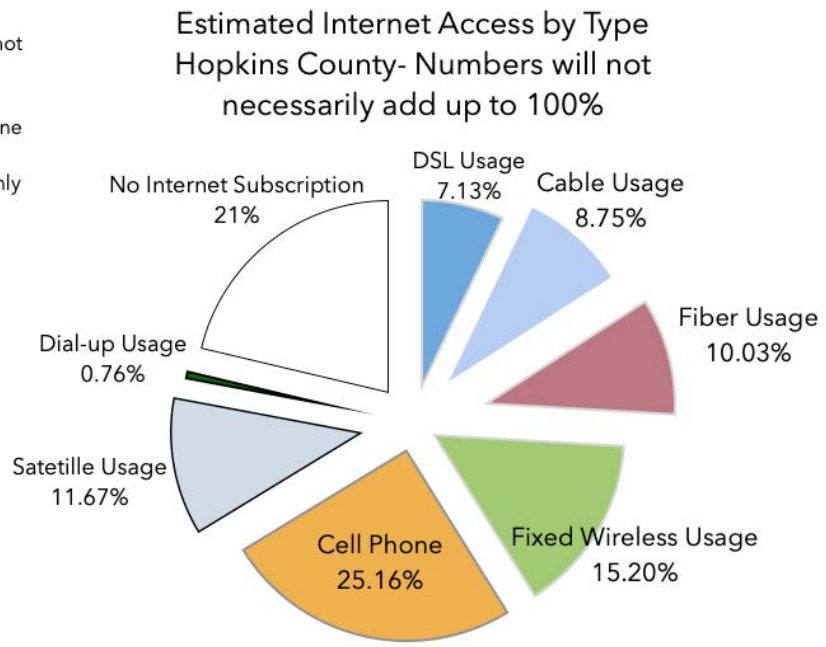
	Least Expensive Internet Only Service	Least Expensive Internet Only Service Meeting 25/3	Least Expensive Triple Pay Package Meeting 25/3
EarthLink 5G	$64.95	$64.95	N/A
T-Mobile 5G Internet	$50	$50	N/A
HughesNet	$64.99	$64.99	N/A
Viasat	$69.99	$99.99	N/A
Starlink	$110	$110	N/A

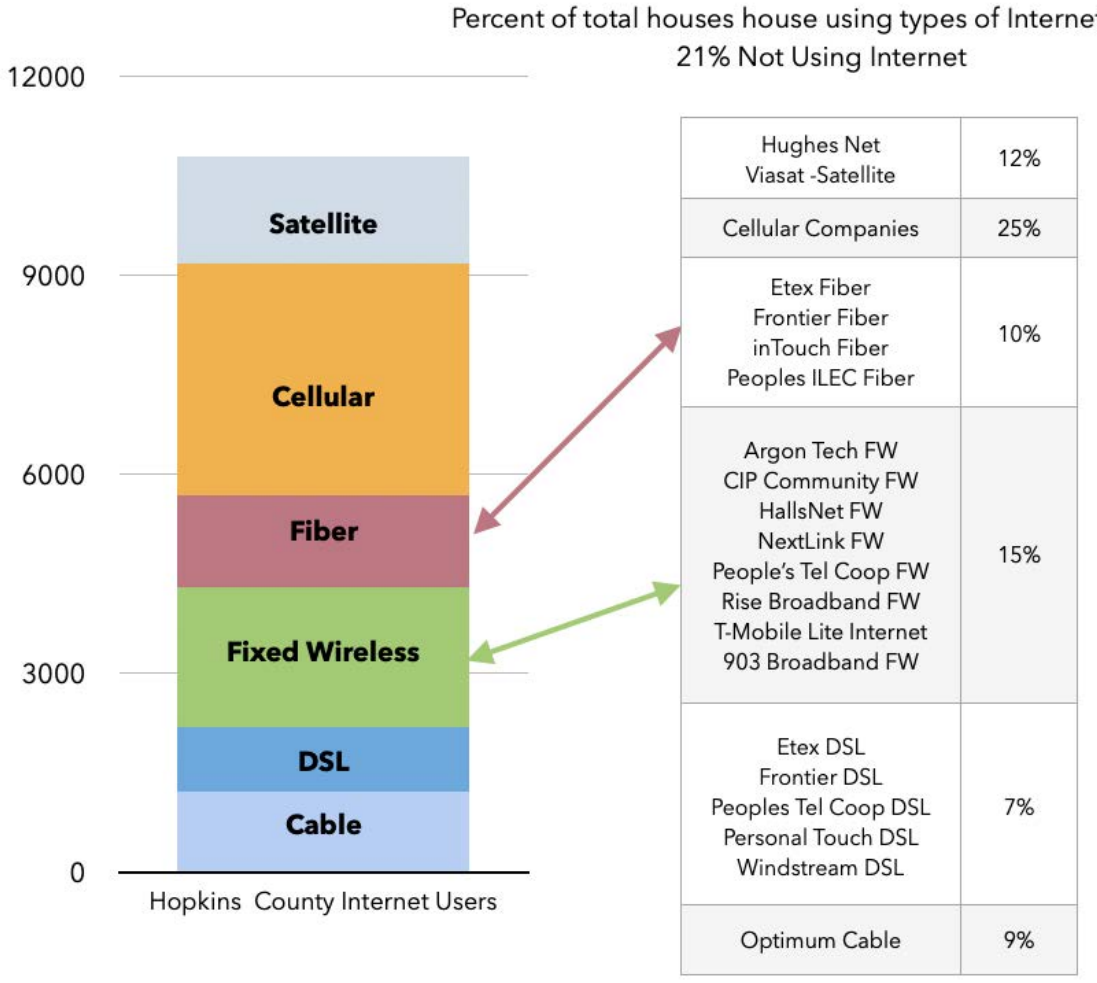
The table below illustrates the estimated telecom expenditures, public and private, over the next thirty years. Over that time period, **almost $395 Million** is put in envelopes and much of it leaves both the county and the state. Redirecting as little as 5% of those funds could build fiber to every home and business in Hopkins County. Information from surveys often does not total 100% because some respondents choose more than one answer even when requested to pick only one.

Telecom Expenditures - Hopkins County, TX

Households	13,746							
Businesses	748							
Household Internet Access Type Estimates	Cell Phone /5G	Fixed Wireles	DSL	Satellite	Cable	No Internet Access	Fiber	Dial-up
Household Percentage	25%	15%	7%	12%	9%	21%	10.10%	0.76%
Households	3,484	2,105	988	1,616	1,212	2,943	1,389	105
Average monthly telecom expenditures	Cell Phone for Voice/ Internet $160 Satellite TV: $100	Cell Phone $127 Fixed Wireless $50 Satellite TV: $100	Cell Phone $127 Phone: $15 Satellite TV: $100, DSL Internet : $55	Cell Phone $127 Satellite TV: $100, Satellite Internet: $100	Cell Phone $127 Phone $40 TV: $70 Cable Internet $80	Cell Phone $127, no Internet, Satellite TV $100	Cell Phone $127, Fiber Internet $65, Stream-ing TV $45	Cell phone $127, Dial-up Internet $12.95, Satellite TV:$100
Monthly cost of Services	$260	$277	$297	$327	$317	$227	$237	$240
Annual household cost	$3,120	$3,324	$3,564	$3,924	$3,804	$2,724	$2,844	$2,879
Annual cost all households	$10,870,080	$6,997,020	$3,521,232	$6,341,184	$4,610,448	$8,016,732	$3,950,316	$302,337
30 year expenditures	$326,102,400	$209,910,600	$105,636,960	$190,235,520	$138,313,440	$240,501,960	$118,509,480	$9,070,110
Total residential expenditures	$326,102,400							
Estimated Hidden Fees	$14,882,875							
Total Business Costs	$53,856,000							
Total expenditures	**$394,841,275**							

Information from surveys often does not total 100% because some respondents choose more than one answer even when requested to pick only one.





If there is no information in the "One-time Fees," it does not necessarily mean there are no one-time fees. It just means that information on the one-time fees could not be found on the company's public website.

NOTE: Many ISPs do not provide upload speeds. This table indicates that no upload speed was discoverable by the abbreviation 'NA' (Not Available)

Wireline Internet service provider comparison for Hopkins County, TX

Provider	Monthly Cost	Promo Rate & Contract Length	Other Monthly Fees	Download /Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees	Services & Incentives
	AT&T lists a number IPBB services on their website. The ones listed are the only ones found. All of the IPBB services are priced the same and are typically very slow.						
AT&T Internet Basic 768K IPBB	$70	$55 includes $5 month AutoPay and paperless discount, $10 discount for 12 months	Extended Wi-Fi $10	0.768/0.4	1,000 $10 charge each additional 50GB (up to $100/ mo.). Unlimited data allowance may also be purchased separately for an additional $30/mo.	Taxes & Fees: Up to $99 installation fee may apply, Monthly cost recovery surcharges, not government-required, apply in TX, OH and NV	Internet Only
AT&T Internet Basic 5 IPBB	$70	$55 includes $5 month AutoPay and paperless discount, $10 discount for 12 months	Extended Wi-Fi $10	5 / 1	1,000 $10 charge each additional 50GB (up to $100/ mo.). Unlimited data allowance may also be purchased separately for an additional $30/mo.	Taxes & Fees: Up to $99 installation fee may apply, Monthly cost recovery surcharges, not government-required, apply in TX, OH and NV	Internet Only

Provider	Monthly Cost	Promo Rate & Contract Length	Other Monthly Fees	Download /Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees	Services & Incentives
AT&T Internet 10 IPBB	$70	$55 includes $5 month AutoPay and paperless discount, $10 discount for 12 months	Extended Wi-Fi $10	10/1	1,000 $10 charge each additional 50GB (up to $100/ mo.). Unlimited data allowance may also be purchased separately for an additional $30/mo.	Taxes & Fees: Up to $99 installation fee may apply, Monthly cost recovery surcharges, not government-required, apply in TX, OH and NV	Internet Only
Blossom Tel DSL	$60	One year contract- $200 penalty if broken		3/1		$100 Maintenance Fee	Internet Only
Blossom Tel DSL	$65	One year contract- $200 penalty if broken		5/1		$100 Maintenance Fee	Internet Only
Blossom Tel DSL	$75	One year contract- $200 penalty if broken		10/1		$100 Maintenance Fee	Internet Only
Blossom Tel DSL	Local Telephone available- Deposit $65.00 (Due the day of application) Connect Fee $37.00						
EarthLink DSL	Unable to verify locations or find pricing						
Peoples Telephone Cooperative DSL Ignyte EDGE Internet	$74.95			15/1.5		$10 membership fee	Internet Only
Peoples Telephone Cooperative DSL Ignyte EDGE Internet	$85.95			25/2.5		$10 membership fee	Internet Only

Provider	Monthly Cost	Promo Rate & Contract Length	Other Monthly Fees	Download /Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees	Services & Incentives
Peoples Telephone Cooperative DSL Ignyte EDGE Internet	$134.95			50/5		$10 membership fee	Internet Only
Peoples Telephone Cooperative DSL Ignyte EDGE Internet	$149.95			100/10		$10 membership fee	Internet Only
Windstream DSL	$69.99	$39.99 for 12 months	Modem available for $8.99	Unknown but will either be 100/100 or 3 / 0.768	None	$60 Activation Fee	Internet Only- Free $100 Prepaid Visa card
Optimum Cable	$45	Rate good for one year then subject to annual rate increase. Monthly cost with Auto Pay and Paperless discount- $40 a month		300/20	Unlimited Data	Standard Installation Included	Internet Only. 60-day money back guarantee- includes Optimum Gateway/ Router/WifFi, one free WiFi extender and $100 prepaid Visa card, add 50 Channel streaming for $10 a month
Optimum Cable	$65	Rate good for one year then subject to annual rate increase. Monthly cost with Auto Pay and Paperless discount- $60 a month		500/20	Unlimited Data	Standard Installation Included	Internet Only. 60-day money back guarantee- includes Optimum Gateway/ Router/WifFi, one free WiFi extender and $100 prepaid Visa card, add 50 Channel streaming for $10 a month

Provider	Monthly Cost	Promo Rate & Contract Length	Other Monthly Fees	Download /Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees	Services & Incentives
Optimum Cable	$85	Rate good for one year then subject to annual rate increase. Monthly cost with Auto Pay and Paperless discount- $80 a month		940/35	Unlimited Data	Standard Installation Included	Internet Only. 60-day money back guarantee- includes Optimum Gateway/ Router/WifFi, one free WiFi extender and $300 prepaid Visa card, add 50 Channel streaming for $10 a month
Optimum Cable	$105	Rate good for one year then subject to annual rate increase. Monthly cost with Auto Pay and Paperless discount- Promo rate of $95 includes Internet Phone $15, Basic TV $30	First set top box is included, Add'l monthly charge will be req'd for each additional TV, $11 monthly for each TV after the first one	300/20		Standard Installation Included	Internet, Basic TV- 50 Channels and phone 60- day money back guarantee- includes Optimum Gateway/ Router/Wifi, one free WiFi extender, and $100 prepaid Visa card - 3 months of Showtime Unlimited Long Distance includes the 50 states as well as Guam, Puerto Rico, and the U.S. Virgin Islands, 25 hours Cloud DVR $8 extra per month

Provider	Monthly Cost	Promo Rate & Contract Length	Other Monthly Fees	Download /Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees	Services & Incentives
Optimum Cable	$155	Rate good for one year then subject to annual rate increase. Monthly cost with Auto Pay and Paperless discount- Internet $150 includes Phone $15, Core TV $75 with 200+ channels	First set top box is included, Add'l monthly charge will be req'd for each additional TV, $11 monthly for each TV after the first one	500/20		Standard Installation Included	Internet, Core TV- 200+Channels and phone. 60- day money back guarantee- includes Optimum Gateway/ Router/Wifi, one free WiFi extender, and $100 prepaid Visa card - Distance includes the 50 states as well as Guam, Puerto Rico, and the U.S. Virgin Islands, 25 hours Cloud DVR $8 extra per month
Optimum Cable	$195	Rate good for one year then subject to annual rate increase. Monthly cost with Auto Pay and Paperless discount- $190 a month, includes Phone $15, Select TV $75 with 200+ channels		940/35	Unlimited Data	Standard Installation Included	Internet, Select TV- 290 Channels and phone.. 60- day money back guarantee- includes Optimum Gateway/ Router/Wifi and $300 prepaid Visa card - 12 months of Showtime Unlimited Long Distance includes the 50 states as well as Guam, Puerto Rico, and the U.S. Virgin Islands. 25 hours Cloud DVR $8 extra per month

