BROADBAND FUNDING SURVEY AND FEASIBILTY REPORT

Mussey Township, Saint Clair County, Michigan

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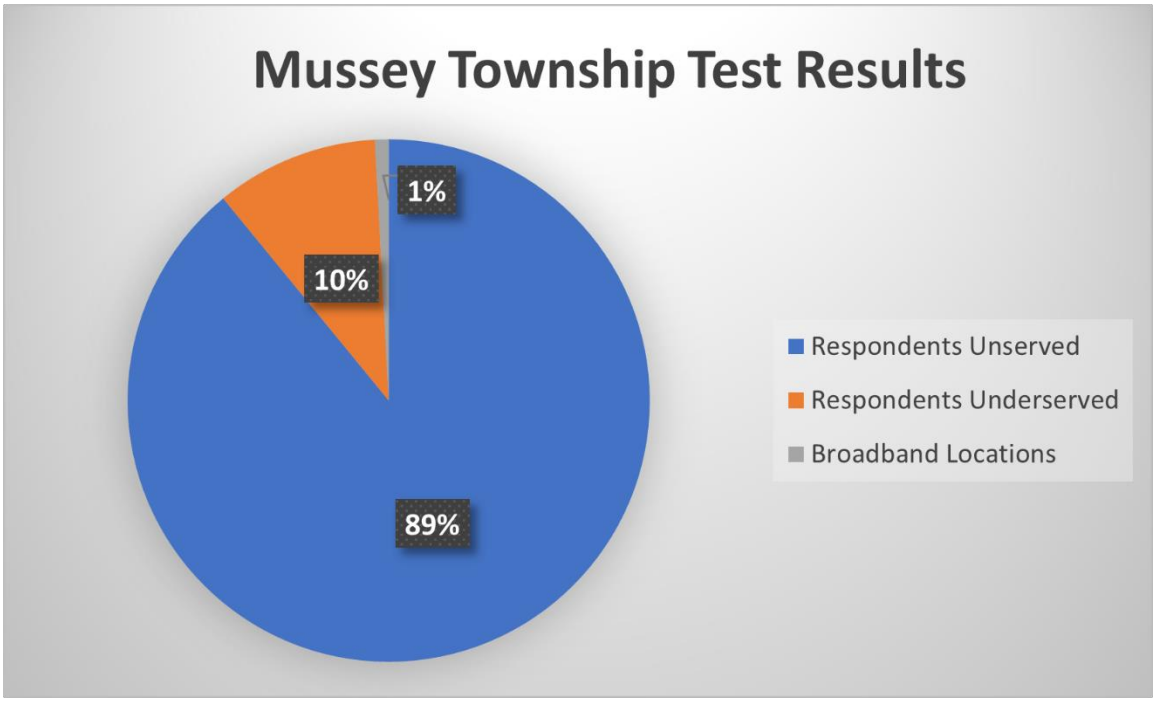
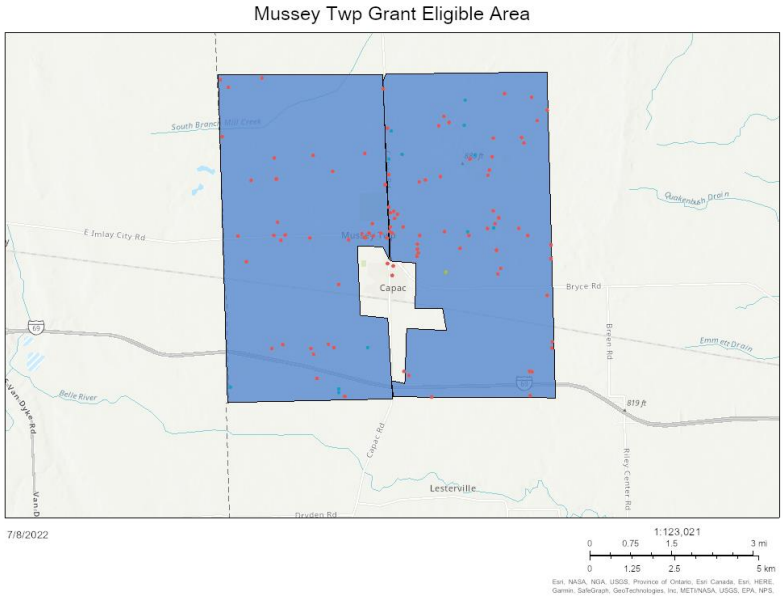
EXECUTIVE SUMMARY

Wideband Group conducted a residential speed test survey and engineering study in Mussey Township, Saint Clair County, MI. The testing application, MI-Speed, gathered the first test on 5/24/2022. As of 7/6/2022, 136 tests were conducted representing 119 households. 6 household responded via phone to indicate they did not have home internet; therefore, the total response is 125 households. The direct mail campaign reached 885 households of the 911 addresses provided by the township, with 17% of the household responding to the campaign. 13 households tested multiple times, enabling us to measure fluctuation in speed at each location. As illustrated below, 89% the households are classified unserved.



The city of Capac was excluded from the study. 100% of the geographic study area is consider Unserved under the federal guidelines, representing all the test households in the township. The federal definition for Unserved is less than 25Mbs down or less than 3Mbs upload. In other words, very poor internet speeds. The unserved area of the township is considered a priority funding area under the Broadband Equity Access and Deployment (BEAD) program.



