ENGINEERING REPORT

for

Municipal Internet Access Network

TOWN OF DRYDEN, NY

November 2019

HUNT 1122-040

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Preliminary Engineering Report

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APPENDICES

Part 1 - EXECUTIVE SUMMARY

In today's connected world of smart devices and the internet of things (IoT), access to bandwidth is more important than ever. Lack of access to the internet can create a digital divide in rural communities affecting education, healthcare, emergency services, home values and the local economy. Education is particularly influenced by its students' access to the internet. Many K-12 educational facilities have either implemented a one-to-one laptop program or create home assignments that require online research. Difficulties arise when students have different levels of access to the internet. Whether it's cost or availability, many residents find it difficult to get service at their homes.

The Town of Dryden, New York is no different. Dryden is in Tompkins County, New York between Ithaca and Cortland. It has a population of over 14,000 residents and over 800 businesses within the Town boundaries. Like other communities in central and western New York State, Dryden struggles with access to broadband in rural areas; the internet service that is available in the rural areas is costly and limited. In the more densely populated areas of the Town, Dryden struggles with a non-competitive environment that primarily offers service on legacy infrastructure, limiting capabilities. The current service provider landscape is a mix of served and underserved areas served by traditional cable & phone providers using copper and some fiber infrastructure.

The goal of this study is to assist the Town of Dryden in determining the feasibility of different Internet Service Provider models that would deliver state of the art internet service to its residents. In an effort to provide equal levels of service to all of Dryden's residents, Hunt Engineers, Architects, Land Surveyors & Landscape Architect DPC (HUNT) has looked to examples of municipalities that provide internet service much like other utilities such as gas, electric, water and sewer. To inform the Town, we gathered data, conceptualized a network design and organized the business plan within this engineering report.

Our approach to this report starts with the evaluation of the Town's geography, demographics and current internet service provider landscape to create a picture of the issues Dryden faces. Based on the information collected, HUNT will look at what business models are available to Dryden along with the advantages and disadvantages of each model.

Next, we will look at a preliminary network design and what services could be offered to the potential subscribers. The proposed services will have recommended rates based on industry standards and the current service provider landscape, these rates will inform the revenue projections and provide a point of reference in the cost per customer break even analysis.

Finally, HUNT will provide a recommendation on what path the Town could pursue to accomplish its goal of equal state-of-the-art broadband for all its residents. This recommendation will outline the next steps required to move the project forward.

Part 2 – Town of Dryden Geography and Demographics

The Town of Dryden's Geography and Demographics will serve as the base data for this engineering report which looked to the US Census data from 2010, 2000 & 1990. From this data, the number and concentration of households and businesses will be used to project take-rate of subscribers. The estimated take-rate of subscribers will then drive all aspects of the business model including capital construction costs, operating expenses and ultimately revenue.

The Town of Dryden currently has an estimated population of 14,435 with 6,016 households as of the 2010 US Census. In 2000, the population was 13,532 (2000 Census); in 1990 the population was 13,251 (1990 Census), with a growth rate from the previous census of 2.1% and 9% respectively. Projecting the Town of Dryden's population using a rate of 3.5% rate will equate to a population of 14,940 in 2020 and a population of 15,462 in 2030.

Figure 1: Dryden Town Boudry Map.

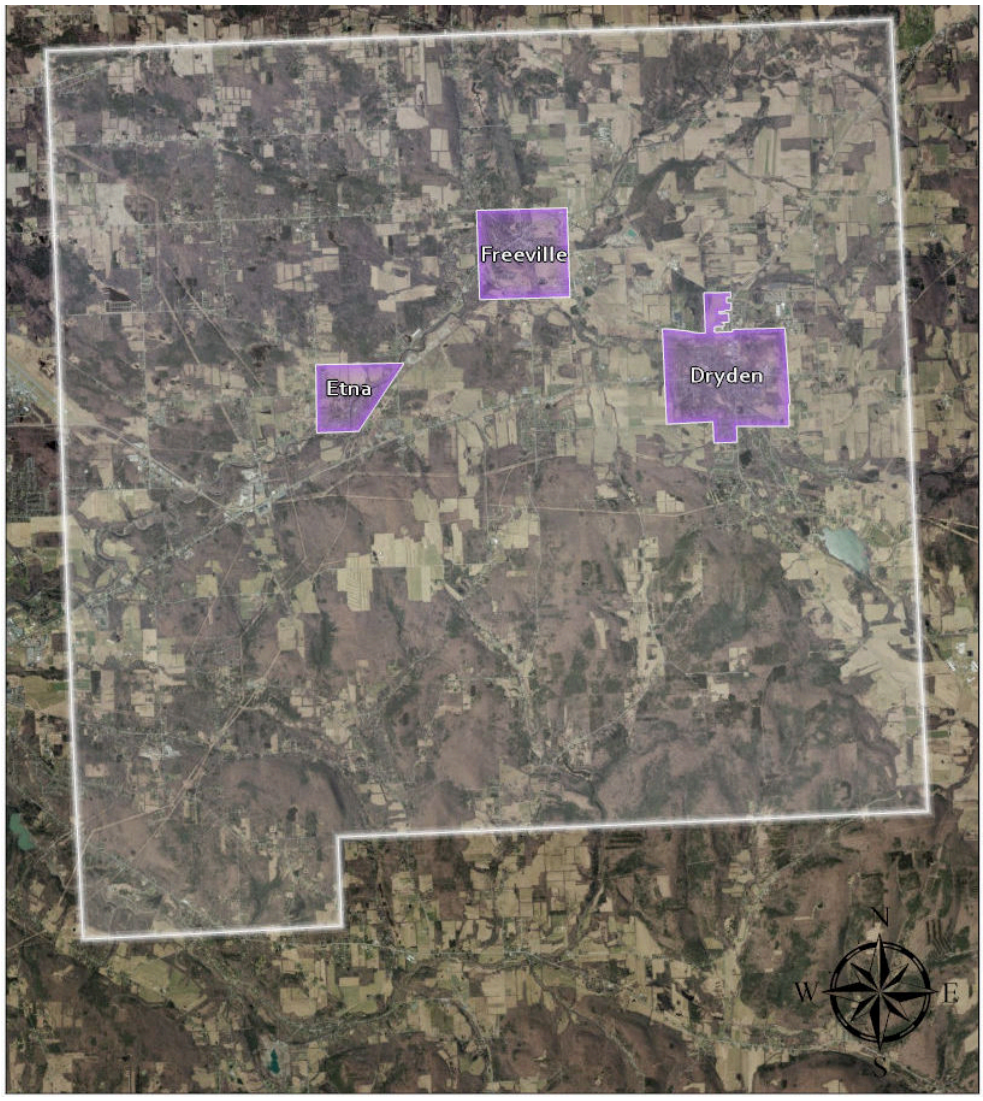


Table 3:
Population data for the Town of Dryden.