Provider	Monthly Cost	Promo Rate & Contract Length	Other Monthly Fees	Download /Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees	Services & Incentives
Optimum Cable	$215	Rate good for one year then subject to annual rate increase. Monthly cost with Auto Pay and Paperless discount- $215 regular rate includes Phone $15, Premier TV	First set top box is included, Add'l monthly charge will be req'd for each additiona l TV,	940/35		Standard Installation Included	Internet, Premier TV- 340 Channels and phone.. 60- day money back guarantee- includes Optimum Gateway/ Router/Wifi and $300 prepaid Visa card - 12 months of Showtime Unlimited Long Distance includes the 50 states as well as Guam, Puerto Rico, and the U.S. Virgin Islands, 25 hours Cloud DVR $8 extra per month
Optimum Cable	$59.95		$12.95 Modem Lease	100/100	Unlimited	Installation up to $200 covered. Professional Installation Includes wiring check, modem install and speed test optimization	Internet Only, No cost service technician visits to your home if there are any issues.
AT&T Internet 300 Fiber	$60	$55 includes $5 month AutoPay & Paperless discount	Extended Wi-Fi $10	300/300	Unlimited	Taxes & Fees: Credit for $99 standard installation	Internet Only-Free $100 Reward Card, also additional $50 Reward Card for Internet sign up. Will pay ETF from previous service-see note
AT&T Internet 500 Fiber	$70	$65 includes $5 month AutoPay & Paperless discount	Extended Wi-Fi $10	500/500	Unlimited	Taxes & Fees: Credit for $99 standard installation	Internet Only-Free $100 Reward Card, also additional $50 Reward Card for Internet sign up. Will pay ETF from previous service-see note

Provider	Monthly Cost	Promo Rate & Contract Length	Other Monthly Fees	Download /Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees	Services & Incentives
AT&T Internet 1 Gig Fiber	$85	$80 includes $5 month AutoPay & Paperless discount	Extended Wi-Fi $10	1000/1000	Unlimited	Taxes & Fees: Credit for $99 standard installation	Internet Only-Free $100 Reward Card, also additional $50 Reward Card for Internet sign up. Will pay ETF from previous service-see note
	AT&T early termination fee policy Reward card amount is based on customer's applicable early termination fee (ETF) from previous internet provider. Customer is eligible to receive a reward card in the amount of their actual ETF rounded up to the nearest $10 increment. (For example, if ETF from previous internet provider is $125, customer will be eligible for a $130 reward card. If ETF is $260, customer will be eligible for a $260 reward card.) Reward card amount based solely on the previous provider's internet service.						
Blossom Tel Fiber	$75	One year contract- $200 penalty if broken		10/10		$100 maintenance fee due on day of application	Internet Only
Blossom Tel Fiber	$85	One year contract- $200 penalty if broken		25/25		$100 maintenance fee due on day of application	Internet Only
Blossom Tel Fiber	$100	One year contract- $200 penalty if broken		50/50		$100 maintenance fee due on day of application	Internet Only
Blossom Tel Fiber	$125	One year contract- $200 penalty if broken		25/25		$100 maintenance fee due on day of application	Internet Only
Blossom Tel Fiber	$75	One year contract- $200 penalty if broken		10/10		$100 maintenance fee due on day of application	Internet Only
Blossom Tel Fiber	$85	One year contract- $200 penalty if broken		25/25		$100 maintenance fee due on day of application	Internet Only

Provider	Monthly Cost	Promo Rate & Contract Length	Other Monthly Fees	Download /Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees	Services & Incentives
Blossom Tel Fiber	$100	One year contract- $200 penalty if broken		50/50		$100 maintenance fee due on day of application	Internet Only
Blossom Tel Fiber	$125	One year contract- $200 penalty if broken		25/25		$100 maintenance fee due on day of application	Internet Only

Wireless Internet service provider comparison for Hopkins County, TX

Provider	Monthly Cost	Promo & Contract Length	Other Monthly Fees	Download/ Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees	Incentives & Notes
Argon Tech (FWA)	$44.95	Two-year		5/1		$50 installation with two year contract	Internet Only
Argon Tech (FWA)	$59.95	Two-year		10/2		$50 installation with two year contract	Internet Only
Argon Tech (FWA)	$74.95	Two-year		15/3		$50 installation with two year contract	Internet Only
AT&T (FWA)	$69.99			25/1	350 - $10 per 50GB of additional data up to a maximum of $200 per mo.	$19.95 Activation Fe. up to $99 installation fee	Internet Only

Provider	Monthly Cost	Promo & Contract Length	Other Monthly Fees	Download/ Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees	Incentives & Notes
AT&T (FWA)	$209.98			25/1	350 Internet Plan Unlimited talk, text, data + 50GB of Premium Data on cell phone	$19.95 Activation Fee	AT&T fixed wireless- Direct TV bundle with unlimited cell phone plan Phone additional Charge
AT&T (FWA)	Additional Fees & Taxes: Price excludes Regional Sports Fee of up to $11.99/mo. (which is extra & applies to CHOICE and higher Pkgs.), applicable use tax expense surcharge on retail value of installation, custom installation, equipment upgrades/add-ons (min. $99 one-time & $7/mo. monthly fees for each extra receiver/DIRECTV Ready TV/Device), and certain other add'l fees & charges.						
Hopkins-synKro (FWA)	$49.00			10/2			Internet Only
Hopkins-synKro (FWA)	$69.00			25/3			Internet Only
Hopkins-synKro (FWA)	$49.00			100/10			Internet Only
NextLink (FWA)	$99.00		Equipment rental varies	20/NA		Installation $250	Internet Only
NextLink (FWA)	$89.95		Equipment rental varies	25/NA		Installation $250	Internet Only
NextLink (FWA)	$99.95		Equipment rental varies	35/NA		Installation $250	Internet Only
NextLink (FWA)	$119.95		Equipment rental varies	50/NA		Installation $250	Internet Only
NextLink (FWA)	All NextLink plans have these options- Residential Phone -Standard $14.95 -Unlimited local and long-distance calling. Calling features including Call Forwarding, Speed Dial, and Simultaneous Ring. Voicemail with Voicemail-to-Email feature- Dish TV pricing $79.99 per month for 190 channels, $99.99 for 240+ channels, $109.99 for 290+ Channels. TV requires 2 year commitment, Early Termination Fee (ETF) is $20 per month of remaining contract. After 6 mos., if selected, you will be billed $10.99/mo. for DISH Protect Silver unless you call to cancel. After 3 years, then-current everyday prices for all services apply. Sample NextLink triple pay packages below estimated to be 25/3 or better.						
Peoples (FWA)	$54.95			10/1			Internet Only
Peoples (FWA)	$54.95			10/1			Internet Only

Provider	Monthly Cost	Promo & Contract Length	Other Monthly Fees	Download/ Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees	Incentives & Notes
Peoples (FWA)	$74.95			15/2			Internet Only
Peoples (FWA)	$104.95			25/3			Internet Only
Peoples (FWA)	$134.95			50/5			Internet Only
Peoples (FWA)	$149.95			100/10			Internet Only
Peoples (FWA)	Digital Phone for $20 extra per month						
Rise Broadband (FWA)	$40	$25 monthly for 12 Months $25 includes $5 discount for auto pay		25/3			Internet Only
Rise Broadband (FWA)	$54.95	$34.95 monthly for 12 Months $34.95 includes $5 discount for auto pay		50/5			Internet Only
Wifires (FWA)	$74.90			20/2			Internet Only
Wifires (FWA)	$84.90			38/3.8			Internet Only
Wifires (FWA)	$94.90			56/5.6			Internet Only
Wifires (FWA)	$104.90			74/7.4			Internet Only
Wifires (FWA)	$114.90			92/9.2			Internet Only
Wifires (FWA)	$124.90			110/11			Internet Only
903 Broadband (FWA)	$46.95			5/2			Internet Only
903 Broadband (FWA)	$66.95			15/3			Internet Only
903 Broadband (FWA)	$86.95			25/5			Internet Only

Provider	Monthly Cost	Promo & Contract Length	Other Monthly Fees	Download/ Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees	Incentives & Notes
903 Broadband (FWA)	$109.95			50/10			Internet Only
EarthLink	$64.95			Unknown uses either 4G LTE or 5G depending on closest tower	50 GB	Activation fee $79.95	Internet Only
EarthLink	$79.95			Unknown uses either 4G LTE or 5G depending on closest tower	75 GB	Activation fee $79.95	Internet Only
EarthLink	$99.95			Unknown uses either 4G LTE or 5G depending on closest tower	100 GB	Activation fee $79.95	Internet Only
EarthLink	$149.95			Unknown uses either 4G LTE or 5G depending on closest tower	150 GB	Activation fee $79.95	Internet Only
T-Mobile Lite Home Internet	$50		$14.95 router	35/3			Plan costs will vary. Have to get account to see the pricing.
T-Mobile 5G	$50	Auto Pay Required - $50 includes $10 credit for autopay	None	182/33 (Varies by location)	None		$100 back when you switch to T-Mobile Home Internet via virtual Prepaid Mastercard® in 8 weeks- will pay to $500 to terminate another contract

Provider	Monthly Cost	Promo & Contract Length	Other Monthly Fees	Download/ Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees	Incentives & Notes
T-Mobile 5G	T- MobileHome Internet General Terms: During congestion, Home Internet customers may notice speeds lower than other customers due to data prioritization. Not available in all areas. $35 assisted support or device connection charge due at sale. Plus taxes & fees for accounts currently paying for a T-Mobile wireless line with additional taxes & fees: Monthly Regulatory Programs (RPF) & Telco Recovery Fee (TRF) totaling $1.40 per data only line ($0.12 for RPF & $1.28 for TRF) apply; taxes/fees approx. 3-12% of bill. Credit approval required. For use only with T-Mobile Gateway for in-home use at location provided at activation. If canceling service, return gateway or pay up to $370						

Satellite Internet service provider comparison for Hopkins County, TX

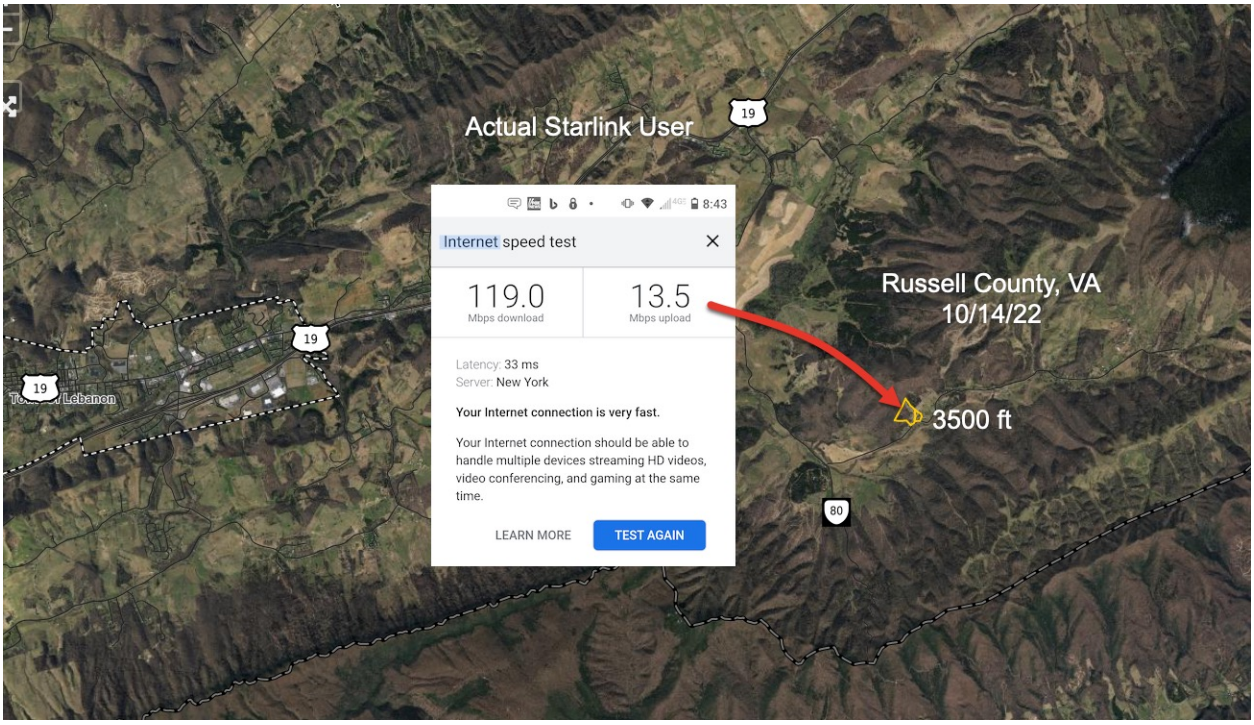
Provider	Monthly Cost	Promo & Contract Length	Other Monthly Fees	Download /Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees
HughesNet	$64.99	24 month commitment required. Up to $400 ETF	$14.99 equipment lease it you don't purchase	25/3	After 15 GB (speeds drop to 1-3 Mbps)	Purchase pricing is $249.99 to purchase or $99 lease activation- instant lease savings of $99- limited time- Users can add unlimited phone service for $22.95 a month
HughesNet	$74.99	$49.99 for first three months. 24 month commitment required. Up to $400 ETF	$15 equipment lease it you don't purchase	25/3	After 30 GB (speeds drop to 1-3 Mbps)	Equipment ricing is $450 to purchase. $100 discount for Internet orders. $15 monthly after $99 lease activation- free installation - Users can add unlimited phone service for $22.95 a month
HughesNet	$89.99	$64.99 for first three months. 24 month commitment required. Up to $400 ETF	$15 equipment lease it you don't purchase	25/3	After 50 GB (speeds drop to 1-3 Mbps)	Equipment ricing is $450 to purchase. $100 discount for Internet orders. $15 monthly after $99 lease activation- free installation- Users can add unlimited phone service for $22.95 a month
HughesNet	$149.99	$99.99 for first six months. 24 month commitment required. Up to $400 ETF	$15 equipment lease it you don't purchase	25/3	After 100 GB (speeds drop to 1-3 Mbps)	Equipment ricing is $450 to purchase. $100 discount for Internet orders. $15 monthly after $99 lease activation- free installation -Users can add unlimited phone service for $22.95 a month