The BEAD program will be administered by the State of Michigan. The state recently passed Senate Bill 565, a state specific program, which modified the federal guidelines expanding the definition of Unserved to include speeds of less than 100Mbs download and 20Mbs upload. The federal guideline provides a more accurate method to prioritize the communities most in need and was used for this study. The speeds associated with each federal category; unserved, underserved and broadband are provided in the report.

One respondent, a commercial facility, achieved Broadband speed. This test does not impact eligibility for funding.

Funding efforts will target the entire study area of the township, as indicated in the above map. A FTTH network is the recommended technology for the fund eligible area with an estimated cost of $7,861 per home and total construction cost of $5.0 million based on an 70% adoption rate. The construction of a Fiber to the Home (FTTH) network is financially feasible with cost subsidies. A provider proposing a FTTH network will be preferred by the grant authorities, and FTTH providers will be sought by Wideband Group for the township.

Markets that are competitive eventually provide consumers better service, technology, and price options. Given the opportunity, the township should consider backing and supporting a provider that will create a stronger, competitive presence in Mussey township.

BACKGROUND

Wideband Group (WBG) was retained by Mussey Township, located in Saint Clair County Michigan to perform a Broadband Engineering Survey and Study of the township. WBG developed and initiated the study in direct response to the Broadband, Equity, Access & Deployment Program (BEAD). The BEAD program provides funding for the deployment of Broadband in unserved and underserved areas of the country. The Federal government agency NTIA administers the issuance of federal funds to the States, and each State decides where and to whom the funds are directed. The study established the level of broadband availability in the township and provides engineering and cost data that may be utilized by Internet Service Providers (ISPs) in the grant application efforts. Further, WBG will promote the township to the ISP industry for inclusion in their funding and expansion plans.

WBG has determined that the survey's response rate to date is significant enough to meet the objectives of the study. The Mussey.mi-speed.com survey site will remain active until 9/22/2022, and this report will be updated on an as-needed basis.

OBJECTIVES

The purpose of the study is to:

- determine areas of the community that are unserved, underserved, and served with broadband,
- provide wireline data and maps of the unserved areas based on the speed test data and field engineering survey,
- provide a budgetary cost estimate to build a fiber-based network.

The information and data gathered as a part of this study is intended to:

- bring attention to the need to for broadband investment in the community
- motivate a commercial Internet Service Provider (ISP) to apply for State of Michigan BEAD grant funding to build a broadband Internet network in the community,
- provide electronic data that an ISP can use directly in the application process as a cost-savings incentive and jump-start the grant writing and validation process.

METHODS

WBG's survey application, Mi-speed, gathered speed test data and household internet subscription information. A unique URL was provided for the township and the survey site was marketed via direct mail and hand-out flyers provided to the township.

The engineering team utilized the speed test data and field surveyed the township's wireline infrastructure to develop network maps and budget costs. The data were analyzed, and the findings are presented in this report.

Definitions and Key Metrics.

Internet Service Categories

The BEAD program places Internet connectivity into one of 3 categories: unserved, underserved, and broadband.

- Unserved: Download speed of less than 25Mbs, Upload speed of less than 3Mbs upload
- Underserved: Download speed of at least 25Mbs, and less than 100Mbs, and upload speed of at least 3Mbs and less than 20 Mbs.
- Broadband: Download speed of at least 100Mbs, and an upload speed of a least 20 Mbs.

Unserved	
Download Less than 25Mbs	**Upload** Less than 3Mbs
One or both can be true for the connection to be considered unserved.	

Underserved	
Download Less than 100Mbs, and greater than or equal to 25Mbs	**Upload** Less than 20Mbs, and greater or equal to 3Mbs
If the connection is not considered unserved - than one or both can be true, and the connection is considered underserved	

Broadband	
Download Greater than or equal to than 100Mbs	**Upload** Greater than or equal to than 20Mbs
Both must be true for the connection to be considered Broadband	

The State of Michigan's Senate Bill 565 eliminates the "underserved" category and considers speeds less than 100/20Mbs as "unserved". The Federal classification of unserved definitively indicates priority areas and therefore is used for this report.

Latency and Jitter

Other measurements that indicate the quality of an internet connection are Latency and Jitter. A connection is considered low quality if the latency measured is greater than 30ms, or jitter is greater than 100ms.

Variability

The report also considered variability. Most residential and small business plans are "best effort" and often described as "speeds up to". This is because bandwidth is locally shared on the provider's network and therefore speeds will vary depending on local demand. For households that performed multiple tests, we measured the percent difference between the high- and low-test results. For wireline providers, high percent difference indicates that the provider's bandwidth capacity is over-allocated, resulting in a less predictable connection speed. For mobile providers, high percent difference is likely due to radio signal quality. We considered a household difference greater than fifty percent between the high and low test to be over-subscribed and vulnerable to capacity issues.

Questionnaire

The survey gathered the following information:

- Email address of the respondent (optional),
- the respondents home test location (address),
- how connected to the internet and through what type of device,
- subscriber plan information and costs (optional).
- Overall subscriber satisfaction.

The questionnaire was designed to not to burden the respondent, decreasing the possibility of abandoning the process.