Year	Population
2020	14,940
2030	15,462

Economically, the Town of Dryden median household income (MHI) is $62,852, which is slightly above both the Tompkins County and the New York State MHI. The average age of the Town's residents is 37 years old. Additionally, there are over 800 businesses within the Town.

Table 4: Median Household Income for the Town of Dryden, Tompkins County, and NYS.

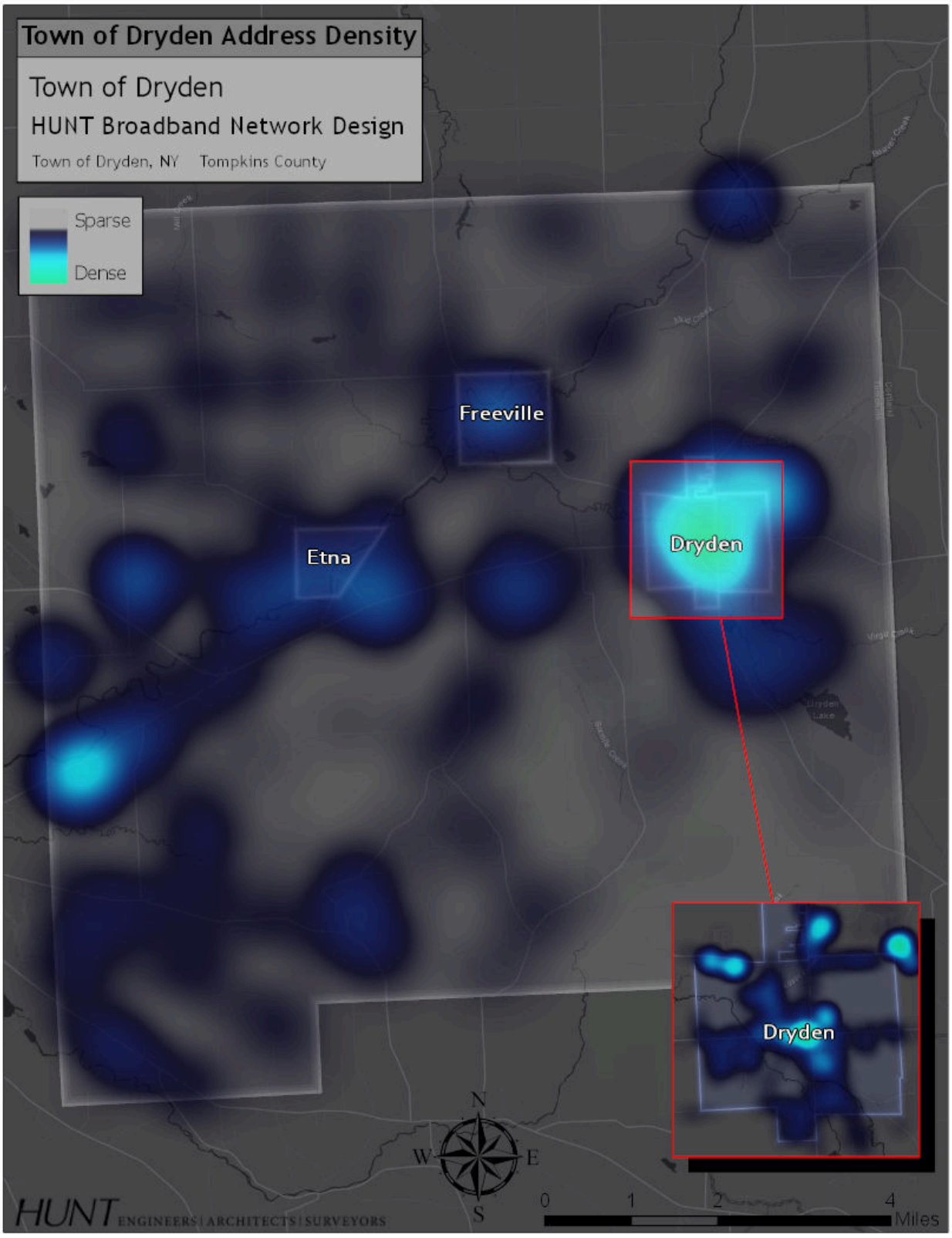
Location	Median Household Income (2013 5-year ACS)
Town of Dryden	$ 62,852
Tompkins County	$ 56,200
New York State	$ 58,003

Population density is greatest in the Village of Dryden, Freeville, Etna, Varna and Route 13 South of the Village of Dryden. The larger concentration of potential subscribers yields a greater per mile take rate if superior service can be provided over the competition. If you refer to the Town of Dryden Population Density Map, you can see that a majority of the population is located within proximity to the Village of Dryden, Freeville, Etna and Varna.

Table 3: Village Household & Business Data.

Location	Household	Businesses
Village of Dryden	770	59
Freeville	210	29
Etna	131	2
Other	4,095	1,006

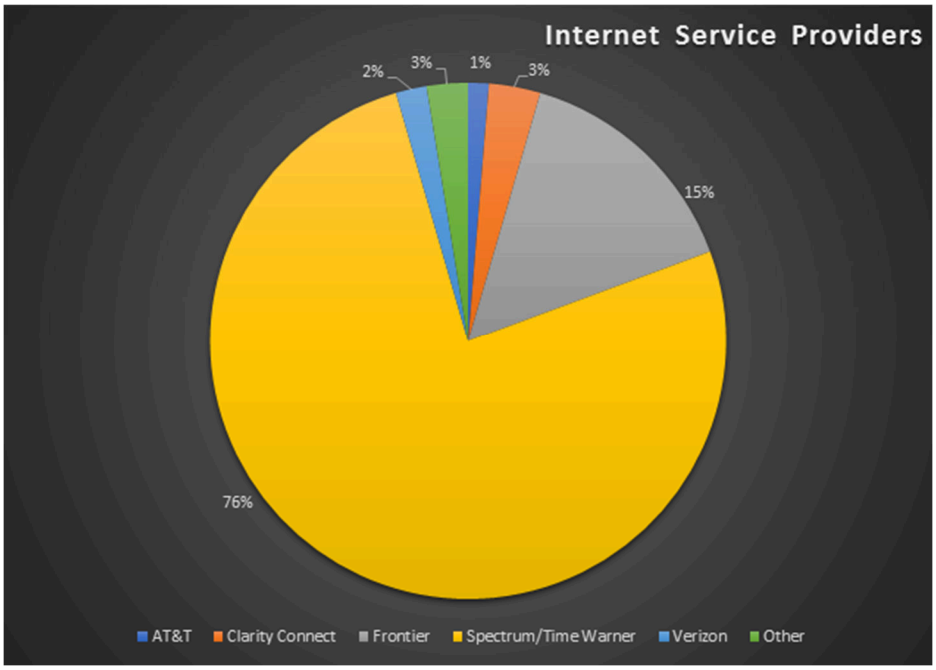
Figure 2: Population Density Map.