Provider	Monthly Cost	Promo & Contract Length	Other Monthly Fees	Download /Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees
Viasat	$69.99	$49.99 for first three months 24 month contract	$12.99/ month (modem)	25/3	40 GB priority data	Setup/Installation could be up to $75 -equipment purchase instead of lease $299.99-
Viasat	$99.99	$69.99 for first three months 24 month contract	$12.99/ month (modem)	50/3	60 GB priority data	Setup/Installation could be up to $75 -equipment purchase instead of lease $299.99-
Viasat	$149.99	$99.99 for first three months 24 month contract	$12.99/ month (modem)	75/3	100 GB priority data	Setup/Installation could be up to $75 -equipment purchase instead of lease $299.99-
Viasat	$199.99	$149.99 for first three months 24 month contract	$12.99/ month (modem)	100/3	150 GB priority data	Setup/Installation could be up to $75 -equipment purchase instead of lease $299.99- $300 prepaid Visa card
Starlink*	$110	Starlink expects to expand service in your area in 2023	$50 shipping cost and $53.55 estimated tax for equipment	100/40	None	$599 for Hardware, shipping $50, Tax $42.19 Requires $99 Deposit- see terms below
Starlink Deposit Terms	Deposit. Applicability. If Starlink Services are currently unavailable in your region and you are placing a deposit payment rather than completing the Order for Services, then Section 1 applies to you. Deposit Payment. Your deposit payment ("Deposit Payment") grants you priority within your region for securing Starlink Services when available. Your Deposit Payment is exclusive of any sales and use or other taxes. Starlink will apply your Deposit Payment to the amount due on the Starlink Kit if and when the Starlink Kit and Services become available. Refundable Deposit. Prior to Starlink shipping your Kit, your Deposit Payment is fully refundable and can be requested at any time via your Starlink account. If you seek and obtain a refund, you will forfeit your priority position. Availability; Limitations. Placing a Deposit Payment does not obligate Starlink to provide you with the Starlink Kit and Services and does not guarantee that the Starlink Kit and Services will be available to you. Prices for the Services and Kits presented at the time you place your Deposit Payment are subject to change to the prices in effect at the time of Order, including any applicable taxes, duties, delivery charges, and any other applicable fees. Enrollment limits may apply based on network availability. Starlink Kit designs and Services are subject to change based on technological innovation. Starlink will not hold your Deposit Payment separately, for example in an escrow account or trust fund, or pay any interest on your Deposit Payment. The Service availability dates are estimates only and subject to change. Starlink does not guarantee when Services will actually be available in your region. Service delivery is dependent on many factors, including various regulatory approvals.					

Provider	Monthly Cost	Promo & Contract Length	Other Monthly Fees	Download /Upload Speed (Mbps)	Data Cap (GB/ Month)	One-Time Fees
Starlink Installation	You are responsible for installation of the Starlink Kit in a location that has a clear field of view, per the Install Guide available in the Starlink Customer Portal. It is your responsibility to ensure compliance with all applicable building codes, zoning, ordinances, business district or association rules, covenants, conditions, restrictions, lease obligations and landlord/owner approvals and requirements for the installation of the Starlink Kit, to pay any associated fees or other charges, and to obtain any permits and other authorizations necessary for the Services and the installation of the Starlink Kit. Should use of the Services require any construction or alteration to your property, Starlink is not obliged to reimburse any expenses or restore your property to the same physical state as prior to delivery of Services. If you require a permanent roof mount installation, you acknowledge the potential risks associated with this type of installation, including, without limitation, with respect to any warranty that applies to your roof or penetration of your roof membrane. Follow the Install Guide. If you cannot safely install the Starlink Kit, do not install it.						

* Starlink service is currently not available in Hopkins County. Early reports from beta testers have been generally positive. Latency is much lower than traditional geostationary satellite services like HughesNet and Viasat, but latency is still much higher than terrestrial fiber Internet connections. If pricing remains similar to what is being charged for early users, Starlink could be a very significant improvement for rural residents and businesses. It is targeted for the Hopkins County area in 2023.

Actual Speed Test result from a recent connection to the Starlink Network in the mountains of SW Virginia.



6 CONNECTIVITY SOLUTIONS

6.1 OVERVIEW OF THE TECHNOLOGY

In some areas of Hopkins County, broadband wireless will be an important strategy for improved Internet access for businesses and residents. But both fiber and wireless technologies and systems are going to be important to meet the goal of improving access to broadband. The rest of this section provides more detail and some specific build out strategies.

Businesses and residents may obtain Internet service:

- With a small radio directly attached to their home or business that receives a signal directly from a tower owned by a private provider, from a County-owned tower (e.g. shared with public safety use), or from a community-owned tower (e.g. a co-op).
- With a small radio attached to a utility pole (60' or 70') to improve line of sight to a tower.
- With a small radio directly attached to their home or business that receives a signal from a "community" utility pole. The "community" pole will receive a signal from a distant tower and redistribute it locally to a cluster of customers (typically within a half mile).
- With a fiber connection to the fiber installed in areas where economic development is important, and in other areas as additional fiber network segments are added.

The table below summarizes how fiber and wireless can work together in a variety of ways.

Distribution Type	Access Type	Capacity
Wireless	Wireless	Typical customer connection starting at 5 to 10 Megabits, can be higher, with 50 Meg connections common. More dependent on the capacity of the wireless distribution link.
Wireless	Fiber	Users can have fiber Gigabit connections locally, but total throughput dependent upon the capacity of the wireless link, which can be up to a Gigabit, depending on distance and budget.
Fiber	Fiber	Any amount of bandwidth needed, with standard connection typically a Gigabit (1,000 Megabits).
Fiber	Wireless	Typical customer connection starting at 5 to 10 Megabits, can be higher, with 50 Megabits connections common.
Fiber	Coax, DSL	Providers can use a fiber middle-mile backbone and distribute improved broadband Internet services using copper-based coax (cable Internet) or DSL (copper phone lines).

6.2 WIRELESS TECHNOLOGIES

Wireless Internet Service Providers (WISPs) use a wide variety of radio frequencies to deliver fixed-point wireless broadband. By "fixed-point," this means that these systems are not designed to support roaming in the way that cellular voice/data radios are (that is, mobile phone and data services).

Fixed-point broadband is broadcast from a tower to individual homes and businesses (fixed-points). Most of the frequencies used require clear line of sight (LOS) between the tower and the location where service is desired.

Hilly topography can work for or against good wireless broadband service. Towers located on the tops of hills and mountains can provide service over a larger area than a tower in relatively flat terrain, but hills also block the signal. A residence can be a short distance from a large tower, but heavy tree cover or an intervening hill will block service. The solution to this can be addressed in several ways:

More larger towers of 180' to 300'

The taller the tower, the wider the coverage, but as tower height increases, the cost of the tower also increases. Towers taller than 199' require a light at the top to make them visible to low-flying aircraft, and lighted towers are more expensive to erect, and the bulbs have to be changed periodically at significant expense. Many broadband towers are 180' to avoid the additional cost of lighting.

Small cell broadband utility poles

Small cell broadband utility poles, often called community poles, are shorter towers or utility poles of typically 60' to 80', located in or very near a cluster of homes. The towers can be wooden utility poles or relatively low cost steel monopoles or steel lattice towers. These towers are located to get above local tree cover so that clear line of sight to a distant taller tower is available. Local access point radios provide service to homes and businesses with line of sight to the pole. In many parts of Hopkins, these are going to be an important part of a strategy to get better broadband to rural residents and businesses.

Variety of radio frequencies

WISPs are beginning to deploy a wider range of licensed and unlicensed radio frequencies to overcome distance, bandwidth, and line of sight issues. Traditional 2.4 Ghz and 5.7 Ghz WiFi and WiMax frequencies are being supplemented or replaced with Long Term Evolution (LTE) and Citizens Broadband Radio Service (CBRS) licensed broadband frequencies that provide better bandwidth and will tolerate light tree cover better (2.5 Ghz, 3.5-3.7 Ghz). Some WISPs are also using lower frequencies (e.g. 900 Mhz) that will travel farther and will also provide better penetration in light tree cover.

6.3 EMERGING WIRELESS TECHNOLOGIES

MIMO Wireless

Multiple Input, Multiple Output (MIMO) describes a variety of technologies that can be summarized as using more than one receive and transmit antenna for wireless data applications. Wireless protocols that are using the MIMO concept include IEEE 802.11n (Wi-Fi), IEEE 802.11ac (Wi-Fi), 4G, LTE (Long Term Evolution), and WiMAX. Each of these protocols use the MIMO technology to increase the amount of available bandwidth in a given section of radio frequency spectrum.

New hardware is required to make effective use of MIMO. While the technology increases wireless bandwidth, the typical amount of bandwidth being used by wireless devices is also increasing rapidly. Some applications where MIMO is likely to provide noticeable improvements are in home wireless routers, where the effective throughput will be able to better handle the demanding bandwidth requirements of high definition (HD) and 4K video streams. MIMO is slowly being developed for use

with cellular smartphones, but both the phones and the cell tower radios have to be upgraded to support MIMO.

LTE/4G/5G

Long Term Evolution (LTE) is a set of protocols and technologies designed to improve the performance of voice/data smartphones. Like MIMO, both the user phone and the cell tower radios have to be upgraded to support LTE improvements. In 2013, only 19% of U.S. smartphone users were able to take advantage of LTE speeds, although that percentage has been increasing rapidly since then, and more than 85% of the U.S. cellular towers have been upgraded to LTE. As noted previously, the actual bandwidth available to a smartphone user is highly variable and depends on distance from the cell tower, the number of smartphones accessing the same tower simultaneously, and the kinds of services and content being accessed by those users.

The primary purpose of cellular bandwidth caps is to keep cellular users from using too much bandwidth and degrading the overall service. While LTE and MIMO improvements will improve overall cellular service, these technologies are not going to replace fiber to the home and fiber to the business.

In 2017, new fixed broadband wireless systems entered the marketplace using LTE frequencies, and many WISPs have begun to replace existing wireless radio systems with LTE equipment. These LTE systems do not provide any cellular voice services; they are designed specifically to support only broadband/Internet service.

In our conversations with both vendors of these systems and WISPs that have begun deploying them, we get two different stories. The vendors have been conservative in discussing the improvements, while some WISPs have been taking single user test results and suggesting that they will be able to deliver higher speeds at greater distances to all users.

To achieve the full benefit of 5G technology, more fiber is needed.

There is little debate that the LTE equipment offers higher bandwidth, at somewhat greater distances, and with somewhat better penetration of light foliage and tree cover. Over the next two to four years, most WISPs will change out most of their existing radio systems for the improved LTE radios. Perhaps the most significant advantage of LTE fixed-point broadband is its ability to provide better performance when clear line of sight between the customer and a tower is not available. LTE provides better penetration of light to moderate tree cover and other line of sight obstacles.

The official standard for 5G radio technologies was released in 2019, and many metro areas of the country now have 5G radio systems. It is worth noting that many smartphones, even some late model smartphones, do not have 5G support built in.

5G does bring much higher speeds to wireless broadband (e.g. it might be able to deliver 30 to 50 megabits of bandwidth consistently). But 5G has significant limitations that do not make it a good solution in rural areas of the U.S.

The fact that 5G can deliver much higher bandwidth means that 5G cell sites will require fiber connections. This is going to effectively limit 5G deployments to denser urban environments where both customers and fiber are plentiful.

There is no free lunch in the physics of radio frequencies. The higher bandwidth of 5G means that cell sites need to be closer together because the 5G frequencies do not travel as far as existing 4G/LTE

frequencies currently being used by the cellular industry. Most users will have to be within 500' to 1,000' to receive 5G service.

Some experts estimate that more than a million miles of new fiber will have to be deployed just to support the 25 largest metro areas in the U.S. 5G will not appear overnight.

As many as eight to 12 cell sites per square mile may be needed to make 5G widely available in a given area. As an example, if about 25%, or 197 square miles of Hopkins County was designated as underserved, very conservatively, 1,570 or more cell sites would be needed to provide good coverage (as many as nine or ten cell sites per square mile may be needed).

For rural areas, the cost of 5G service may be one of the most significant obstacles. The cellular carriers see the increased customer bandwidth use possible on 5G networks as a major revenue opportunity. While they will increase the "standard" bandwidth package for monthly service, bandwidth caps and rate limiting is likely to keep 5G cellular customers bills high.

Many rural areas of Hopkins County have poor or no cellular voice/data service, and somewhat counter-intuitively, more fiber can solve that problem. Cell towers need fiber backhaul connections to provide the best cellular data performance, and so rural fiber will also help address the issue of poor cellular service.

White Space Broadband

White space broadband uses some of the frequencies that were formerly used by analog TV channels. These lower frequencies travel farther and provide better penetration of light foliage. Microsoft has been supporting a number of community white space experiments, and has promised much wider support for this technology, but there are few other users, equipment is still relatively expensive, and few WISPs have ventured into this still largely experimental technology. A Microsoft white space project in southern Virginia, although still underway, serves less than three hundred households and is still regarded as experimental. Other white space pilot projects have reported good results. One ISP experimenting with the technology has indicated that their trials with white space equipment has been able to deliver 50 Meg/50 Meg service.

Low Earth Orbit (LEO) Satellite Internet

The Elon Musk-funded Starlink effort began offering "beta test" service in late 2020. There is a one-time equipment and installation fee of $499, and a monthly fee of $99. The company is promising download speeds of between 50 Meg/sec and 100 Meg/sec and upload speeds of up to 20 Meg/sec. Latency is lower than traditional satellite Internet services. If the prices remain reasonable, this is likely to become a much better alternative to the older satellite Internet services.

In early fall of 2021, Starlink announced that the company would move the service out of beta, which would make the service more available to more users. Currently (late 2022) the company says it has about 400,000 subscribers in the U.S., and service is available in roughly 75% of U.S. counties, according to Ookla.

The service has received generally favorable reviews from users in terms of speed and reliability. It will be important mostly for rural users who have line of sight problems for terrestrial fixed-point wireless and for households and businesses that are completely outside the coverage area for fixed-point wireless.

By comparison, geosynchronous satellite service may have latency of 10 to 20 times higher than Starlink. In the third quarter of 2022, speed test results from the Ookla speed test service suggested

that as Starlink is adding more customers, the average speed is flattening out. Download speeds dipped to an average of about 50 Mbps, and upload speeds declined from an average of 16 Mbps to 9.3 Mbps. Starlink's average latency varies between 50 and 110 milliseconds, depending on location. Low latency is critically important for good quality two-way voice and video conversations. Starlink's average latency is far superior to geosynchronous satellite Internet services (e.g. Viasat, HughesNet).