RESULTS

Digital Data

Reports, raw data, and shapefiles are available for download:

Mussey File Share (request access through website)

Speed Test Map

Resident Campaign Response

Table 1

RESPONSE

Total Addresses	911
Direct Mail Addresses	885
Number of speed tests	136
Distinct Addresses	119
Percent of Direct Mail Households	16.7%
Households that performed multiple tests	13
Respondents Unserved	106
Respondents Underserved	12
Broadband Locations	1
Households without Home Internet	6

INTERNET SERVICE SATISFACTION

Satisfied	Unsatisfied
20%	80%

TESTING DEVICE

Type	*Number*	*% Total*
Cell Phone	50	41
Computer / Tablet	72	59

CONNECTION USED FOR TESTING

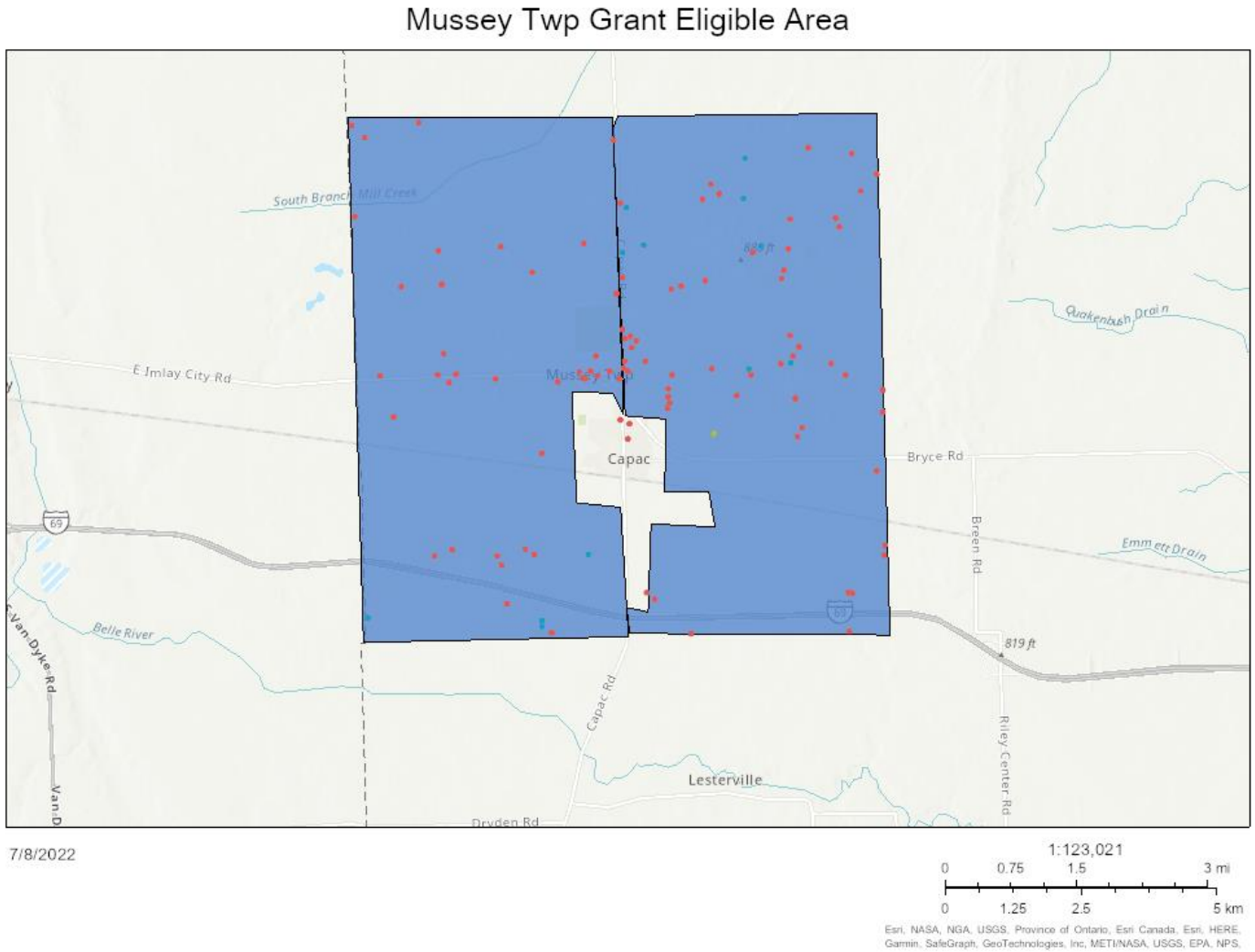
Type	*Number*	*% Total*
WiFi	85	69.7
Ethernet Cable	20	16.4
Cellular Hot Spot	10	8.2
Don't Know	2	1.6
Other	5	4.1