Part 3 – Existing Service Provider Offerings

Per the FCC and New York State Broadband Office data, the existing internet service providers (ISPs) operating in the Town of Dryden are Spectrum (Charter Communications), HughesNet, AT&T and Frontier. More advanced coaxial based wireline services are available within the Town's Villages and nearby areas. In the rural areas, Asymmetric Digital Subscriber Line (ADSL2+) & Satellite services are offered that provide up to 25 Mbps Download and 3 Mbps upload speeds. It must be kept in mind that ADSL signal degrades over distance and 25/3 Mbps is only achievable at very close proximity to the system headend. Within a mile, signals are under 10/1 Mbps. Satellite likewise has issues with latency that affects how certain services like streaming video, perform.

Figure 3: ISP Marketshare (Data from Survey).



Spectrum - Spectrum offers internet, phone and cable services using primarily copper and coaxial cabling to the residence. While up to 100 Mbps download speeds are available over a mix of coaxial copper and fiber infrastructure, upload speeds are unknow, however, survey data indicates this is approximately 10 Mbps. Symmetrical internet service is not available to residents. Promotions are offered for 12-months with standard rates applied after the 12 months.

Table 4-Spectrum Service Offerings

Service	Monthly Cost
100 Mbps*	$44.99 for 12 Months; $65.99 (After Promotion)
Business 100 Mbps	$59.99 for 12 Months; $85.99 (After Promotion)
Business 400 Mbps	$109.99 for 24 Months
Business 940 Gbps	$249.99 for 12 Months

Frontier Communications - Frontier offers internet and phone services using Asymmetrical Digital Subscriber Line technology over existing copper phone lines. ADSL2+ technology specifically, has an optimal performance speed of 25Mbps download and 3Mbps upload, but the technology is extremely limited by distance due to the properties of low voltage signals over a copper medium. Within 1 mile from an ADSL2+ headend, the signal quickly slows to speeds of 10 Mbps download by 1 Mbps upload. The signal continues to degrade, and the quality of service diminishes. Symmetrical internet service is not available to residents. Frontier offers 3 service plan levels. All service levels are DSL service and elude to distance limitations in the fine print. There is also an additional $10/month router fee and an additional charge for technical service after the first 12 months.

Table 5 - Frontier Communications Service Offering

Service	Monthly
Up to 6 Mbps for.	$27.99/month
Up to 25 Mbps for.	$34.99/month
Up to 115 Mbps for.	$44.99/month
Up to 6 Mbps for.	$27.99/month
Up to 25 Mbps for.	$34.99/month

HughesNet – HughesNet offers satellite internet connection of up to 25Mbps download and 3Mbps upload and is limited by data usage limit of 10, 20, 30 & 50 Gigabits depending on the package. This is likely the only option for some of the Dryden residents as HughesNet received a large amount of New York Broadband Program funding. Once funding of any kind has been awarded to an area, it disqualifies that area from both federal and state funds. Latency is also an issue with satellite and limits the use of video and other media requiring low latency signals. HughesNet offers 4 service levels for the area. All service levels are satellite service. All levels offer 25 Mbps download speeds and 3 Mbps upload speeds with data caps on available download. All prices require a 2-year agreement. Equipment is leased from HughesNet at an additional cost of $9.99 for 12 months and $14.99 each month after. The below offers are 12-month promotional offers with standard rates applied after the 12 months.

Table 6 - HughesNet Service Offerings

Service	Monthly
Data capped at 10 GB	$59.99/month
Data capped at 20 GB	$69.99/month
Data capped at 30 GB	$99.99/month
Data capped at 50 GB	$149.99/month

Part 4 - Broadband Survey Results

To inform the study, Dryden facilitated an online survey and a physical mailer survey to its residents regarding their current internet service and if they would support a municipally run Internet Service Provider. The goal of this data was not only to inform the study of the Town's general interest in the service but also help use, develop and justify a subscriber take-rate that will be used to project business operations. The online survey linked to a network speed test that not only provided a tool for users who are not aware of how much bandwidth they purchase but also a method of testing technologies like ADSL2+ & Satellite on the actual bandwidth delivered to the customer. The survey questions were as follows:

Question 1: Which of the following would you qualify as? Please check one.

Table 7

Selection	% of Responses
Resident	95.9%
Business	0.82%
Farm	0.00%
Other	3.28%

Question 2: Do you currently subscribe to internet service?

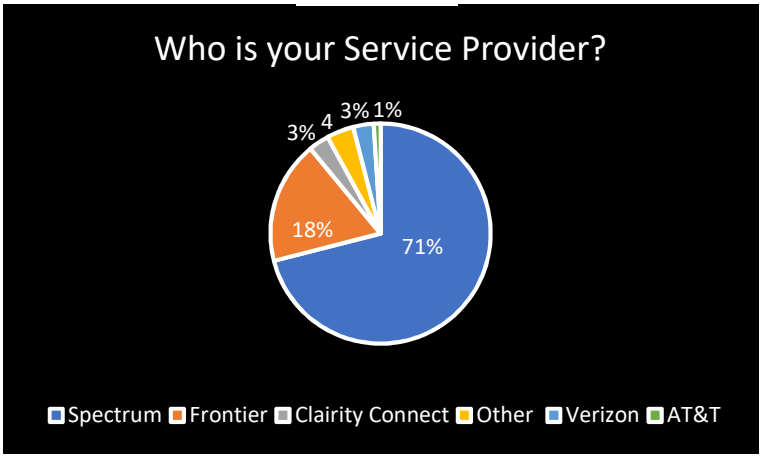
Table 8

Answer	% of Responses
Yes	96.93%
No	3.07%

Table 9

Service Provider	% of Residents
Spectrum	71%
Frontier	18%
Clarity Connect	3%
Other	4%
Verizon	3%
AT&T	1%