Millimeter Wave Service

Millimeter wave services use a variety of very high frequency wavelengths in range of 30 Ghz to 300 Ghz. An emerging wireless broadband service that uses the term "millimeter wave" covers very short wavelengths in the 71-76 GHz, 81-86 GHz, and 92-95 GHz (70/80/90 GHz) bands. These shorter wavelengths permit the use of very small antennas while still being able to provide high directivity and high gain. A primary advantage of the smaller antennas is the ability to use more of them and to make each individual antenna highly directional. The higher frequencies also permit transmission of much higher bandwidth. However, the higher bandwidth rates are distance limited.

In early testing in 2020, U.S. Cellular was able to demonstrate speeds of 100 Mbps at distances of three miles using 5G radio equipment (5G equipment is also close to the millimeter wave spectrum using lower frequencies of 24 Ghz, 28 Ghz, and 39 Ghz for some equipment). Radio equipment tests are often conducted in optimum conditions, and in real world conditions, the practical distance may be lower and the bandwidth may be lower, where buildings and trees can degrade or block the radio signals.

6.4 DARK FIBER AND LIT FIBER

About Dark Fiber

Dark fiber is installed in conduit underground and/or hung on utility poles. It is called "dark" because no network electronics are installed to "light" the fiber (using small lasers in a fiber switch). For small municipal/local government fiber installations, dark fiber has a significant advantage in terms of management–very little ongoing operational responsibility is required.

Dark fiber is leased out to service providers, who install their own network electronics in cabinets or shelters attached to the fiber cables. The providers typically lease fiber pairs between the cabinet and their customers, and are responsible for all equipment-related management and maintenance. Dark fiber networks can be used by service providers to provision either Active Ethernet or Gigabit Passive Optical Network (GPON) services to their customers.

Dark fiber networks do not generate large amounts of revenue, but this is offset by very low maintenance costs–primarily an emergency break-fix arrangement with a local or regional firm qualified to splice fiber. Emergency break-fix contracts are usually based on a time and materials basis, so there is little or no expense if there are no fiber breaks.

Other costs include "locates," which are called in to Texas 811 service (Miss Utility Hotline) and are performed by either the local Public Works department or a private sector contractor. For small fiber networks, locate costs are generally modest.

About Lit Fiber

A "lit" fiber network includes the network electronics needed to transmit data over the fiber (using the small lasers in a fiber switch, hence there is light traveling over the fiber cable). In a lit network, "lit circuits" are leased out to service providers rather than fiber pairs. The muni/local government/

community network provides the network electronics, which reduces costs for the service provider—meaning they are able to pay higher lease fees for the circuits they use to deliver services (like Internet) to their customers. Lit networks generate more revenue, but also have higher expenses because the network electronics have to be monitored and managed on a 24/7/365 basis (this task can usually be outsourced at reasonable cost). However, very small fiber deployments often do not pass enough homes or businesses to generate sufficient revenue to cover the higher costs.

Like dark fiber, a lit network incurs break-fix and locate costs as well.

6.5 THE MEET-ME BOX CONCEPT

In some of the larger towns, some smaller communities, rural neighborhoods, and subdivisions, "meet me" boxes could be installed. A meet me box is a telecom cabinet with fiber cables installed between the cabinet and nearby homes and/or buildings. Providers only have to reach the meet-me box, lowering their costs. Both wireline and wireless providers can use this infrastructure. This approach can also be used to provide fiber services in business and industrial parks. A small Virginia county installed five miles of fiber in their business park and was able to attract a Tier One provider to provide service to an existing business (a manufacturing plant that was going to leave if the county did not help them get better Internet service).

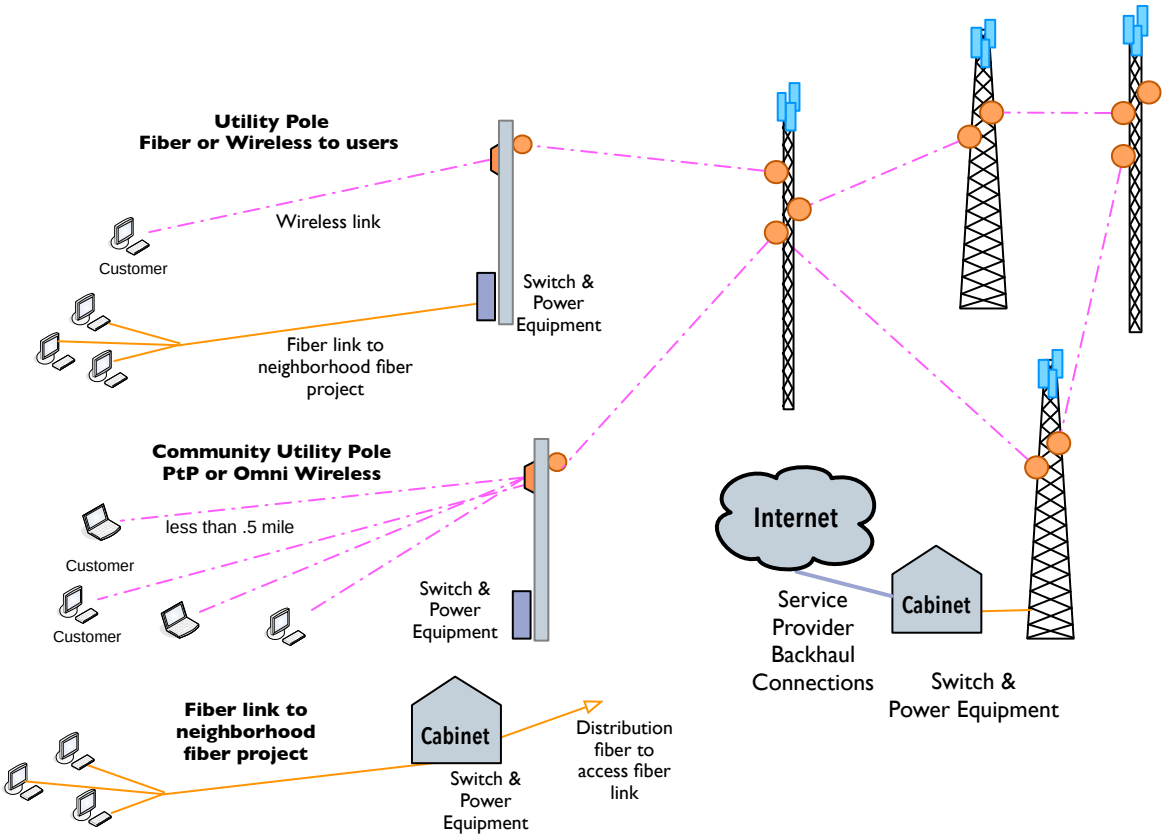
The dark fiber approach minimizes operational costs. Service providers would install their own equipment in the cabinet and would pay a small monthly lease fee for the fiber strands they use to connect customers to their services.

For a meet-me box installed in a "main street" area (e.g in an alley behind commercial/retail buildings) with relatively inexpensive and short fiber drop cables into nearby buildings, the lower end of an installation might start at $35,000. For a box installed in a rural sub-division that requires distribution conduit/fiber and drop cables, the cost to connect 25 homes might start at $175,000 on the low end and increase as the number of homes connected increases. Larger numbers of homes or businesses will add to the cost, but adding more connected premises also increases the value of the infrastructure and increases the revenue potential.

6.6 CONNECTIVITY SOLUTIONS

Both wireless and fiber networks, as well as legacy copper-based networks, all share three primary components. How these are designed and deployed can vary greatly, but all networks have these three parts in some form.

- The **Core Network** provides access to the Internet, a place for Internet service providers (ISPs) to distribute their services locally on the network, and for larger institutional and business customers to meet service providers. Hopkins County has both landline and wireless service providers, but there are still areas that are underserved. Each of these providers has their own Core Network, but wireless broadband could be more widely available if additional county-owned towers were available to the private sector providers.



- The **Distribution** portion of the network connects the Core Network with collections of users. A distribution network can include both fiber and wireless portions of a network.
- The **Access or Last Mile** portion of the network connects residential users and businesses to the network, and like the distribution network, that connection will be by fiber or by a wireless link.

The illustration on the next page shows the full range of technology options (fiber and wireless) and how they can be connected together in various ways to meet the diverse needs of the county. More detail is provided on the following pages

Last Mile Access

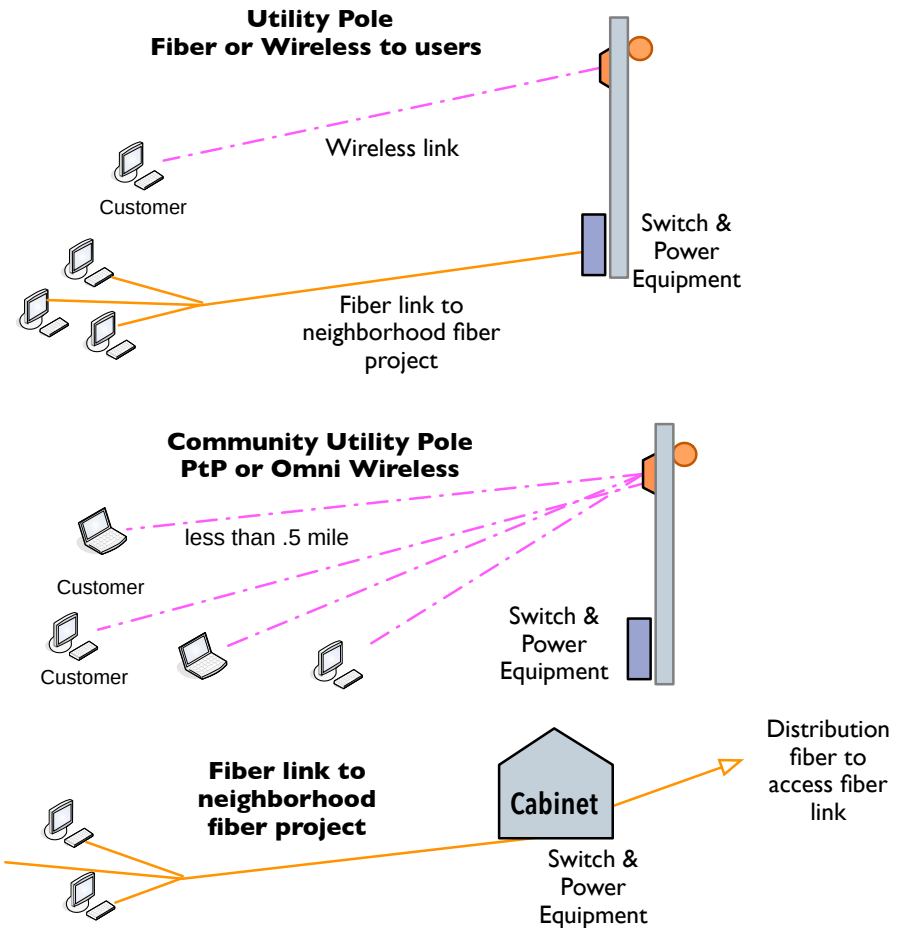
The Last Mile Access is the portion of the network that connects customers to their service provider and the Internet. Both broadband wireless and fiber links can be utilized to provide service. There are several ways that customers can receive service:

- Service providers can install their own local access radios on the distribution towers, using both point to multi-point and point-to-point radios to deliver service to their customers.
- A single user utility pole (or inexpensive steel lattice tower) can be installed on the property of a single resident or business. A radio at the top of the pole receives service from another tower site (typically one of the distribution towers).
- A utility pole (or inexpensive steel lattice tower) can be installed near a cluster of homes (e.g. a rural residential sub-division, several homes in close proximity on a rural road). Service providers can install their point to multi-point radios on this pole and provide economical service to several customers from a single pole.

- A utility pole (or inexpensive steel lattice tower) can be installed in a rural subdivision. A service provider installs a point-to-point radio on the pole, and fiber cable can be run from the pole past several homes to offer fiber service with wireless backhaul.
- Customers near existing fiber can have a fiber drop installed directly to their home or business.

Distribution Network

Distribution is the portion of the network between the distribution sites to the Last Mile Access portion of the network. It is desirable for each distribution site to have a connection back to more than one distribution site (tower) on a redundant ring. This ring topology protects against hardware failure at the port level and does provide some protection if one of the tower-to-tower wireless links is disabled by an equipment failure.

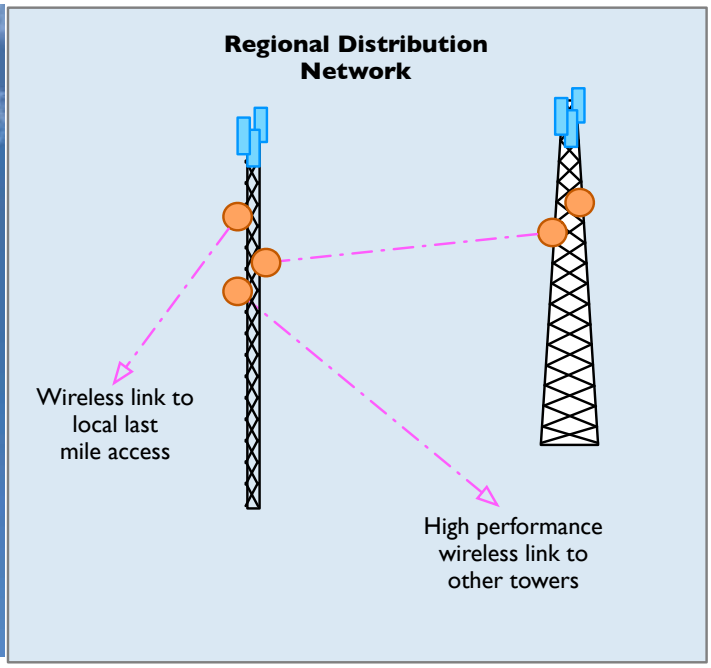


These tower sites are typically 120′ to 180′ tall to provide the height needed to enable Line Of Sight (LOS) between towers, and for local access, to enable service providers to mount point to multi-point radios on the towers.

Towers taller than 199′ become subject to FAA regulations because the height can be a potential hazard to airplanes. Towers that exceed 199′ usually have to be painted (alternating red/white) and have a blinking light at the top. These requirements increase the long term maintenance costs, but the taller towers can improve line of sight to other towers.

The towers can provide two functions:

- Space for backhaul connections to other towers in the county.
- Space for local access radios to provide Internet access within 2-3 miles of the tower (or farther with good LOS).