The current state of Broadband in Mussey township

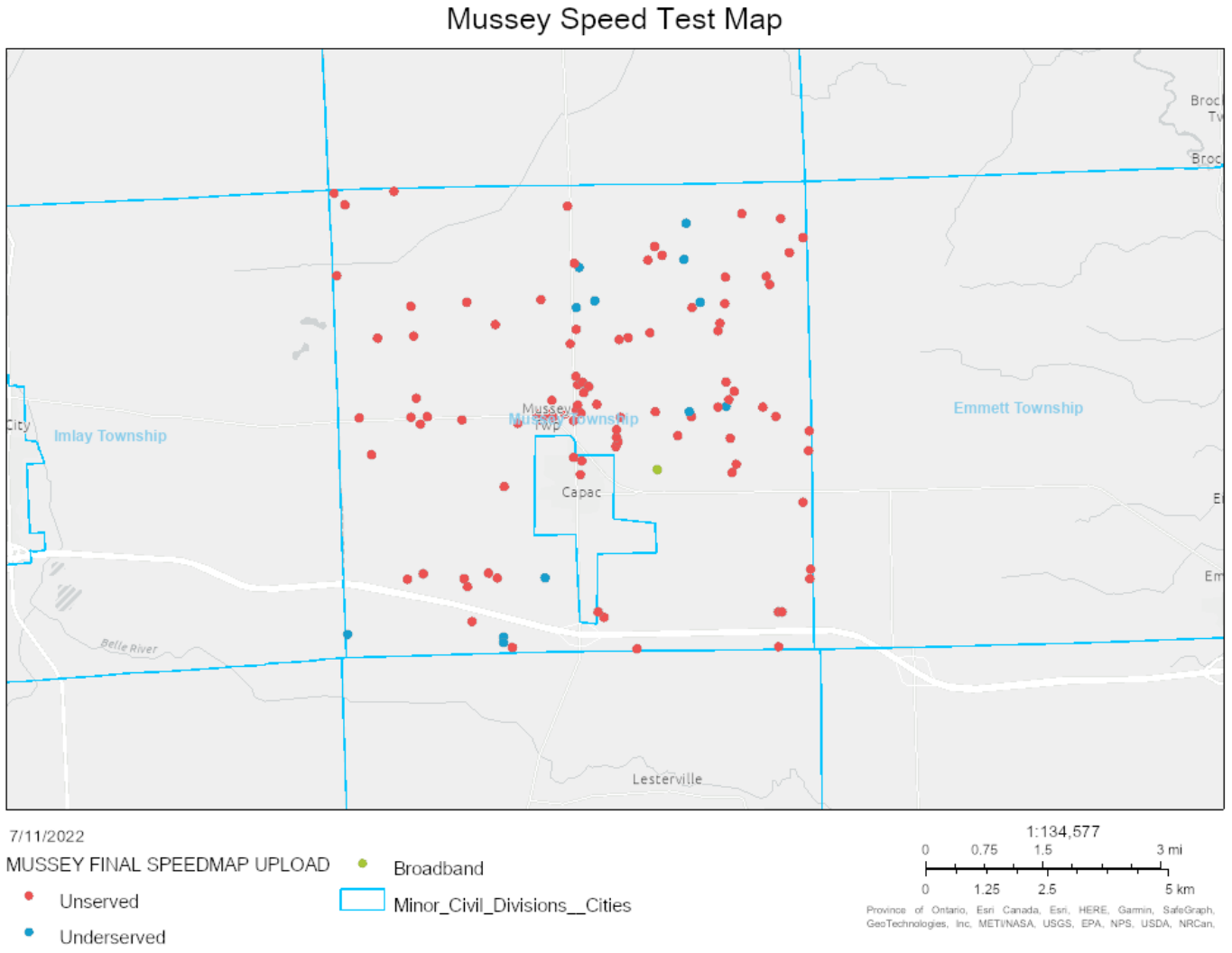
Table 2

Service Classification	Sq. Miles	% Survey Area	Households
Unserved	34.12	100%	910
Underserved	0	0	0
Broadband Available	0	0	0

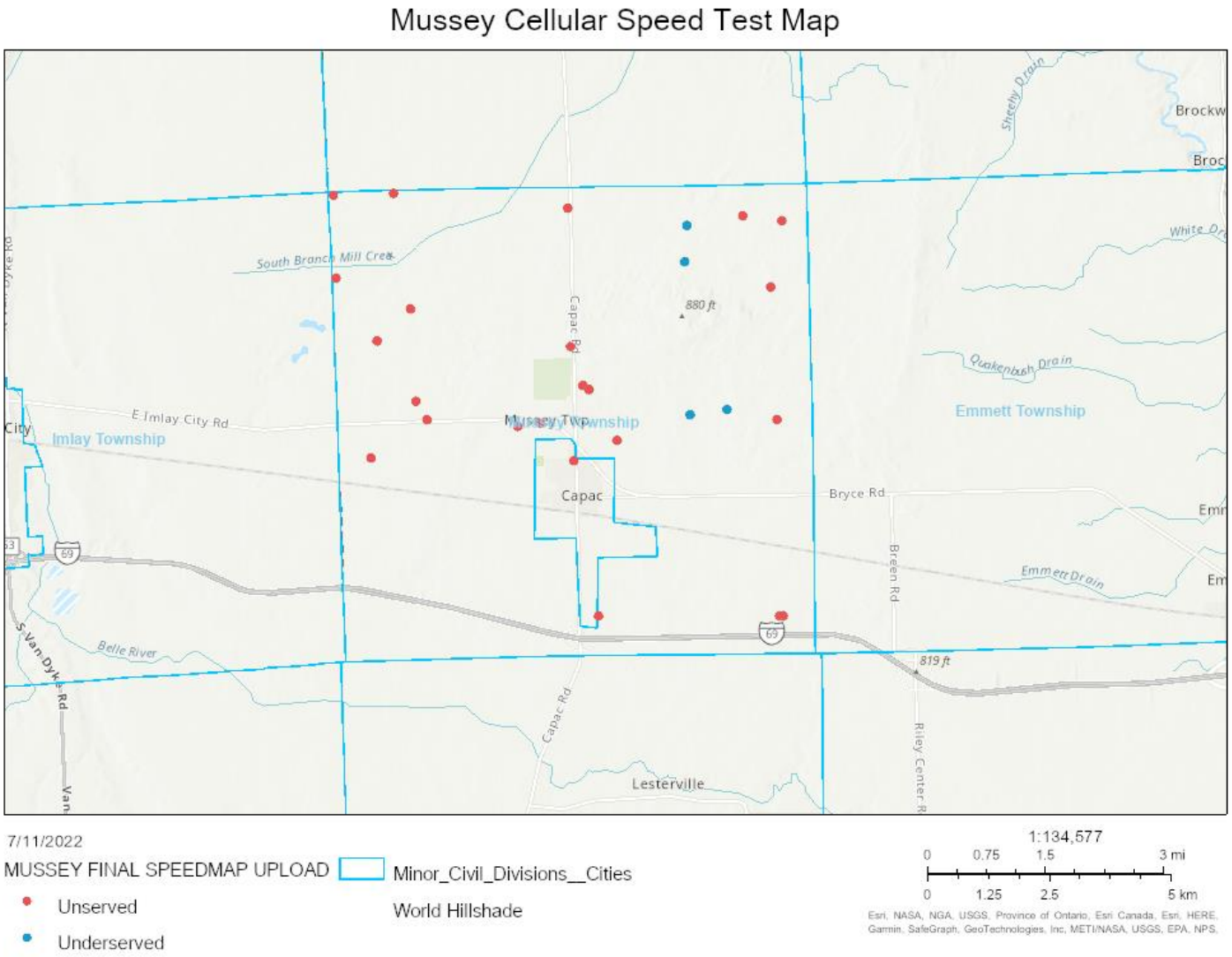
Map 1 - Unserved under the Federal Guidelines: Funding Priority