Figure 4

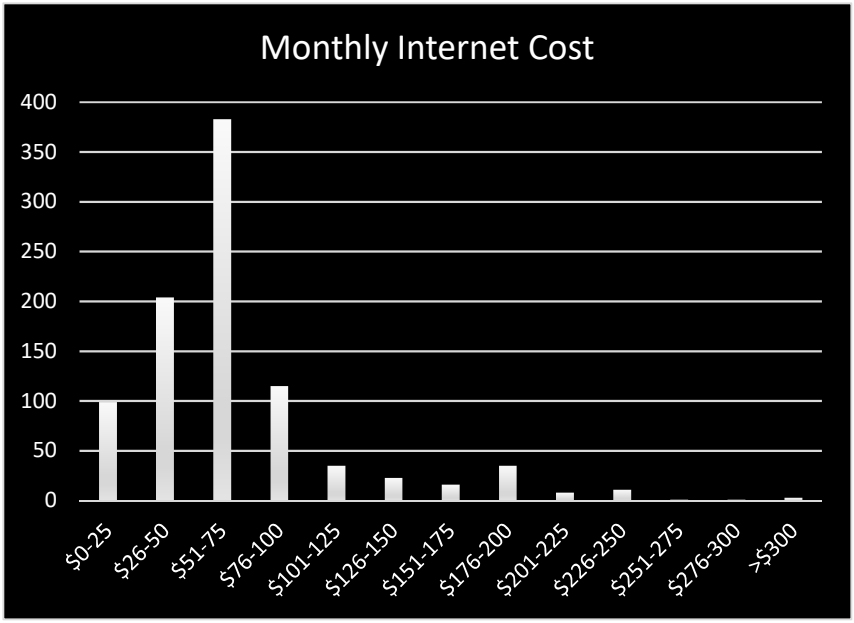


Question 3: Approximately, how much do you pay per month for your Internet services?

Table 10

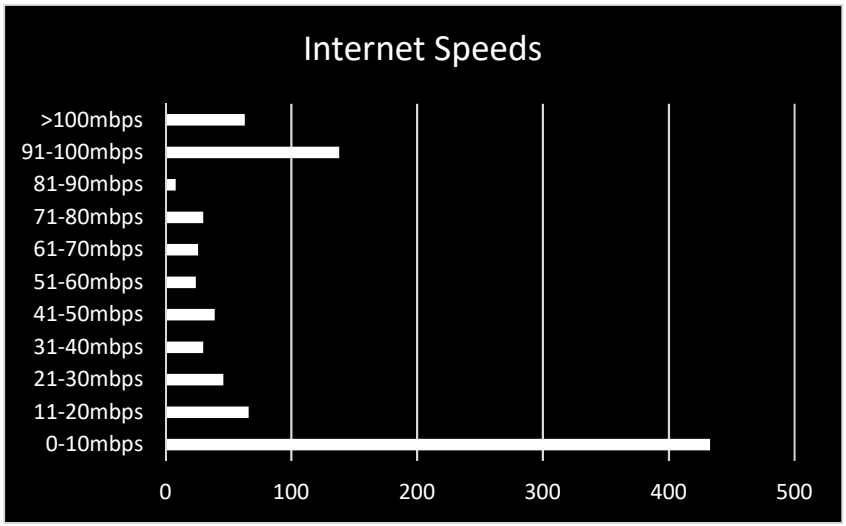
Cost Range	# of Responses
$0-25	99
$26-50	204
$51-75	383
$76-100	115
$101-125	35
$126-$150	23
$151-175	16
$176-200	35
$201-225	8
$226-250	11
$251-275	1
$276-300	1
>$300	3

Figure 5



Question 4: What Internet service speed do you currently receive from your provider, if any?

Figure 6



Question 5: What services do you require from an Internet provider?

Table 11

Choice	% of Responses
Phone	31.97%
Cable	30.74%
Internet	99.18%

Question 6: Would you be interested in broadband internet if 100 Mbps were made available below market cost? (50 Mbps national average)

Table 12

Answer	% of Responses
Yes	96.72%
No	3.28**%**

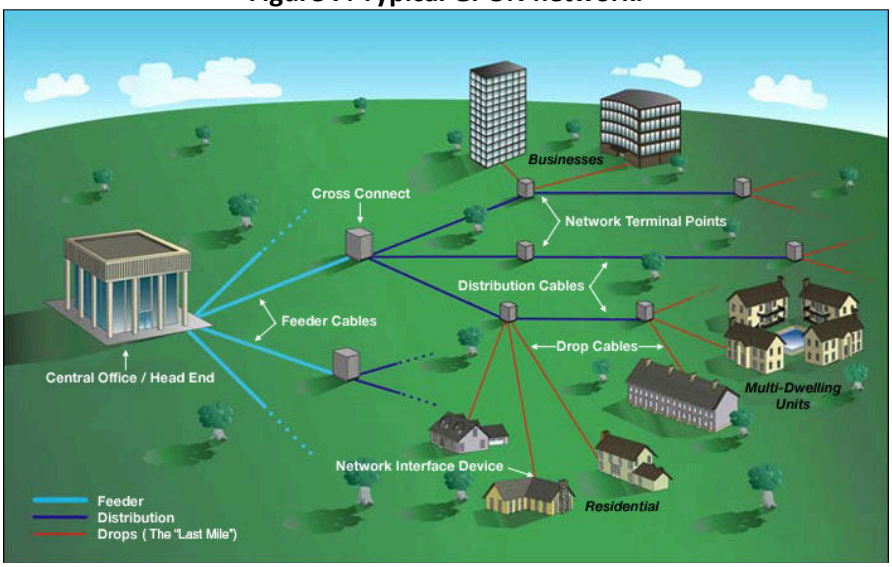
Question 7: Would you like to know when service will be available?

96.17% of respondents provided their email address to be notified when service is available.

Part 5 – Network Design

When looking at the design for an access network that will provide internet to residents, there are several technologies to design around but Passive Optical Network (PON) and the equipment designed around this technology is the best choice for advanced broadband services. In PON, fiber optic cable is used to distribute signal from the Town's head end location to the homes and businesses through optical splitters. Fiber has several advantages over all other mediums available in the telecommunications industry. Fiber's most important attribute is that single-mode fiber has changed very little since its invention yet is still at the forefront of the telecommunications industry and can support current and future applications. For this study, HUNT based the design on both Gigabit Passive Optical Networks (GPON) and NG-GPON technologies to support the proposed service levels listed below.