Core Network and Service Providers

In the past, the telephone company switch office (Central Office, or CO) has provided a central equipment location for a local network. Today, many communities have either a community-owned data center or a privately owned data center that offers an affordable range of options for customers of broadband services.

The colocation (colo) facility provides a meet point for various public and private fiber cables and networks to inter-connect. A local facility with space available for both public and private uses could help attract additional private sector investments (e.g. a long haul fiber provider wants to connect to this facility because of increased access to customers).

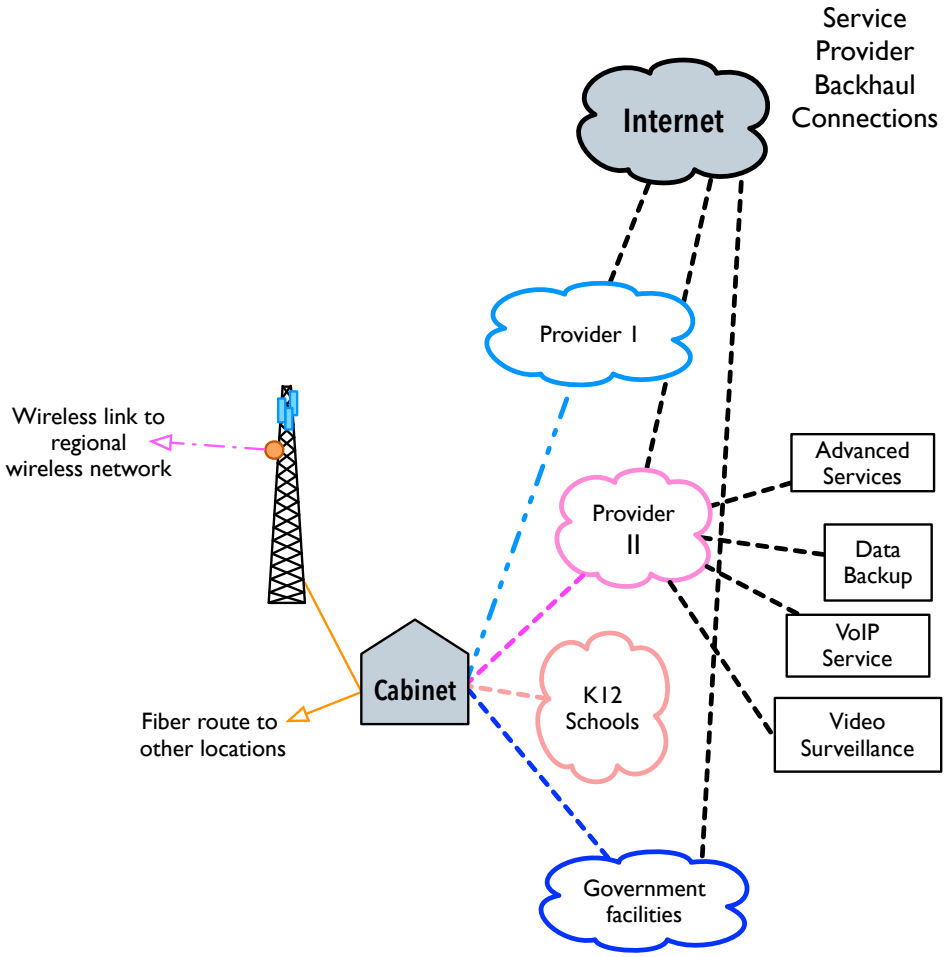
A colo facility is a controlled environment (i.e. secure, heated, and air-conditioned) room with Internet access through wired and/or wireless systems. The colo facility is a place where fiber, wireless, and copper-based network facilities meet. It is equipped to house high-end network equipment, servers, and other electronic gear.

A variety of middle layer network components and services can be located within the colo including, for example, directory services, replicated content servers, routing services, and other elements needed to deliver new multimedia services to the home and small office from multiple, competing providers.

Characteristics of the colocation facility are:

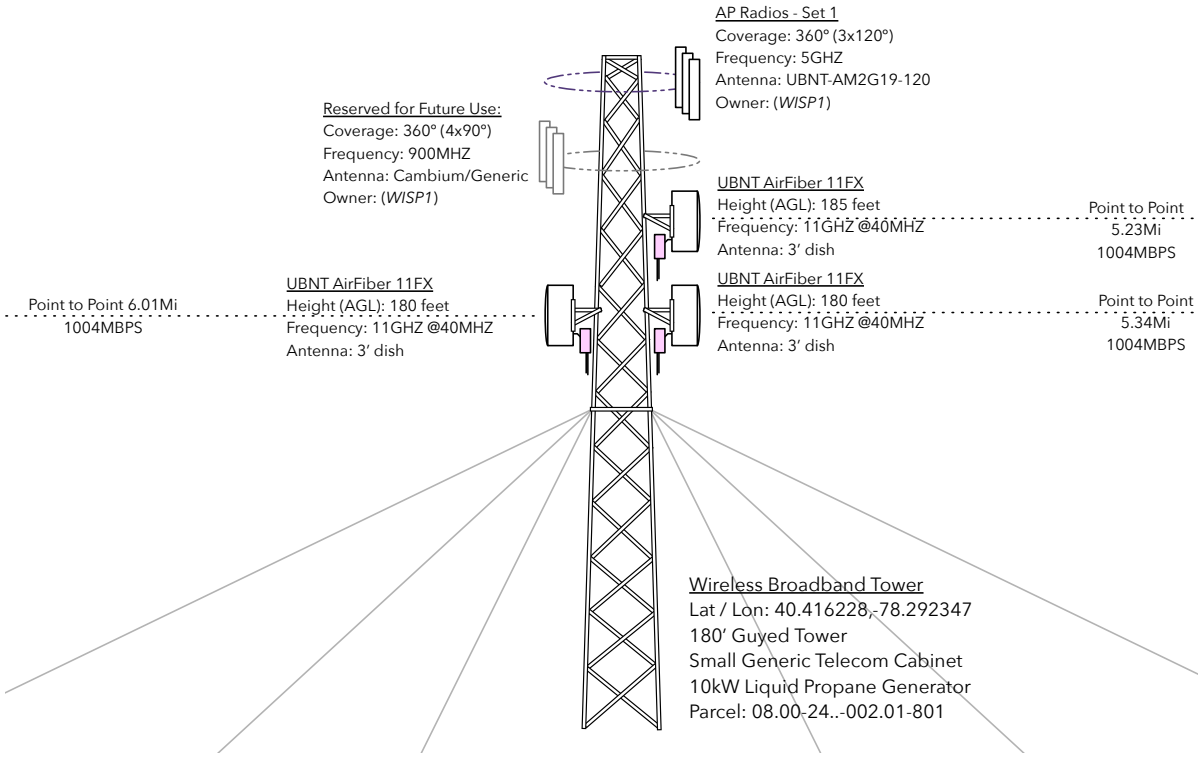
- A reliable source of AC electric power is required, with backup Uninterruptible Power Supply (UPS) service, and additional power backup available by an onsite generator is desirable.
- Controlled access to the facility (e.g. by electronic keycard) 24 hours/day, seven days a week. Service providers need to be able to gain access to the equipment room as needed, and work activities performed at night or on weekends is common.

- Racks for locating network equipment and servers, and optionally locked cages for equipment racks.
- Sufficient cooling capacity for the network's current and long-term needs. Equipment rooms require both a cool air input vent and an air return vent.



6.7 WIRELESS NETWORK ARCHITECTURE

The diagram below shows an example of the equipment typically placed on a tower, and details about the equipment that is planned. Several sets of access point radios can be placed on a tower operating in different frequencies, and can be owned/operated by multiple WISPs. Point-to-point radios link this tower to several other sites.



When developing wireless networks there are several categories of costs at each site. Construction of the network will incur site related costs at each tower site including:

- Site development - clearing the site of trees and vegetation, construction of a tower road for access to the site, and strict adherence to all erosion and sediment control measures required by the owner.
- Passive site equipment - In most cases, a network cabinet will be installed and a new power service will need to be run to it. At each site there will be a generator and most likely a propane tank also installed. Reliable power systems will be installed inside the cabinets, and other equipment management solutions will be installed in the cabinet for network equipment.
- The tower itself - new towers in this estimate are designed as 180' guyed towers. A guyed tower is usually a small profile lattice type tower that is supported by guy wires at several points on the tower. Guyed towers usually have a smaller visual profile than self-supporting towers because they are narrow from the top all the way to the base. Self-supporting towers will have the same lattice type structure but the tower widens as you get closer to the base. If the tower base is obscured by trees all around, a self-supporting tower may be preferred. Some sites may require design changes

based on site conditions. Other types of towers such as monopoles could be considered for this project, especially if the owner is working with cellular providers on developing a site.

- Network equipment such as point-to-point radios, routers, switches, and access point equipment will be installed during the construction of this network. Since the network has built in redundancy, the configuration will need to support automatic failover and other high-level network functions. In addition to the networking expertise needed to configure large networks, such as this the contractor(s) configuring the network will need to understand spectrum management, wireless signal propagation, and other physical aspects specific to wireless networks.
- Permitting - depending on the locality developing a wireless site usually requires extensive permitting processes that require a relatively long timeline and professional services.

6.8 SMALL CELL BROADBAND POLES

Line of sight issues are a constant problem for rural residents and businesses, as clear line of sight (or near line of sight) is required for fixed wireless Internet services. Even newer technologies like white space and LTE systems work better with clear line of sight to distant towers.

The increased use of wooden utility poles is already common in some other areas of the country, and increased use of this technique to get the Customer Premises Equipment (CPE) radio/ antenna above tree cover is a relatively simple solution.

The utility poles would normally be placed on private property, subject to existing or updated ordinances governing the placement of wooden utility poles. The local government would have no responsibility for maintenance and repairs.

The cost of placing an 80' pole can range from a low of about $2,000 to $7,000 or more, depending on permitting, engineering requirements, and the location of the pole. Some municipalities provide "by right" permitting of these poles if they are placed on private property, which can reduce the cost of installing them.

Because these are placed on private land, local government would not have to provide any direct funding. However, the localities could encourage wider use of this option with a public awareness campaign developed in partnership with wireless providers. Local banks could be encouraged to provide low cost financing of the poles so that property owners could make a small interest and principal payment monthly over several years to reduce the financial impact.

This strategy requires minimal financial support from the County and it has the potential of improving broadband access in rural areas of Hopkins quickly. The County should work with WISP partners to promote this option to improve access to new and existing wireless broadband towers.

6.9 NANO-CELL AND WIFI CALLING SERVICE

A common complaint in Hopkins County is the poor cell service in many areas. In some parts of the county, there may be adequate broadband service via DSL or fixed-point wireless Internet, but poor cellular phone/data service. There are now two solutions to improving rural cellular service that do not involve the expense or difficulty of attracting and/or building more cellular towers.

WiFi Calling – This approach takes advantage of the WiFi Calling feature that is now common in many late model cellphones. Once the phone is connected to a WiFi network (e.g. in the home using the home's broadband Internet service), the phone will automatically route the call over the WiFi network—phone calls and text work normally, as if the phone is connected to a cellular tower.

Nano-cell Calling – Poor or no cellular service in rural areas can be addressed by promoting the wider use of "nano-cell" devices. These small pieces of equipment are connected to the DSL or wireless broadband connection and provide improved cell service in the home or business. The working distance of these devices is limited, and service generally drops off once you leave the house itself (it may work for some short distance in the yard). These devices work very well and do not require an upgrade to a newer phone.

The cellular providers do not always promote the use of these devices, so many cellular users who would benefit from their use are not aware that this option is available. The device averages around $200 retail, but the cellular providers often provide substantial rebates (50% discount or more) and in some cases may provide them at no charge.

The improved wireless broadband service will also support use of WiFi calling and/or nano-cell devices.

This strategy is important because improved broadband service can also improve cellular service without the need for more cellular towers, especially in parts of the county where cellular providers have not been able to make the business case for more towers.

7 PLANNING FOR BROADBAND

7.1 TOWER AND WIRELESS NETWORK DEVELOPMENT ACTIVITIES

This section identifies the key tasks and timelines associated with identifying ISP partner(s) and tower sites.

Tower Site and Tower Development Process

ACTIVITY	DESCRIPTION	DISCUSSION	TASKS
Issue Hopkins County partnership RFP	For many of the grant opportunities, a private sector ISP will be needed.	The RFP should be short and should not require large amounts of work from respondents. For best response, allow at least 45-60 days for ISPs to submit a response.	• Start RFP development by obtaining sample RFPs from other localities. • Develop draft RFP and have it reviewed. • Issue RFP. • Review responses and conduct interviews as needed. • Select best candidate.
Assess and inventory prospective tower sites in Hopkins County	Grant applications for wireless towers require specific locations for towers.	Use report data to identify where towers are needed.	• Appoint someone to lead tower site effort. • Assemble a list of locations from report data. • Begin meeting with property owners to determine willingness to provide space for tower and availability of road access and electric service. • Collect site agreements.

Tower Site and Tower Activities

TASKS	MONTHS											
	1	2	3	4	5	6	7	8	9	10	11	12
Obtain sample ISP partner RFPs												
ISP RFP development and review												
Issue RFP for ISP partner(s)												
Review responses and conduct interviews												
Select ISP partner(s)												
Appoint site identification team												
Collect prospective sites												
Meet with property owners												
Collect site agreements												

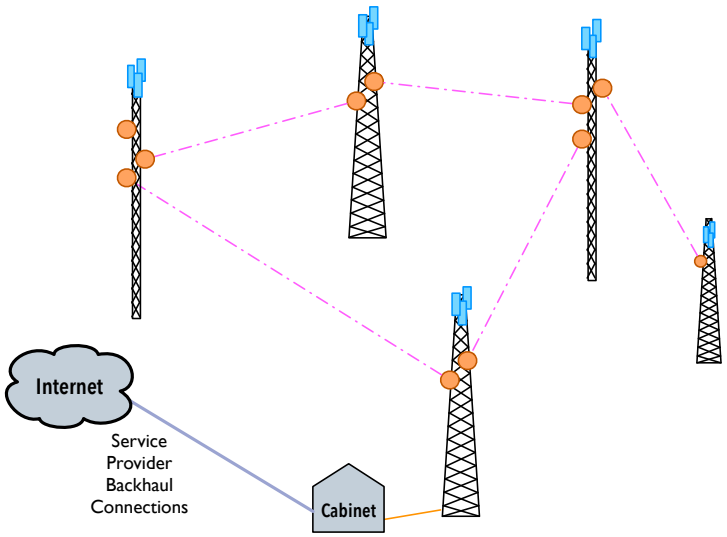
7.2 TOWER COST DETAIL

About Wireless Tower Cost Estimates

The line items for each named tower include the cost of the tower, site preparation, estimated cost of electric service, generator cost and placement, cost of the tower, and labor to assemble and erect the tower, and backbone equipment.