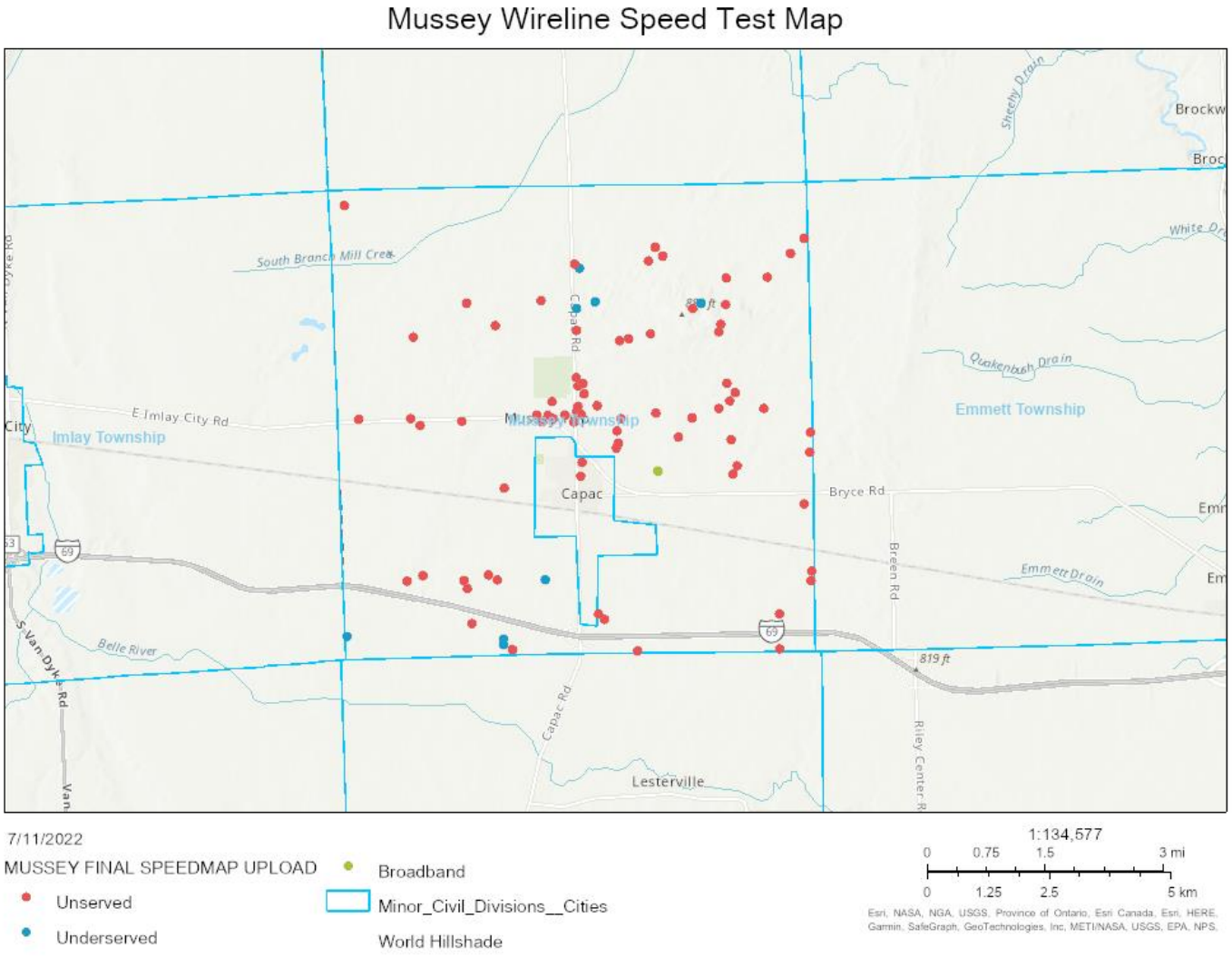
Map 2: All Test locations



Map 3: Cellular Home Internet



Map 4: Wireline Home Internet



Performance of Providers

Table 3

ISP	Type	# of Tests	Unserved	Underserved	Broadband	High Latency /Jitter	Max Down	Max Up	Low Down	Low Up
AT&T Mobility LLC	Cellular	2	2	0	0	1	5.6	0.5	0.8	0.4
AT&T Services, Inc.	Cellular	2	2	0	0	1	14.4	0.3	2.1	0.2
Air Advantage LLC	Wireless	9	8	1	0	3	36.5	20.8	0.3	0.1
Amazon.com, Inc.	VPN (unknown)	1	1	0	0	0	13.2	1.1	13.2	1.1
Cloudflare, Inc.	VPN (unknown)	1	1	0	0	1	3.9	0.6	3.9	0.6
Comcast Cable Communications	Wireline	1	0	1	0	0	132.7	11.9	132.7	11.9
Frontier Communications Solutions	Wireline	68	62	5	1	6	254.6	85.1	0.9	0.3
Hughes Network Systems	Satellite	3	2	1	0	2	36.4	4	1.1	0.3
Level 3	VPN (unknown)	1	1	0	0	0	7.3	1.5	7.3	1.5
Netskope Inc	VPN (unknown)	1	0	1	0	0	46.1	5.8	46.1	5.8
SpaceX Starlink	Satellite	6	3	3	0	1	87.2	14.1	7.5	3.6
T-Mobile USA, Inc.	Cellular	3	3	0	0	2	7.8	6.2	0.2	0.1
Verizon Business	Cellular	20	15	5	0	1	85.2	27.9	0.3	0.1
ViaSat, Inc.	Satellite	2	2	0	0	2	31.9	1.8	18.4	0.4
ZSCALER, INC.	Satellite	2	2	0	0	0	21.9	1.6	21.8	1.5

Provider Speed Consistency

Respondents that completed multiple tests allowed us to measure the variability of their home's internet connection. the predictably and reliability of their internet speed. We measured the percent difference between the high- and low-test results, and the average per carrier is provided below. The higher the percentage, the greater the difference between and the high- and low-test results, and therefore less predictable the speeds.

Table 4 – Data for Multiple Test Households

Provider	Avg DL % Difference	Avg UL % Difference	# of Households	# of Tests
Frontier	39%	43%	4	13
Verizon	27%	61%	1	2
Air Advantage LLC	86%	76%	2	4
SpaceX Starlink	44%	71%	1	2
AT&T	85%	53%	1	2

Appendix B provides data on a per household basis.

Subscriber Cost

Subscriber cost is an optional question on the survey. A summary of price data is provided in Appendix C. Mobile subscriptions may include multiple phone lines, and pricing for bundled services can vary based on the subscribers chosen plan. Some subscribers may have subsidized connections through the FCC Emergency Broadband Benefit program. Subscriber cost data is provided to assist an ISP in determining the price point in the application process, in addition to the FCC guidelines.

SUMMARY OF FINDINGS

Mussey Township Internet Service Providers

Frontier Communications

Frontier Communications is the incumbent phone company (ILEC) for the township. 91% of Frontier subscribers are considered unserved and 7% underserved. 8% of the results have high latency or Jitter. The test results indicate that Frontier's current infrastructure is dated and very limited in capability.

Mobile Networks