Figure 7: Typical GPON network.



The essential elements needed to provide internet service as an access level provider are bandwidth (purchased wholesale), facilities to store equipment, network equipment, fiber optic cabling and optical splitters. In this section we will describe the network design components and how the Town of Dryden should approach the project from a design perspective.

Bandwidth

Bandwidth should be procured from a primary source and, in the future, a secondary source to provide redundancy and load balancing. Bandwidth can be provided by any reputable carrier for the lowest cost and it is recommended that Dryden bid these services to get the best cost for the term of the agreement. HUNT also recommends that Dryden solicit proposals from wholesalers that specialize in IP transport and can bring that connect to the Dryden Central Office located at 93 East Main Street, Dryden, NY.

The amount of bandwidth required should start low and scale up based on the number of customers. The industry standard for calculating shared bandwidth is 1:15 the sum of the customer bandwidth provisions. For example, 1000 subscribers that require 300mbps will require 20gbps provisioned bandwidth. It is recommended that Dryden start with a 5Gbps connection and scale up based on bandwidth utilization of the customers. This will allow for real world data to determine when bandwidth needs to scale upward as this will be the most significant operating cost.

Central Office

The Central Office (CO) is a physical building and is the landing point where bandwidth will enter the service network. For the purposes of the study, HUNT used the Town Hall facility located at 93 East Main Street, Dryden, NY. It will consist of a four-post telecommunications rack that will contain network equipment and battery backup to support the network. The location of this rack should be a secured and climate-controlled environment. From this location using Fiber optic cables will allow sustained distances of up to 12 miles without sacrificing signal quality. This distance limitation will dictate the number and location of both the Central Office and the Branch Offices.

Branch Office

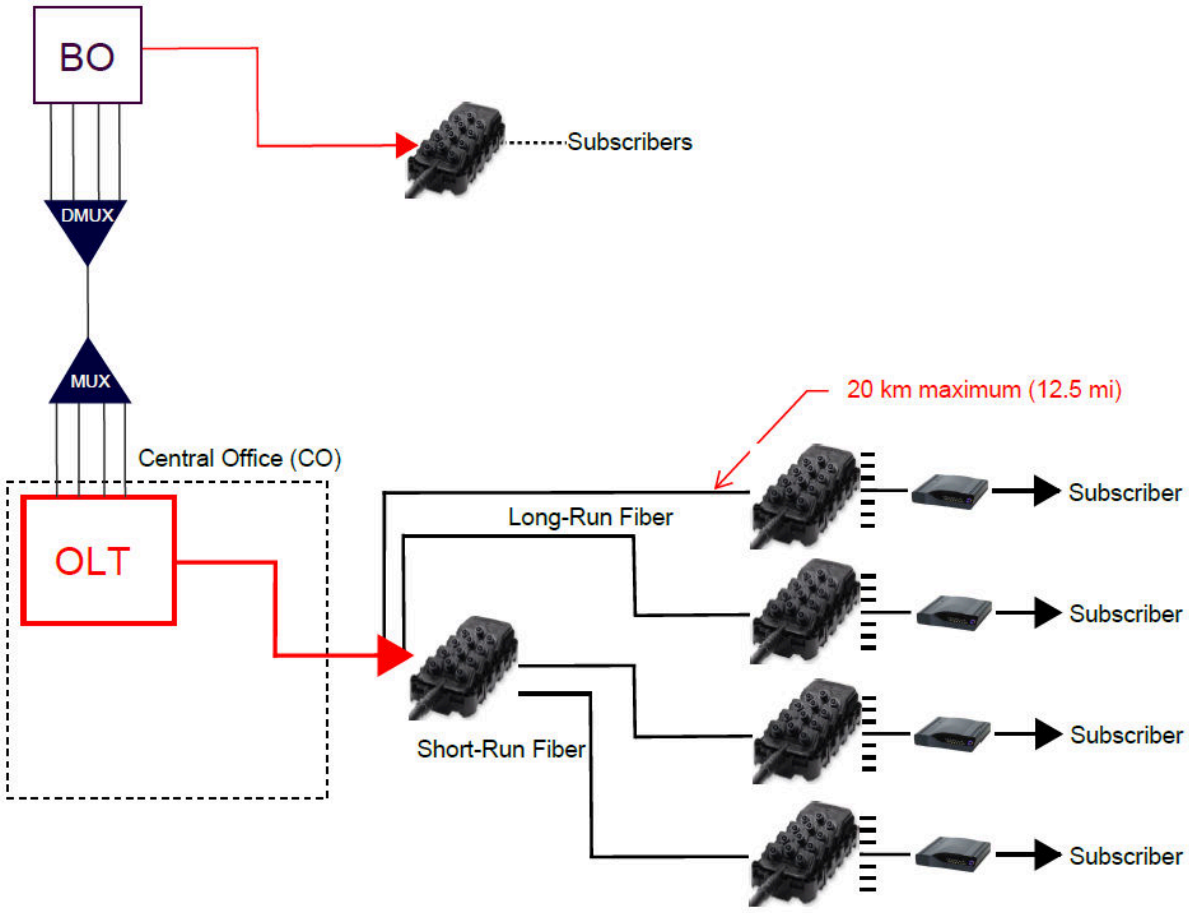
A Branch Office (BO) connects to the CO and serves to extend the reach and coverage area of the network. For the size of the Town, HUNT recommends the addition of 1 BO to connect subscribers to the CO. For the purpose of this report, the BO will be located at the corner of Pinckney Rd and Lower Creek Rd (Near Campbell Meadows Natural Area). It will consist of a 10'x12' precast shelter containing equipment racks and outfitted with climate control, power and battery backup. This shelter will be set on a concrete pad and will maintain security and protection from the elements for the equipment.

Figure 8: Example precast communications shelter

Network Equipment

The network equipment connects each subscriber to the network allowing them to access the internet. In the GPON and NG-GPON network architectures, this consists of an Optical Line Transmitter (OLT), located in the CO & BO, and Optical Line Terminals (ONT), located in the subscriber homes and businesses. The OLT receives bandwidth from upstream equipment and provisions it to subscribers through the fiber connections. The equipment can split the signals through the fiber by using Wave Division Multiplexing, which separates each signal by using a different light wavelength. The OLT are a modular network switch stack with fiber optic ports in different configurations. The platform used for this study supports both GPON and NG-GPON to coexist on the same switch stack, allowing for rapid future expansion of the network and the ability to upgrade technology quickly. This will ensure that the municipal fiber network is robust enough to carry the Town far into the future.