This section of the report provides an estimate of the cost of using existing towers to provide improved Internet access. The diagram below shows the logical design of a five-tower network. Four of the five towers have adequate line of sight between the towers to build a fully redundant ring between the towers, which will provide much more reliable service, because a single tower or equipment failure will not affect service.

Any placement of new towers should be preceded by a careful viewshed analysis of how much area/users are likely to be able to receive service. Site acquisition and site preparation costs can affect the overall cost of such a project. Existing county properties (e.g. fire/rescue stations, county parks, dump transfer sites, etc.) may be candidates for towers. Note that existing towers may require an engineering study to confirm that additional antennas can be added without exceeding the tower load limits.



Existing Tower Improvements

For existing towers owned by the state, the county, or other stakeholders that might be candidates for project use, modest upgrades to equipment at the base of the tower would be needed to make them broadband-ready.

Upgrades to existing towers typically may include adding or upgrading generators, additional cabinet or shelter space for service provider equipment, and sometime fencing and physical access changes.

Note that this estimate represents a worst-case scenario. If the site already has a generator that can be used by a new WISP co-locating on the tower, that could reduce the cost by as much as $7,500. If no road improvements are needed and existing electric service does not require a new H-frame and meter, another savings of up to about $3,000 is possible. If the tower has a current certification (i.e. had a formal engineering inspection), additional savings are possible, bringing the best-case cost to about $11,000 to $12,000.

Existing Tower Development and Improvements (Fit-up)

ITEM/PROJECT	UNITS	UNIT COST (LOW)	UNIT COST (HIGH)	COST (AVG)
Tower Study / Survey	1	$4,950	$7,700	$6,325
Site Development (Clearing, Road Improvements, etc.)	1	$0	$1,650	$825
Small Telecom Cabinet AmProd AM47P-2636-24RU or Equivalent	1	$5,000	$7,500	$6,250
10kW Liquid Propane Generator	1	$4,000	$6,000	$5,000
Cabinet Foundation and Installation	1	$2,250	$3,250	$2,750
New Power Service / Installation (assumes power available on-site)	1	$1,500	$2,500	$2,000
Power System Installation Labor	1	$300	$500	$400
Generator Installation Labor	1	$1,500	$2,500	$2,000
Propane Service Installation - tank and install by local gas company	1	$750	$1,250	$1,000
Poject management				$10,000
Total:				$36,550

New Tower

New towers have a range of configurations and cost options. This estimate is for a new 180' bare tower with no radio equipment. If located on existing county properties, the time needed to plan for construction can be shortened. If site acquisitions/leases are required, negotiations can add several months to the process. Note that a full permitting process may be required even if a new tower is placed on existing county-owned property. The permit process can add 60 to 120 days to the time needed to put a new tower in service.

New Tower Costs (180' Guyed)

ITEM/PROJECT	UNITS	UNIT COST (LOW)	UNIT COST (HIGH)	COST (AVG)
Labor and Contracting: $91,738				
Site Development (Clearing, Road Improvements, etc.)	1	$16,500	$16,500	$16,500
New Power Service / Installation	1	$1,500	$4,000	$2,750
180' Guyed Tower Construction Labor & Contracting	1	$55,000	$82,225	$68,613
Cabinet Installation Labor	1	$1,000	$1,500	$1,250
Power System Installation Labor	1	$500	$750	$625
Generator Installation Labor	1	$1,500	$2,500	$2,000
Propane Service Installation - tank and install by local gas company	1	$750	$1,250	$1,000
Materials: $39,485				
180' Guyed Tower Construction Materials	1	$19,250	$30,250	$24,750
Small Telecom Cabinet	1	$5,000	$7,500	$6,250
Cabinet Foundation, Installation Materials	1	$1,250	$1,750	$1,500
10kW Liquid Propane Generator	1	$4,000	$6,000	$5,000
Spare Fuses	1	$10	$20	$15
Power System Installation Materials	1	$20	$40	$30
Samlex 1000W Inverter	1	$350	$450	$400
Samlex SEC1230-UL Battery Charger	1	$200	$300	$250
100ah 12v Non Spillable Backup Battery	4	$250	$350	$1,200
DC Voltage Monitoring Device	1	$40	$60	$50
Unmanaged Rack Mount PDU (6O)	1	$35	$45	$40
Total:				$132,223
Project Management, Network Design				$37,500
Site Engineering, Surveying, Viewshed Analysis, etc.				$10,450
Misc Fees, Technical Services				$8,250
Contingency				$13,222
TOTAL:				$201,645

New Community Pole

A single wooden utility pole or inexpensive steel lattice tower with a line-of-site wireless connection to a 180' tower and local access radios could provide access to any residence with line of sight within a half-mile or more. This would spread the cost of pole construction and equipment costs across several households or businesses. There are many areas in the county where there is a cluster of homes along a relatively short stretch of road. All of those homes could share the use of a single local utility pole access site.

If there were 20 homes that could receive service and the cost of the pole and equipment was $12,000, each household connected would have a one-time cost of $600. There could be a matching grant program where each county could provide 50% of the cost of putting the pole and equipment in place, and the balance would have to be developed from other sources. Some localities are using this concept to offer WISPs exclusive access to the pole in return for a portion of the construction costs.

Pole costs vary depending upon what equipment is installed. Point-to-point link radio costs vary with distance from a nearby tower.

Neighborhood Pole Costs

ITEM/PROJECT	UNITS	COST (LOW)	COST (HIGH)	COST (AVG)
Site Development (Clearing, Road Improvements, etc.)	1	$0	$2,500	$1,250
3x3 NEMA Box	1	$800	$1,200	$1,000
New Power Service / Installation	1	$650	$1,500	$1,075
60' Wooden Utility Pole Construction Materials	1	$3,000	$4,000	$3,500
Unmanaged Rack Mount PDU (6O)	1	$35	$45	$40
60' Wooden Utility Pole Construction Labor & Contracting	1	$3,000	$4,000	$3,500
Neighborhood Pole Coordination and Project Management				$5,500
Total:				$15,865

Point-to-Point Links

The table below show the cost of a backhaul radio installation, with one licensed radio set (AirFiber 11FX). The licensed radios are less susceptible to interference and have higher bandwidth. A regional backhaul network between towers has several desirable characteristics:

- It reduces the cost to providers of being able to affordably offer service on all the towers.
- It increases the reliability and robustness of the WISP services because of the ring design (on at least four of the towers).
- County government data and/or public safety services could also be carried on the backhaul network to provide improved access to some remote facilities.
- K12 schools may be interested in having a redundant network to improve reliability of their existing fiber connections. This can be especially important during periods when online standardized testing is taking place.

A tower in a larger network may have one, two, or several backhaul radios included, and number of radios depends on the tower's location in the network and how many other towers it is connected to using point-to-point link pairs.

Licensed PTP Radio - Single Side - AirFiber 11FX

ITEM/PROJECT	UNITS	UNIT COST	COST
Ubiquiti AF11 Complete H/L Band Kit AF11-Complete-LB *or* AF11-Complete-HB	1	$1,499	$1,499
FCC Licensing	0.5	$2,000	$1,000
Shipping @ 5%	1		$125
Point-to-Point Link Assembly, Installation, Alignment, and Testing	1	$3,960	$3,960
Project Management, NIIT	0.5		$3,000
TOTAL			$9,584

7.3 ESTIMATED TIMELINES FOR COMPLETION

Each kind of project will have its own timeline, and will vary widely depending on the type of funding. Grant-funded projects may need six months to one year to plan and apply for funding, depending on where in the grant cycle the network owner commits to applying for a grant and the length of time that the grant agency takes to review and approve grants.

Tower improvements and construction times can be dependent on weather (more weather related delays are likely in late fall through early spring) and on procurement. Most grant-funded projects require careful attention to a public procurement process, which can add 90 to 180 days to the timeline.

Broadband Construction Timetable

Project Type	Project Execution Planning	Project Procurement	Project Engineering and Construction	Total Estimated Timeline
Improvements to existing towers	2-3 months	3-4 months	2 months	7-9 months
New towers of 180'	4-6 months	4-6 months	4-8 months	12-19 months
Small cell community broadband poles	3 months	2 months	2 months	7 months
Public WiFi hotspot	3 months	1 month	1 month	5 months
Point-to-point tower backhaul links	2-3 months	3-5 months	1-2 months	6-10 months
Fiber to the home/ business projects	4-6 months	4-6 months	6-12 months	14-24 months

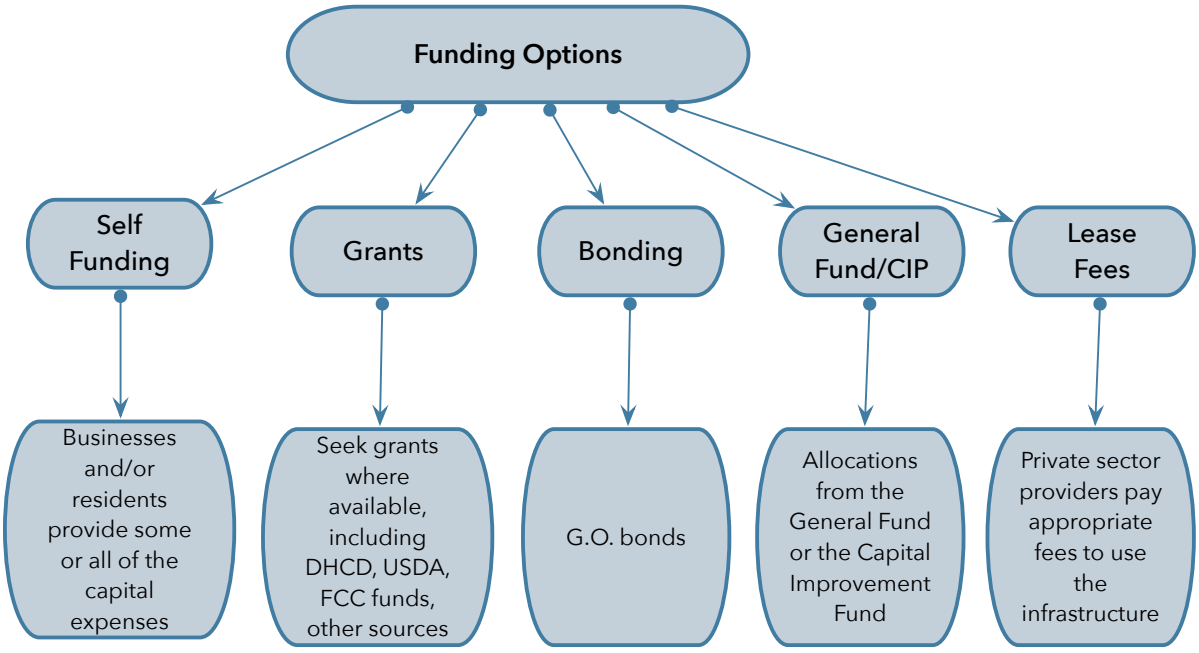
8 INFRASTRUCTURE FUNDING AND GRANT OPPORTUNITIES

There are a wide variety of state and Federal grant programs, and one outcome of the COVID crisis is a widespread recognition that access to affordable, high performance broadband for homes and businesses is both an economic and community development issue.

Funding opportunities vary from state to state. The American Rescue Plan Act of 2021 (ARPA) allowed states and local governments to use some ARPA funds for broadband infrastructure improvements. Many localities chose to simply pass their ARPA funds directly to local and regional ISPs, with varying results. Some ISPs that received funds had little or no experience building fiber to the home networks, and their construction efforts have been slow and/or more costly than projected. Some areas have received excellent fiber to the home and fiber to the business services.

It is important to note that any investment by county government in broadband infrastructure should be focused on passive infrastructure. Passive infrastructure can be leased to private sector service providers, generating long term revenue for maintenance and expansion. Leasing passive infrastructure like towers and dark fiber is not a "telecommunications service."

These assets will have a conservative life span of 30 years or more (e.g. wireless towers, conduit, fiber cable). These types of infrastructure investments create hard assets that have tangible value and can then be leveraged for additional borrowing. The demand for services and the associated fees paid for those services will provide the revenue that will pay back loans over time. There is ample time to recoup not only the initial capital investment, but also to receive regular income from the infrastructure.



The financing of local government and/or community-owned telecommunications infrastructure faces several challenges with respect to funding.

- Not all local governments are willing to commit to making loan guarantees from other funding sources like property taxes, because the idea of community-owned telecom infrastructure has a limited track record and therefore a higher perceived risk.
- Similarly, citizens are not always willing to commit to the possibility of broadband fees or higher taxes that may be needed to support a telecom infrastructure initiative, for many of the same reasons that local governments are still reluctant to make such commitments: perceived risk and a lack of history for such projects.
- Finally, banks and investors are also more skeptical of community telecom projects because of the relative newness of the phenomenon. By comparison, there are decades of data on the financial performance of water and sewer systems, so the perceived risk is lower.

Somewhat paradoxically, the cost of such a community digital road system is lower when there is a day one commitment to build to any residence or business that requests service. This maximizes the potential marketplace of buyers and attracts more sellers to offer services because of the larger potential market. This is so because:

- Service providers are reluctant to make a commitment to offer services on a network without knowing the total size of the market. A larger market, even if it takes several years to develop, is more attractive.
- Funding agencies and investors that may provide loans and grants to a community network project want to know how the funds will be repaid and/or that grants will contribute to a financially sustainable project. Knowing that the size of the customer base is the maximum possible for a service area helps reduce the perceived risk for providing loans and grants.

8.1 TEXAS FUNDING OPPORTUNITIES

The Broadband Development Office (BDO) was established by the state legislature in 2021 to award grants, low-interest loans and other financial incentives to applicants seeking to expand access to and adoption of broadband service in designated areas determined to be eligible by the office. The BDO is managing several funding opportunities that will be available to local governments in 2023 and 2024.

The **Bringing Online Opportunities to Texas Program (BOOT) Program** is funded by the Coronavirus Capital Projects Fund. The goal of the BOOT program is to make sure Texas communities have adequate broadband by funding critical broadband infrastructure projects that bring last-mile connectivity to homes and businesses across the state. Applications for the 2023 BOOT funds closed in early May, 2023.