23% of the respondents use mobile cellular networks as their household connection. Households that use mobile networks for their primary home internet connection have the least overall predictable speeds. 88% of the Cellular broadband connections were classified as unserved, the remaining 12% are considered underserved.

Satellite

Legacy satellite systems such as Hughes Net and ViaSat are prone to poor quality (high latency & jitter), and very unpredictable. All legacy satellite systems tests are classified as unserved. Two households are subscribed to SpaceX Starlink low orbit satellite system. Tests indicate that connection quality is ok, however speeds are classified as unserved.

Fixed Wireless – Air Advantage

Several households are subscribed to Air Advantage fixed wireless. Of the 8 households that tested, 1 connection is considered underserved, the remaining results indicate that fixed wireless is not viable internet option. The data indicates the unserved connections are not usable for any modern internet services.

Virtual Private Networks

Virtual Private Networks (VPN) mask the underlying provider network. VPNs provide a more secure internet connection, however, have no effect on speed. The underlying provider for VPN connections will be one of the ISPs listed in Table 4.

Other

- Some respondents rely on more than one provider to gain usable access at their homes.
- Approximately 6 residents have notified the township that they have no internet connection at home; if an address was provided, the data was included in the study.

Engineering Study

The speed test data were combined with a field survey of the township to develop the high-level engineering data and map included in Appendix A of this report. The engineering data is for a Fiber to the Home (FTTH) network and targets the Unserved areas of the township. Field Technicians considered the viability of the DTE utility pole network in their engineering assessment. Aerial placement was selected when attachment to the utility pole route was determined to be feasible. When aerial placement was considered not feasible, due to the location and/or condition of the pole route, underground cable placement was selected.

The study found that at least fifty-four percent of the planned network will likely be placed underground, with the remaining attached to the utility poles. The cost of constructing a FTTH network to serve the Unserved areas of the township is $5,008,000. This cost can be considered typical for projects of similar size and scope.

CONCLUSIONS

All premises within the study area are considered rural and unserved under the federal guidelines. Mussey Township is considered priority areas for BEAD funding and state funding.

From a construction standpoint, a FTTH network to serve the unserved areas is viable and utility pole conditions are favorable. The township offers very few areas of housing density, therefore construction of an FTTH network is only feasible with substantial subsidies.