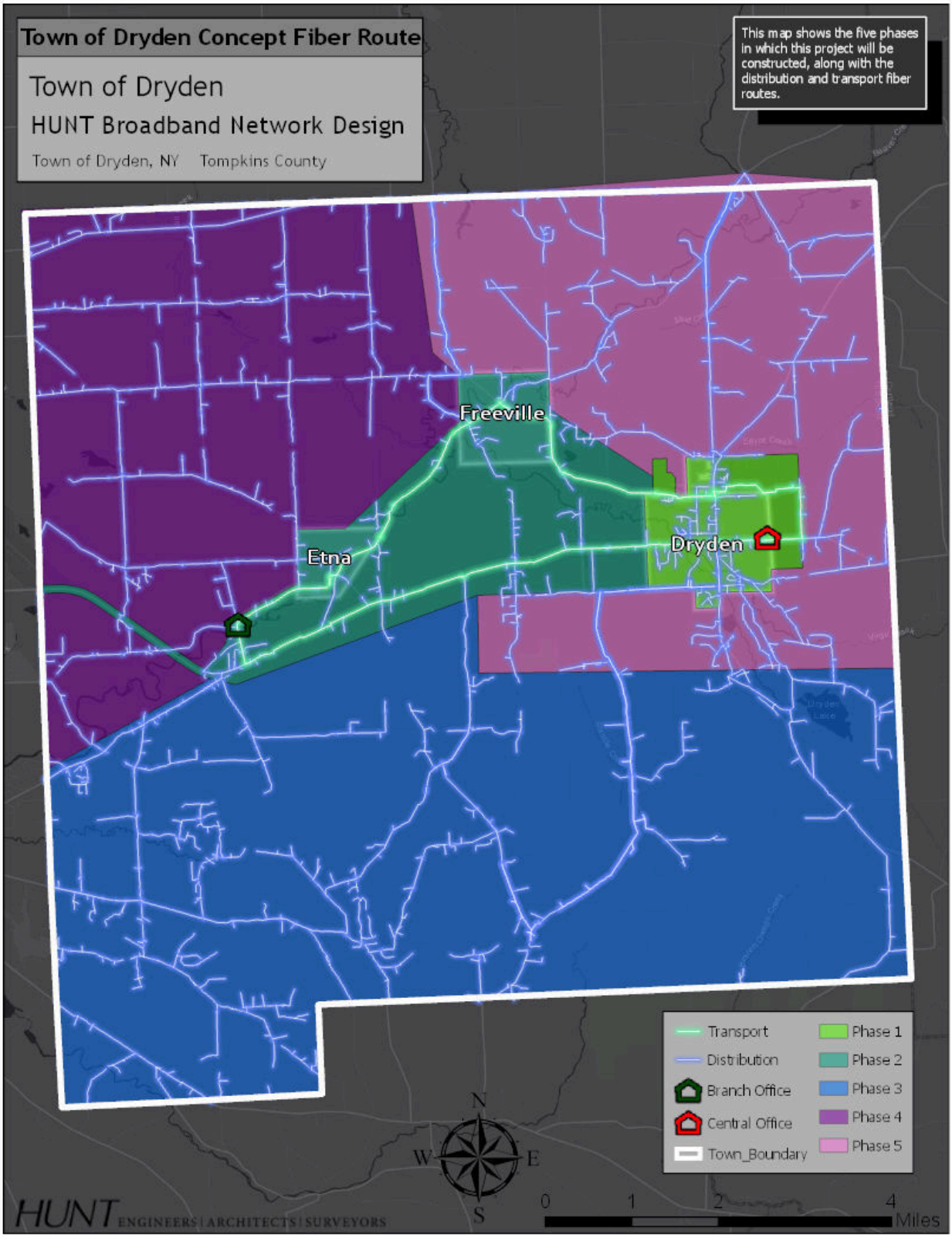
Figure 9: FTTH Infrastructure Diagram



Fiber Optic Cabling

The fiber optic cabling will consist of 2 types of cabling, transport and distribution. Transport cables interconnect the CO and the BOs and the distribution lines. Distribution lines connect the subscribers to the transport lines and tend to be a lower count fiber. This network will consist of a 15-mile ring of 48-fiber count transport fiber and 220 miles of 24-count distribution fiber. The transport ring will allow for redundancy and resiliency of the network ensuring that there is minimal customer impact even if damage should be sustained to a portion of the network.

Figure 10: Project Map with Phasing



Part 6 - Permits & Agreements

The purpose of this section is to describe the most difficult aspect of telecommunications projects which is accessing and establishing Right-of-Way (ROW) for the infrastructure. The fiber optic cabling will be installed by both aerial and underground pathways depending on the accessibility and cost. In most instances, overhead installation on power poles will be required due to existing home drops being aerial. In some cases, attaching to an existing electric pole will be cost prohibitive due to make-ready work. In these cases, underground or new areal pathways may be more cost effective, in which case the Town is in a unique position grant access and assist with establishing these permits.

Aerial installations will be primarily designed around NYSEG electrical distribution poles that reside in existing utility ROW. While aerial installation is easy to install and maintain, there are three major considerations:

1. Pole lease fees – there is an annual cost associated with poles leased from companies such as NYSEG. The cost for this is usually about $10/pole/month.

2. Makeready costs – this is a one-time fee required to prep the utility poles for the contractor to attach the new fiber to the pole.

3. Susceptible to the elements.

The process for aerial cable consists of field work capturing vital information for each of the utility poles being considered for attachment. Once this information is gathered, calculations are done by our team and the pole information is submitted in an attachment permit application to the utility company that owns the poles (in this case NYSEG). The application will be reviewed and any necessary make ready cost will be determined. Once we have had an opportunity to verify make-ready work to be done, the contractor can start placing the cable.

Burial installations are more costly up front, require environmental review and require more detailed permitting but do provide some potential operating expense savings.

1. Trenching cost is estimated at $50 per linear foot.

2. Directional drilling is used under roads where trenching is not an option due to traffic impact. The cost is estimated at $100 per linear foot.

For the purposes of this report, HUNT used an aerial installation to account for any potential recurring cost that might impact the business model. If the project, progresses further, necessary and optional underground routes will be presented that may provide some operational savings.