The **Texas Broadband Pole Replacement Program** is awaiting Federal funding approval. If funded, the program would pay for the cost of utility pole replacement up to the lesser of $5,000 or 50% of the costs incurred or paid by a broadband provider or pole owner to replace a pole used to deploy eligible broadband service. It is worth noting that the cost of replacing a single utility pole can easily exceed $7,000, but the subsidy and the significantly lower cost of aerial fiber deployment should make it much easier to get fiber into rural areas with aging utility poles that cannot handle the additional loading of fiber cables.

The **Broadband Equity, Access, and Deployment (BEAD)** Program will fund projects that help expand high-speed internet access and use. It supports infrastructure deployment, mapping and adoption, including planning and capacity-building in state offices. It also supports outreach and coordination with local communities. The program is designed to expand Internet access in unserved areas with broadband speeds less than 25/3 Mbps, and underserved locations where broadband speeds are greater than 25/3 Mbps but less than 100/20 Mbps speeds. Distribution of Federal BEAD funds have been delayed over problems with the National Broadband Map, but the first BEAD awards from the BDO are planned for 2024. Texas has been awarded $3B for this program.

The **Digital Equity Act of 2021** will fund projects that help ensure Texas communities have the information technology capacity needed for full participation in society, democracy, and economy by promoting a diverse array of digital advancement projects.

These projects may range from providing digital literacy and digital skills education to low-income populations, improving the online accessibility of social services for individuals with disabilities, or more accurately measuring broadband access and adoption in rural communities.

BDO expects programs related to the Digital Equity Act of 2021 to be operational in 2024. In the meantime, BDO will be establishing a State Digital Opportunity Plan through various engagement opportunities.

Hopkins County should maintain regular communications with the Broadband Development Office to pursue every possible funding opportunity.

8.2 BEAD FUNDING

The BEAD (Broadband Equity, Access, and Deployment) Program has been allocated $42.5 billion to expand Internet access. The funds will be distributed to individual states, based on the number of unserved households in each state. The BEAD program is part of the Infrastructure Investment and Jobs Act (IIJA) passed by Congress in 2021, with a total of $46.2 billion in funds for broadband.

Funding will be distributed state by state based on the number of locations that fall below the 25/3 threshold. The program will allow some overbuilding (i.e. fiber deployment in areas that exceed the 25/3 threshold) but cannot be more than 20% of the total locations to be served. Areas that already have federal, state, or local funding allocated are not eligible; RDOF areas need to be examined as part of the application process, as they would not qualify.

Funds can be spend for:

- Broadband mapping, planning, and data collection.
- New or upgraded broadband infrastructure (i.e. materials and equipment).
- Cost of installation, labor, engineering, and related expenses.
- Workforce training and development.

An interesting requirement of acceptance of grant funds is that no data caps will be allowed. This is an excellent requirement that protects customers from a common type of "hidden" price increase in the future after the initial build is completed.

One billion of the $42.5 billion has been allocated specifically for middle mile projects that will be operated as open access (non-discriminatory use by any and all providers and users). Partnerships are encouraged.

8.3 MIDDLE MILE BROADBAND INFRASTRUCTURE PROGRAM

The Federal Middle Mile (MM) program has been allocated $1 billion for high speed Internet access. The goal of the program is to expand middle-mile infrastructure in unserved and underserved areas. "Middle-mile" is defined as the mid-section of Internet infrastructure that transports high volume data at high speed over long distances. Middle-mile investments can also assist with the development of redundant fiber routes, which are important for economic development, public safety, education, and health care.

Both states and local governments are eligible to apply, and collaborations are also eligible (e.g. county government and one or more ISP partners). The grant application was released in May, 2021, and the applications are due by September 30th, 2021. Awards will be made sometime later in the first quarter of 2023. Grant funds can be expended over a five year period.

Grants can be used for the construction, improvement, or acquisition of middle-mile infrastructure, including:

- Construction, improvement, or acquisition of facilities and equipment
- Engineering design, permitting and work related to project reviews
- Personnel costs, including salaries and benefits for staff and consultants
- Other costs necessary to programmatic activities

8.4 DIGITAL EQUITY ACT OF 2021

The Digital Equity Act of 2021 provides $2.75 billion to establish three grant programs that promote digital equity and inclusion. These programs will fund projects that help ensure U.S. communities have the information technology capacity needed for full participation in society, democracy, and economy by promoting a diverse array of digital advancement projects.

These projects may range from providing digital literacy and digital skills education to low-income populations, improving the online accessibility of social services for individuals with disabilities, or more accurately measuring broadband access and adoption in rural communities.

Awards to the states were made in 2022. Local governments should check with the state agency administering these funds to determine if funds are still available.

The three programs are:

- The State Digital Equity Planning Grant Program is $60M formula grant program for states, territories and tribal governments to develop digital equity plans. This program is administered by allocating funds to each state, and the governor of each state will appoint an administering agency responsible for distributing the funds. No cost sharing or matching funds are required to apply for this program.

- The Digital Equity Capacity Building Grant Program is a $1.44 billion formula grant program for states, territories, and tribal governments. As of late spring, 2023, this Federal program has not released a NOFA (Notice of Funds Availability).
- The Digital Equity Competitive Grant Program is a $1.25 billion grant program. It will fund annual grant programs for five years to implement digital equity projects. As of late spring, 2023, this Federal program has not released a NOFA (Notice of Funds Availability).

8.5 HUD COMMUNITY DEVELOPMENT BLOCK GRANTS

The U.S. Housing and Urban Development (HUD) Community Development Block Grant (CDBG) State Program allows the state of Texas to award grants to smaller units of general local government (e.g. counties, towns) that develop and preserve decent affordable housing, to provide services to the most vulnerable in a community, and to create and retain jobs. In recent years, CDBG funds have been successfully used for broadband infrastructure development where the local government applicant can show the improvements meet the general guidelines of the program—so grant funds have to be spent in low and moderate income areas.

Over a one, two, or three-year period, as selected by the grantee, not less than 70% of CDBG funds must be used for activities that benefit low- and moderate-income persons. In addition, each activity must meet one of the following national objectives for the program: benefit low- and moderate-income persons, prevention or elimination of slums or blight, or address community development needs having a particular urgency because existing conditions pose a serious and immediate threat to the health or welfare of the community for which other funding is not available. More information is available here (https://www.hud.gov/program_offices/comm_planning/communitydevelopment/programs).

8.6 USDA RECONNECT PROGRAM

The ReConnect program is a new funding program managed by the USDA Rural Development Office. This program is sometimes called the USDA e-Connectivity pilot program. Grant applications can be a combination of 100% grant, 50% grant/50% loan, or 100% loan. $40 million was awarded by the program for 2023, and a wide variety of entities can apply, including non-profits, co-ops, and state and local governments. Award amounts are lower than in previous years, and this is likely due to the much larger pool of funds for the BEAD program (see above).

Applications are usually due in the spring of each year. More information is available here: (reconnect.usda.gov). A mapping tool is available on the web site to show areas that are eligible. To qualify as an eligible area, households must have less than a minimum of 10 Megabit down/1 Megabit up broadband service.

8.7 USDA COMMUNITY CONNECT

The USDA Community Connect grant program offers financial assistance to eligible applicants that will construct broadband networks that provide service on a community-oriented connectivity basis in rural areas.

Community Connect helps rural communities receive access where broadband service is least likely to be commercially available, but where it can make a tremendous difference in the quality of life for

people and businesses. The projects funded by these grants help rural residents tap into the enormous potential of the Internet for jobs, education, healthcare, public safety and community development.

Eligible applicants include State and local governments, Federally recognized Tribes, nonprofits, for-profit corporations, and Limited liability companies.

The minimum grant amount for any project is $100,000. The maximum grant amount shall not exceed $5 million. The match the applicant is required to contribute towards the project is 15% of the requested grant amount. The match must be in cash and can be used to fund operations or facilities of the project.

For 2023, applications are due June 20, 2023. Electronic applications will only be accepted when submitted through the Community Connect Grant Portal (link available at https://www.rd.usda.gov/community-connect).

Applicants must register with SAM at https://www.sam.gov/. Applicants should keep in mind that it can take up to 15 business days to register with SAM, so applicants should plan accordingly and begin the process well in advance of the application deadline.

The funds may be used for:

- The construction, acquisition, or leasing of facilities, spectrum, land or buildings used to deploy broadband service.
- All residential and business customers located within the Proposed Funded Service Area
- All participating essential community facilities (such as public schools, fire stations, public libraries, and public safety stations)
- The cost of providing broadband service free of charge to the essential community facilities for two years
- Up to 10% of the grant may be used for the improvement, expansion, construction, or acquisition of a community center that provides online access to the public.

The definition for Broadband Service has been raised. Eligible areas must lack access to 25 Mbps/ 3 Mbps). Mobile service and satellite service are not considered Broadband Service regardless of speed. The Broadband Grant Speed has been increased from 25 Mbps/3 Mbps to 100 Mbps/20 Mbps (download/upload).

Applications must undergo a Public Notice process where the service areas of each application will be posted to allow potential service providers within the area applied for to challenge eligibility of the project. Those providers will have 45 days from the date the notice is published to file their responses. Any response filed will be subject to validation by RUS staff. Projects funded under the Community Connect Grant Program are subject to a Buy American requirement.

8.8 LEASE FEES

Initiatives like tower access and access to local government-owned conduit and fiber can create long term revenue streams from lease fees paid by service providers using that infrastructure. The City of Danville, Virginia has recovered their entire initial capital investment from lease fees paid by providers on the Danville fiber network.

8.9 CONNECTION FEES

Tap fees, pass by fees, and connection fees are already commonly used by local governments for utilities like water and sewer. The revenue share model can be strengthened from additional sources of revenue, including one-time pass by fees, connection fees and sweat equity contributions. It is important to note that the Co-op Membership Fee can be treated as a connection fee in whole or in part.

Pass By Fees – Pass by fees could be assessed once the fiber passes by the property, just as some communities assess a pass by fee when municipal water or sewer is placed in the road or street–and the fee is assessed whether or not the premise is connected, on the basis that the value of the property has been increased when municipal water or sewer service passes by. At least one study has indicated that properties with fiber connections have a higher value by $5,000 to $7,000 that similar properties without fiber access.

One Time Connection Fees – A one-time connection fee can be assessed to property owners (e.g. residents and businesses) when the fiber drop from the street to the premise is installed. This is similar to the kinds of connection fees that are typically charged when a property is connected to a municipal water or sewer system. The fee is used to offset the cost of the fiber drop and the Customer Premise Equipment (CPE) needed to provide the operational access to the network. The connection fee can be modest (e.g. $100) or it can be a larger percentage of the actual cost of the connection. Fiber CPE may range from $250 to $350 and a fiber drop may cost from $200 for a premise very close to the distribution fiber passing along the property to $1,000 or more if the premise is hundreds of feet from the road. One variant would be to charge a minimum connection fee for up to some distance from the road (e.g. $100 for up to 75′ and $2 for each additional foot).

There is already some data that indicates that residential property values increase by as much as $5,000 to $7,000 if fiber broadband services are available, so pass by fees can be justified on the basis of increased property values accruing to the property owner. Given the novelty of this approach, pass by fees may need more time to become an accepted finance approach, but tap fees (for installing the fiber cable from the street or pedestal to the side of the home or business) may be easier to use, especially for businesses that may need improved broadband access. Tap fees have the potential of reducing the take rate in the early phases of deployment, but as the value of the network becomes established, it is likely that there will be much less resistance to paying a connection fee.

8.10 SPECIAL ASSESSMENT/SERVICE DISTRICT

Communities like Bozeman, Montana and Leverett, Massachusetts have been funding broadband infrastructure improvements with special assessments (in Leverett, $600/year for five years), and in Bozeman, TIF (Tax Increment Funding) is being used in some areas to add telecom conduit, handholes, and dark fiber. In some localities, it is possible to levy a special assessment in a service district designated for a particular utility (like broadband) or other kind of public service.

Charlemont, Massachusetts intends to add an $11/month assessment to every household to build a town-owned Gigabit fiber network that will pass every household in the community. A town-wide vote supported this funding approach. Put in perspective, the average cost of a large, single topping pizza in the U.S. is currently $9 to $12.

Two small cities in Utah are currently evaluating the potential of a $10-12 utility tax levied on every household and business to finance a full fiber to the premises build out, including a modest "free" Internet service that would be adequate for email and light Web use. Most households will probably choose to select a higher performance Internet package from a private provider on the network. A $10/month special assessment (the average cost of one large pizza) on every household in Hopkins County could raise as much as $81M for broadband over 20 years—enough to take Gigabit fiber to nearly every home and business.

The tables below shows the kind of funds that could be generated over several time periods. If $10 per month were collected from each household for 30 years, it would easily finance the immediate build out of Gigabit fiber that would pass nearly all homes and businesses in the county.

Individual Service District Examples				
Monthly Assessment Amount	Fifty Homes Five Year Assessment	Fifty Homes Ten Year Assessment	100 Homes Five Year Assessment	100 Homes Ten Year Assessment
$5	$15,000	$30,000	$30,000	$60,000
$10	$30,000	$60,000	$60,000	$120,000
$25	$75,000	$150,000	$150,000	$300,000
$50	$150,000	$300,000	$300,000	$600,000

A lesser amount (e.g. $2/month over 20 years) would easily finance the immediate build out of a comprehensive wide area wireless tower network in each, as well as some fiber infrastructure.

Hopkins County Special Assessment Examples		
Monthly Assessment Amount	Twenty Year Assessment	Thirty Year Assessment
Number of Households	33,983	
$1	$8,155,920	$12,233,880
$2	$16,311,840	$24,467,760
$5	$40,779,600	$61,169,400
$10	$81,559,200	$122,338,800

8.11 PROPERTY TAX INCREASE

While raising taxes can be politically very difficult, a very small incremental increase in property taxes, with the increase clearly earmarked specifically designated for broadband development (.e.g. one-quarter cent) might be possible to sell to citizens and businesses.

The table below illustrates a hypothetical example of what funds might be raised for broadband improvements with a sample county-wide assessed property value.