An operational proforma was not within the scope of this study. A network designed to minimize infrastructure maintenance and fees will be a primary consideration for a service provider to deploy a network in Mussey township.

The State of Michigan's Senate Bill 565 is basically restricted to private carriers. It will allow incumbent providers to apply for additional subsidies in their existing markets, in addition to greenfield deployments. Michigan's pre-BEAD grant program does weigh the local municipality's preferred service provider as a part of the application process.

RECOMMENDATIONS

A Fiber to The Home (FTTH) Network is future-proof. Speed, capacity, and quality are not an issue with a properly engineered FTTH network. Today, ninety percent of the wireline networks built from the ground up are FTTH. Funding Authorities prefer FTTH applications over any other solution. Wideband Group will prioritize FTTH provider(s) in the search for an ISP for Mussey Township.

There are no barriers preventing any provider, including the incumbents, from applying for funding in Mussey Township. Furthermore, there could be multiple providers submitting applications that include Mussey Township in their broadband expansion plans. Wideband will actively track applications with the state and notify the township should any include your area. The township may choose to support a particular applicant, and this support will impact the decision-making process within the State's granting authority. We recommend applying the following considerations when choosing an ISP to support:

- The applicant's responsiveness to the needs of your community in the past
- The applicant's efficient use of prior government funding
- The impact competition has on quality, service, and pricing
- Locale of the applicant

Wideband Group will remain engaged with Mussey Township and advocate for the best and timely solution to their broadband needs.

Grant Application Data & Interactive Maps

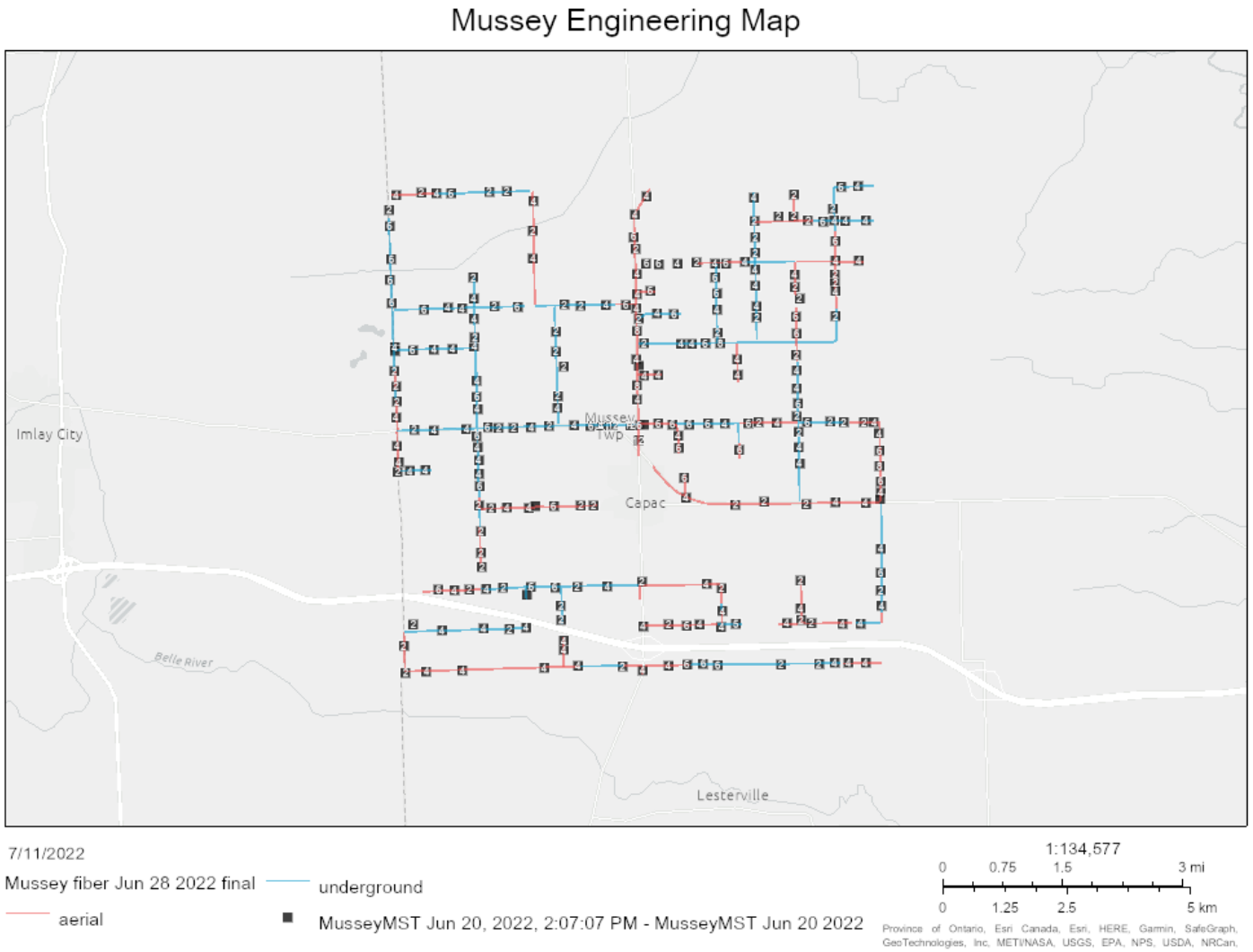
The following electronic data is available for download at www.widebandgroup.com