Certificate of Public Convenience and Necessity (CPCN) will be provided as required Pursuant to Section 99 of New York State Public Service Law, firms seeking to offer telephone services in New York State for profit must apply for and obtain a CPCN from the Public Service Commission (Commission) before constructing facilities and/or offering telecommunications services to the public. In addition HUN will submit a Telecommunications Carrier Critical Information Form (TCCI) electronically as required.

Part 7 – Environmental Impact

There are three potential areas in which there may be some environmental impact that will need to be further evaluated as part of any future project.

1. Telecommunication Hut – In the case of Dryden's network design, this will be the Branch Office in Etna, NY where ground will be disturbed to lay the concrete slab foundation of the prefabricated concrete hut.

2. Underground cable construction – Underground cable installation in established Right of Way (ROW) will also be disturbing earth and will need to be evaluated. If the ROW is new, more in-depth investigation will be required, if the ROW is existing, a more brief environmental evaluation is all that will be required.

3. Overhead cable construction over navigable waterways – Any cable crossings over a navigable water way may need an environmental impact statement if the ROW is not previously established.

Part 8 - Project Estimate

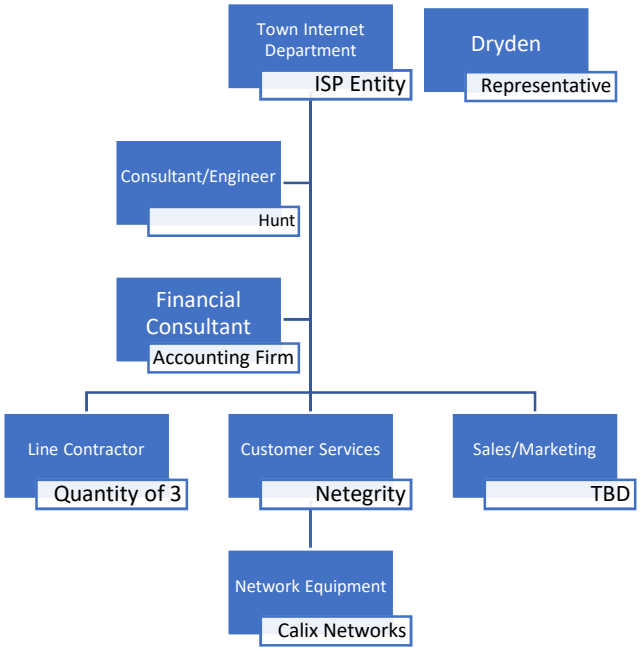
To inform this study, HUNT has created the following project estimate to construct the internet access network for the residents of Dryden. The project is projected out in 6 phases that could be completed within 6 years. This would include all network elements with the exception of the customer premise drop cables and customer installation as that will be done as the customers subscribe to the network.

Table 13 – Project Cost Estimate

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Subtotal
Central Office	$80,000	$0	$0	$0	$0	$0	$80,000
Branch Office	$0	$80,000	$0	$0	$0	$0	$80,000
Network Equipment	$100,000	$100,000	$23,000	$23,000	$22,000	$0	$268,000
Transport Cable	$0	$560,000	$0	$0	$0	$0	$560,000
Distribution Cable	$480,000	$720,000	$720,000	$720,000	$720,000	$720,000	$4,080,000
Customer Equipment	$97,000	$195,000	$200,000	$185,000	$195,000	$0	$872,000
Customer Installs	$630,000	$1,260,000	$1,260,000	$1,260,000	$1,260,000	$202,500	$5,872,500
Total	$1,387,000	$2,915,000	$2,203,000	$2,188,000	$2,197,000	$922,500	$11,812,500
Contingency	$208,050	$437,250	$330,450	$328,200	$329,550	$138,375	$1,771,875
Total Construction	$1,595,050	$3,352,250	$2,533,450	$2,516,200	$2,526,550	$1,060,875	$13,584,375
Incidentals	$111,654	$234,658	$177,342	$176,134	$176,859	$74,261	$950,906
Total Project Cost	$1,706,704	$3,586,908	$2,710,792	$2,692,334	$2,703,409	$1,135,136	$14,535,281

Part 9 – Operations & Expenses

Without the established infrastructure required to run an Internet Service Provider, the Town will need to implement a subcontractor model. While it is possible to develop the logistical components such as employees, vehicles, customer service representatives, it would take months or years to accomplish and would likely occur later in the lifecycle of the business. At the onset of providing service, success is critical and expert partners will be required. To assist with creating this model and administrative structure, HUNT put assembled some conceptual examples upon which this report bases the projected operational costs.



Administrative Costs – An administrative layer of the Internet Department of the Town must be established that will require some time from a town employee to ensure that the it is represented and providing decision making required. This position will provide support through the creation of the municipal entity and can then be limited to operational meeting and periodic report to the Town supervisory board.

Network Plant Maintenance & Expansion – To provide maintenance of the physical cable plant and expansion/customer installations, we recommend the municipality approve three in-state cable line contractors that can make repairs and provide expansion where needed. After the initial construction of the network, the network will be monitored by the network equipment which will provide notification of faults and the precise location. This notification would be assigned to one of the three contractors who are on call to repair the damaged cable. HUNT recommends three contractors to provide flexibility, parity and capacity.

Engineering – Engineering during the operations phase will include permitting, GIS documentation, producing workorders for new customer installs and assisting in network infrastructure maintenance. It is recommended this be done with a specialized GIS software capable of tracking fiber optic infrastructure age, function, warranty and splice documentation. The system should also be capable of connecting to the network equipment in order to

troubleshoot and streamline responses. Workorder should also be tied to the system in order to quickly deploy detailed information to one of the approved contractors and documenting the completion of the work.

Network Operations – The telecommunications equipment that powers the distribution of the bandwidth to customers is a critical component to the system and expertise running the equipment is a specialty. Fortunately, HUNT has identified a local company that can provide networking support to the Town. The scope of this role would be to add/remove/change network electronic hardware, provide all programming & networking & provision customer equipment. While they will facilitate customer account management, billing and other operations, this will likely be a shared task between the network operations support contractor and the customer service contractor. This coordination will be automated and coordinated on a frequent basis in operations meetings. Please refer to **APPENDIX 4 – Customer Service Proposal** from Netegrity and **Appendix 5 – Network Equipment Proposal** form Calix Networks.

Customer Service Contactor – This role is to provide end user support to the customers and will consist of on-line and phone methods of contact. The successful contractor will be responsible for level 1 & 2 support that encompasses ensuring the customer equipment is connected and their computer is networked correctly. It is recommended that the Town offer managed Wi-Fi as an optional subscription, this will increase revenue, ensure the customer has the best service and reduce your support call volume. This is because the home Wi-Fi is managed by the customer support contractor rather than by the individual homeowner. Please refer to **APPENDIX 4 – Customer Service Proposal** from Netegrity.