	Sample Assessed property value	Broadband increment	Annual Broadband Fund	Ten Year Aggregate	Twenty Year Aggregate	Thirty Year Aggregate
1/4 of one cent	$7,000,000,000	$0.0025	$157,500	$1,575,000	$3,150,000	$4,725,000
1/2 of one cent	$7,000,000,000	$0.0050	$315,000	$3,150,000	$6,300,000	$9,450,000
One cent	$7,000,000,000	$0.0100	$630,000	$6,300,000	$12,600,000	$18,900,000

8.12 GRANT APPLICATION ACTIVITIES

Activity	Description	Discussion	Tasks
Develop a grant application	The grant application process, from start to award announcement, can be nine to 12 months.	Broadband grant application requirements have become more stringent over time, with more grant agency oversight and review. Careful planning is essential to develop a successful application.	• Once a grant opportunity has been identified, review grant requirements to determine if the project can qualify. For example, some grants require two years of financial history. • Identify regional agency that will assist. • Begin contacting potential ISP partners. • If the project qualifies, identify at least two people to take the lead to prepare application. • Prepare a task list of all grant materials requirements and identify data needed. • Develop a timeline for developing sections of the grant. • Identify requirements for letters of support and matching funds and develop timeline to solicit and collect commitments. • Complete all sections of grant application with assistance from public and private partners. • Submit grant application.

Timeline for Grant Application

TASKS	MONTHS STARTING WHEN GRANT IDENTIFIED											
	1	2	3	4	5	6	7	8	9	10	11	12
Determine grant qualifications												
Identify regional agency partner												
Identify ISP or WISP partner if needed												
Appoint grant team												
Create grant task list												
Prepare timeline and assign tasks to partners												
Identify matching fund requirements and letters of support to solicit and collect as needed												
Complete all sections of the grant application												
Submit grant												
Grant agency review												
Awards announcement												

9 PARTNERSHIP OPPORTUNITIES

Because nearly all telecom infrastructure includes some use of public right of way, public/private partnerships are always a requirement for broadband infrastructure. Between Hopkins County and private entities like ISPs and WISPs, the more common synergies are:

- The need for more bandwidth,
- The need for more affordable bandwidth, and
- The need for more affordable bandwidth to be more widely available.

Potential project partners include:

ISPs and WISPs

Throughout the U.S., many WISPs are aggressively pursuing public-private partnerships (PPPs) with county governments. These partnerships may include a variety of strategies: collaboration on a grant opportunity, shared costs of developing a new tower site, revenue sharing, fee waivers, and other sorts of cost and revenue sharing. The advantage of this kind of PPP is that the WISP typically is responsible for most of the day-to-day management of the network assets.

The County can pursue public/private partnerships with technically qualified and financially stable ISPs and WISPs. Where appropriate, the County can channel grant funds to providers who will use the funds to build and manage new broadband infrastructure.

Selected providers should be able to show technical competency and have a demonstrable track record of managing substantial fiber and/or wireless builds on time and within budget. It will also be important for any public/private partnership agreement have a claw-back agreement. When public funds are transferred to a private company, the County should have the ability to "claw back" the built infrastructure for a minimum of five to ten years.

Conditions for a claw back could include bankruptcy of the ISP, sale to a third party (where substantial profit taking leverages the public funds), poor service, unreasonably high cost of service, and/or poor service reliability.

Public Safety

The Sheriff's department, fire, and rescue departments all need better access to broadband and improved wireless voice/data communications. Throughout the United States, public safety voice and data communications systems are being upgraded, often at staggering cost. Many of the upgrades include new towers to eliminate "holes" in the served area where first responder, fire, and rescue radios do not work. Combining public safety needs with community broadband needs can bring new sources of funding and cut costs, sometimes dramatically. Elected officials may need to take the lead in this area to ensure that public safety officials work collaboratively with the broadband efforts.

The availability of public-safety towers and/or new towers can enable new services and applications for police, fire, and rescue in Hopkins County. Secure WiFi hotspots can be set up around and near the towers, so that reports can be filed from the field using the WiFi Internet connection. Other communities that have done this have found that it saves time and keeps patrol cars out in the field longer.

There are often grants available for public-safety voice and data communications improvements, like new towers and upgrades to existing tower facilities, that could also support the broadband initiative. Any public-safety tower or communications expenditure should be analyzed to determine if the expenditure can also support expanded broadband access in the county.

K12 Schools

Hopkins County schools have adequate broadband service at existing school locations. But K12 students often lack adequate Internet service at home, and some schools are careful not to assign homework that requires Internet access. Parents consistently report on the burden of having to drive children to a public library or some other WiFi hotspot to get Internet access for school work. The County should work with the schools to apply for education grant funds to achieve this goal, and to keep K12 parents informed about broadband activities.

County Businesses

Businesses in the county and the local Chamber of Commerce (CoC) chapters have an important role to play as advocates for the broadband work of the County. At both the county and state level, businesses that need more affordable and better broadband should ensure that elected officials understand the urgency. The County, as part of its broadband awareness efforts, should ensure that local businesses are kept up to date with work activities, grants, and other efforts (e.g. attend CoC meetings at least quarterly to report on the work of the County).

Electric Utilities

Electric utilities are natural partners in any county broadband venture. Electric utilities own utility poles, bucket trucks, and the equipment needed to install aerial fiber. In the City of Chattanooga, TN, the fiber to the premises (FTTx) initiative has enabled millions in savings for the city-owned electric service. When power outages occur from events like ice storms or tree damage, the utility is able to use the fiber network to very accurately pinpoint where the outage occurs, enabling a more rapid repair of the electric network at less cost.

The County should meet from time to time with the local electric utilities to assess their interest in broadband projects, especially if the County and the electric utility could collaborate on fiber to electric service substations.

APPENDIX A: GLOSSARY

Active network: Typically a fiber network that has electronics (fiber switches and CPE) installed at each end of a fiber cable to provide "lit" service to a customer.

Asymmetric connection: The upload and download bandwidth (speed) are not equal. Cable Internet and satellite Internet services are highly asymmetric, with upload speeds typically 1/10 of download speeds. Asymmetric services are problematic for home-based businesses and workers, as it is very difficult to use common business services like two way videoconferencing or to transfer large files to other locations.

Backhaul: Typically refers to a high capacity Internet path out of a service area or locality that provides connectivity to the worldwide Internet.

Colo facility: Colo is short for Colocation. Usually refers to a prefab concrete shelter or data center where network infrastructure converges. A colo or data center can also refer to a location where several service provider networks meet to exchange data and Internet traffic.

CPE: Customer Premises Equipment, or the box usually found in a home or business that provides the Internet connection. DSL modems and cable modems are examples of CPE, and in a fiber network, there is a similarly-sized fiber modem device.

Dark fiber: Dark fiber is fiber cable that does not have any electronics at the ends of the fiber cable, so no laser light is being transmitted down the cable.

Fiber switch: Network electronic equipment usually found in a cabinet or shelter

Fiber Optic Splice Closure: See **FOSC**.

FOSC: Fiber Optic Splice Closure. Typically a water and air tight cylindrical container where fiber cable is split open to allow splicing (connecting together) of fiber strands for a drop to a premises.

FTTH/FTTP/FTTx: Fiber to the Home (FTTH), Fiber to the Premises (FTTP), and Fiber to the X (FTTx) all refer to Internet and other broadband services delivered over fiber cable to the home or business rather than the copper cables traditionally used by the telephone and cable companies.

Handhole: Handholes are open bottom boxes with removable lids that are installed in the ground with the lids at ground level. The handholes provide access to fiber cable and splice closures that are placed in the handhole. Handholes are also called **pull boxes**.

IP video: Video in various forms, including traditional packages of TV programming, delivered over the Internet rather than by cable TV or satellite systems.

Latency: The time required for information to travel across the network from one point to another. Satellite Internet suffers from very high latency because the signals must travel a round trip to the satellite in stationary orbit (22,500 miles each way). High latency makes it very difficult to use services like videoconferencing.

Lit network: A "lit"network (or lit fiber) is the same as an active network. "Lit" refers to the fact that the fiber equipment at each end use small lasers transmitting very high frequency light to send the two way data traffic over the fiber.

MST: Multiport Service Terminals are widely used in fiber to the home deployments to connect individual home drop cables to larger distribution cables on poles or in handholes. Pre-connectorized drop cables snap into the MST ports and do not require any splicing.

Passive network: Refers to infrastructure that does not have any powered equipment associated with it. Examples include wireless towers, conduit (plastic duct), handholes, and dark fiber.

Pull boxes: Pull boxes (also called handholes) are used to provide access to fiber cable and splice closures. They are called pull boxes because they are also used during the fiber cable construction process to pull the fiber cable through conduit between two pull boxes.

Splice closures: Splice closures come in a variety of sizes and shapes and are used to provide access to fiber cable that has been cut open to give installers access to individual fiber strands. Splice closures are designed to be waterproof (to keep moisture out of the fiber cable) and can be mounted on aerial fiber cable or placed underground in handholes. Also called **FOSC**s.

Splicing: The process of providing a transparent joint (connection) between two individual fiber strands so that laser light passes through. A common use of splicing is to connect a small "drop" cable of one or two fiber strands to a much larger (e.g. 144 fiber strand) cable to provide fiber services to a single home or business.

SCADA: Supervisory Control and Data Acquisition. Used by the electric utility industry and some other utilities (e.g. water/sewer) to manage their systems.

Symmetric connection: The upload and download bandwidth (speed) is equal. This is important for businesses and for work from home/job from home opportunities.

Virtual Private Network: A VPN creates a private, controlled access link between a user's computer and a corporate or education network in a different location. VPNs are often encrypted to protect company and personal data. VPNs usually require a symmetric connection (equal upload and download speeds) to work properly.

APPENDIX B: CENSUS BLOCKS WITH RDOF WINNERS

Census Block	County	Zip Code	Bidder	Tier
482239508002042	Hopkins	75497	Resound Networks, LLC	Gigabit
482239507005039	Hopkins	75494	CCO Holdings, LLC	Gigabit
482239507005047	Hopkins	75494	CCO Holdings, LLC	Gigabit
482239507005084	Hopkins	75494	CCO Holdings, LLC	Gigabit
482239507005090	Hopkins	75494	CCO Holdings, LLC	Gigabit
482239507005070	Hopkins	75494	CCO Holdings, LLC	Gigabit
482239507005048	Hopkins	75494	CCO Holdings, LLC	Gigabit
482239507005030	Hopkins	75494	CCO Holdings, LLC	Gigabit
482239507005088	Hopkins	75494	CCO Holdings, LLC	Gigabit
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482239507005067	Hopkins	75494	CCO Holdings, LLC	Gigabit
482239507005038	Hopkins	75494	CCO Holdings, LLC	Gigabit
482239507005046	Hopkins	75494	CCO Holdings, LLC	Gigabit
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482239501001065	Hopkins	75482	NexTier Consortium	Gigabit
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482239503002012	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503002088	Hopkins	75482	CCO Holdings, LLC	Gigabit

482239503003044	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503002094	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239501001200	Hopkins	75482	NexTier Consortium	Gigabit
482239501001174	Hopkins	75482	NexTier Consortium	Gigabit
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482239503001009	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503001010	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503002182	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503002173	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239508002030	Hopkins	75482	Resound Networks, LLC	Gigabit
482239507004058	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239507004029	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239502003116	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503001005	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503002005	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503002133	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503002049	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503002036	Hopkins	75482	CCO Holdings, LLC	Gigabit
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482239503002078	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503002079	Hopkins	75482	CCO Holdings, LLC	Gigabit
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482239503003039	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503001001	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239508002008	Hopkins	75482	Resound Networks, LLC	Gigabit

482239501001079	Hopkins	75482	NexTier Consortium	Gigabit
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482239503003033	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503002062	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503002053	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503002200	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239503002144	Hopkins	75482	CCO Holdings, LLC	Gigabit
482239507003008	Hopkins	75482	AMG Technology Investment Group LLC	Gigabit
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482239501002061	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002079	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002109	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002084	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002075	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002104	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002050	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002112	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002056	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002057	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002111	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002105	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002065	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002106	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002058	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002118	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002072	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002054	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002071	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501001032	Hopkins	75437	NexTier Consortium	Gigabit
482239501002053	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002059	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002029	Hopkins	75437	CCO Holdings, LLC	Gigabit

482239501002025	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002060	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002125	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002070	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002087	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002076	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002102	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002023	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002052	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239501002077	Hopkins	75437	CCO Holdings, LLC	Gigabit
482239502001069	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001067	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001073	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001075	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502002019	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502002020	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003032	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001052	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003099	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003132	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003141	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003122	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502002052	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502002029	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003088	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003053	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003107	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003041	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003042	Hopkins	75433	CCO Holdings, LLC	Gigabit

482239502003085	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001071	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001019	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001055	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001093	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003065	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001053	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001074	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502002025	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003045	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003103	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003030	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003073	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003147	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001070	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001068	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003121	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003063	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001095	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003075	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003144	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003040	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003064	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003039	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502001094	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502002031	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003028	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003086	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502002030	Hopkins	75433	CCO Holdings, LLC	Gigabit

482239502003054	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003082	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003123	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003160	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502003078	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239502002016	Hopkins	75433	CCO Holdings, LLC	Gigabit
482239507001002	Hopkins	75431	AMG Technology Investment Group LLC	Gigabit
482239507001021	Hopkins	75431	AMG Technology Investment Group LLC	Gigabit
482239507003062	Hopkins	75431	AMG Technology Investment Group LLC	Gigabit
482239508001041	Hopkins	75431	CCO Holdings, LLC	Gigabit
482239503003038	Hopkins	75431	CCO Holdings, LLC	Gigabit
482239503003032	Hopkins	75431	CCO Holdings, LLC	Gigabit
482239503003036	Hopkins	75431	CCO Holdings, LLC	Gigabit
482239507001043	Hopkins	75431	AMG Technology Investment Group LLC	Gigabit
482239507003014	Hopkins	75431	AMG Technology Investment Group LLC	Gigabit
482239508001036	Hopkins	75431	CCO Holdings, LLC	Gigabit
482239508001038	Hopkins	75431	CCO Holdings, LLC	Gigabit
482239507001003	Hopkins	75431	AMG Technology Investment Group LLC	Gigabit
482239502003012	Hopkins	75428	CCO Holdings, LLC	Gigabit
482239502001028	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001014	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001005	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001043	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001000	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001047	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001051	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001059	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001022	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239503001060	Hopkins	75420	CCO Holdings, LLC	Gigabit

482239502001029	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001001	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001027	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239503001057	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001035	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001041	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001045	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001042	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001015	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001034	Hopkins	75420	CCO Holdings, LLC	Gigabit
482239502001023	Hopkins	75420	CCO Holdings, LLC	Gigabit