Name	Description	File Type
Mussey Twp Address	Tax Roll Addresses	.xls
Speed Test Data	Excel Workbook containing raw data, Groomed Data, Variance, Summary Tables	.xls
GIS Speed Test Data	Plotted data points	.zip shapefiles
GIS Engineering Data	Infrastructure Elements for unserved area	.zip shapefiles

Interactive maps of the survey are available at www.widebandgroup.com

APPENDIX A: BUDGETARY ENGINEERING AND COSTS

Map 6: FTTH Feasibility Map



Market Build Data - FTTH Centric

Mussey Township - Grant Application Data
Area Defined in Study as Unserved under the Federal Guidelines

Premise Data	**Item**	**Units**	**U**
	Premises Passed	910	units
	Adoption Rate (estimate)	70%	of total
	Premises Served	637	units

Fiber Cable Data (GIS CSV)	**Item**	**Units**	**U**
	Total Fiber Cable - GIS	152,134	ft
	Storage, Ring Cut & Waste	1.30	mulitplier
	Total Fiber Cable - PO	197,774	ft

Design	**Item**	**Units**	**U**
	Planned Underground	82,152	ft
	Planned Aerial	69,982	ft

Aerial Build Data	**Item**	**Units**	**U**
	Est. Percent Aerial Permit Approved - GIS	75%	of total
	Est. Aerial Approved - GIS	52,486	ft
	Snow Shoes every 2500ft + Splice cases	154	units
	Storage Loops - 1/2500ft	21	units
	Utility Poles (avg span length of 250ft)	280	units

Underground Build Data	**Item**	**Units**	**U**
	Planned Underground	82,152	ft
	Add Est. Pole Denial	17,495	ft
	Underground - Total	99,648	ft

	Underground Access - Small (1/350ft)	285	units
	Underground Access - Large (1/1000ft)	100	units
	Total Access Units	384	units

Service Drop Data	**Item**	**Units**	**U**
	Drops < = 500ft	40%	of total
	Drops < = 1000ft	40%	of total
	Drops < = 1500ft	20%	of total
	500ft Drop Cable	255	units
	1000ft Drop Cable	255	units
	1500ft Drop Cable	127	units
	Total Drop Footage	573300	ft

Customer Premise Equipment	**Item**	**Units**	**U**
	ONT - WiFi (estimate)	85%	of total
	ONT - Gateway only (estimate)	15%	of total
	ONT - WiFi	541	units
	ONT - Gateway only	96	units

Terminal Data (GIS CSV)	**Item**	**Units**	**U**
	Terminal Units - Total	184	units
	Tail or jumper footage	1000	avg ft
	Total tail or jumper footage average	184,000	ft
	% Waste	0%	of total
	Total Install Footage	184,000	ft

Splice Data (PON 1:32)	**Item**	**Units**	**U**
	FOSCs - Total	65	units
	Ports	910	units
	Terminal to Feeder	28	units
	Feeder to Ring	28	units
	Ring to Hub	28	units
	NIDs	637	units
	Total Splices	1,632	units

Nodes / Hub	1	unit

Budgetary Costs

Budgetary costs consider the current market conditions for materials and labor, and do not anticipate costs beyond 6 months as of the date of this report.

Local Fees

Type	**Governing Authority**	**Cost**
Joint Use Pole Application Fee	DTE Energy	$100/per pole
Underground Permit	Saint Clair County	Variable–budgetary $500/application
Road Closure / Crossing	MDOT	$500.00 for defined Build Period
Railroad Crossing	Canadian National Railway	Variable / budget $9000.00

Build Cost

Budgetary estimate includes engineering, management, materials, labor and equipment necessary to build network. Does not include bandwidth or operational expenses.

Home location	**Count**	**Infrastructure**	**Cost / Home**	**Extended**
Rural	637	Distribution	$ 5206	$ 3.3 mil
Rural	637	Drop – Terminal to Premise	$ 2655	$ 1.7 mil
Semi-Rural	NA			
			Total	**$ 5.0 mil**

APPENDIX B – SUBSCRIBER COST

Provider	Average	Max	Min
AT&T Mobility LLC			
Internet Only	$68.00	$68.00	$68.00
AT&T Services, Inc.			
Internet + Phone	$106.00	$106.00	$106.00
Air Advantage LLC			
Internet Only	$46.44	$93.00	$30.00
Amazon.com, Inc.			
Internet Only			
Cloudflare, Inc.			
Internet Only			
Comcast Cable Communications			
Internet + TV			
Frontier Communications Solutions			
Internet + Phone	$107.65	$150.00	$30.00
Internet + TV	$161.00	$288.00	$75.00
Internet + TV + Phone	$184.82	$246.00	$83.47
Internet Only	$1,539.52	$57,000.00	$39.99
Hughes Network Systems			
Internet Only	$86.11	$120.00	$65.00
Level 3			
Internet Only	$60.00	$60.00	$60.00
Netskope Inc			
Internet Only	$60.00	$60.00	$60.00
SpaceX Starlink			
Internet Only	$108.33	$110.00	$100.00
T-Mobile USA, Inc.			
Internet Only	$90.00	$170.00	$50.00
Verizon Business			
Internet + Phone	$93.92	$160.00	$20.00
Internet + TV	$168.00	$168.00	$168.00
Internet + TV + Phone	$279.00	$279.00	$279.00
Internet Only	$91.25	$170.00	$50.00
ViaSat, Inc.			
Internet + TV	$180.00	$180.00	$180.00
Internet Only	$185.00	$185.00	$185.00

ZSCALER, INC.			
Internet Only	$67.00	$84.00	$50.00