Utility Costs – Utility costs will consist of wholesale bandwidth that will be distributed to users and power associated with the Central Office and Branch Office. Bandwidth can be scaled easily so it is recommended that the Town entertain a "burstable" solution with the bandwidth wholesaler. Connections should be placed in both the central office and branch office to provide redundancy & load balancing. A burstable solution provides a set bandwidth provision such as 10 Gbps IP Transport Circuit but also allow you to exceed this amount at a cost if needed. The burstable option should only be considered a safeguard to overflow and the base level of bandwidth should be increased per the formula shown in the network design section. For the purpose of this report, we approached two know wholesalers, Cogent Communications and Ruralnet. Cogent was unable to reach Dryden through any of its partner from its Syracuse location. Ruralnet was able to reach Dryden by way of the Southern Tier Network that extends to Cornell University.

Service Truck Deployment - Some instances will require a site visit to resolve issues that are reported by customers. Depending on the issue, this will be one of the approved line contractors of the customer service contractor. This will depend on if the issue is infrastructure related or a customer equipment issue. The service truck deployments will be the most costly operational expense per customer, so any measures that can be taken to avoid these issues is extremely beneficial. Two measures HUNT recommends are first, employing a customer service contractor certified on the network switch manufacturer that is chosen for the project. Second, customer Wi-Fi should be offered at a reasonable additional cost, controlling the management of the customer Wi-Fi allows the customer service contractor to diagnose Wi-Fi issues remotely rather than dispatching a service technician. Wi-Fi makes up the majority of residential customer service issues. If the Town has a desire to create its own service infrastructure, Service Contractors could be locally sourced to create jobs.

Part 10 – Financials

To determine the financial feasibility, the population data was gathered, and a projected subscriber take rate percentage was applied to estimate the number of customers that would subscribe. The take rate was informed by the online and mailed survey results. Once the number of projected customers is established, the proposed service offering costs can be applied to calculate the projected revenue. Customer installs were spread out over time to anticipate the rate at which customers will request service.

Next, several local contractors we contacted to provide budgetary pricing to cover all the scope outlined in Part 9. Costs were structured in both fixed and variable forms depending on the service being provided. Based on the anticipated customer take rate and rate at which the network can be constructed, yearly total operating costs were estimated to compare to the anticipated yearly revenue.

The anticipated yearly revenue combined with the yearly anticipated operation costs will yield the estimated Earnings Before Interest, Tax, Depreciation and Amortization (EBITDA). The EBITDA will demonstrate the earnings available to payback the investment in the network.

Take Rate

The term "take rate" is used to define the percentage of households that you anticipate subscribing to the service Dryden intends to provide. While this is hard to determine with precision, there are several factors that can inform the Town in determining what take rate should be used to plan the business model.

The first thing that should be evaluated is the need for service and the competition landscape. Is the goal to provide service where there is none, provide better service than is currently available or both?

Next, potential customers should be surveyed to collect data that will inform the Towns decision. To do this, HUNT has assisted the Town of Dryden in posting an online survey and a mailable survey to all households within the Town of Dryden.

The results of the survey to date have provided the following information:

1. Residents have services available to them but are unhappy with their current providers.
2. While telephone and cable services are still required by 30% of the population, most interest comes from available internet service.
3. Residents were overwhelmingly in favor of purchasing a service from a municipal entity if the price point and service are competitive.

To apply the results of the survey to the Town's population data, HUNT looked at the 2010 census blocks within the Town limits, specifically the households within each census block to apply the anticipated take-rate of 70%. Below are the results of the take rate applied to each of the six Phases:

Table 14 – Subscriber Projections

Service	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Total
Residential						
# of Residents	1190	986	1280	1280	1280	6016
400 Mbps	714	591	768	768	768	3609
1 Gbps	119	98	128	128	128	601
Business						
400 Mbps	8	4	50	50	50	162
1 Gbps	5	2	33	33	33	106

Service Offerings

Service offerings are the actual offerings that you would offer to your customers as an internet service provider. Each customer will subscribe to a service plan that will be priced according to the level of bandwidth access they require. HUNT recommends that Dryden offer a small variety of service levels (two or three) to accommodate for a few different price points but not enough that it requires addition network hardware, electronics and complexity. We also recommend offerings symmetrical service as opposed to asymmetrical service with regards to upload and download speeds. When competing with legacy ISPs that utilize copper plant, symmetrical service cannot be provided over this infrastructure and will provide Dryden with a distinct technological advantage over the competition. HUNT proposes that Dryden implement a residential class and business class services, each with two levels of service.

For residential service, a basic level of service and a premium level is recommended. The basic level is a 400 Mbps symmetrical service for $50 per month. At this price point, this service will compete with the incumbent carrier's premium residential service. The premium service offering is recommended as a 1Gbps symmetrical service that will cost $100 per month. This will give the Town a bleeding edge offering at a price point lower than the other area FTTH providers. Additionally, for residential customers, managed Wi-Fi should be offered for an additional $10 per month. Not only will this provide a better service for customers, 60% of customer support calls are home Wi-Fi issues. If Dryden is managing the home Wi-Fi, issues can be troubleshot tempting by the customer support contractor.

For businesses, the same level of services should be provided however business class customer service will be provided for an additional $25 per month. This will allow the small businesses decide what level of support they require by subscribing to residential or business class service. A managed Wi-Fi solution should be offered to businesses as well but with a slightly different structure. Starting at an additional $15 per month for one Managed Wi-Fi access point and an additional $5 per month for each additional access point, Dryden could provide an enterprise class Wi-Fi network for businesses. Additional cabling cost may apply.

Projected Earnings

Earnings for the Internet Service Department business model were calculated by using the projected take rates and service offerings to show the earnings before any of the unknown incidental costs that may change with the business model. These exceptions are interest on debt, taxes, depreciation and amortization.

Table 14 – Projected Earnings

Year	EBITDA
Year 1	$0
Year 2	($74,745)
Year 3	$230,664
Year 4	$793,816
Year 5	$1,285,766
Year 6	$1,758,066
Year 7	$2,882,541
Year 8	$3,676,432
Year 9	$3,684,981
Year 10	$3,697,567
Year 11	$3,710,191
Year 12	$3,722,852
Year 13	$3,735,551
Year 14	$3,748,288
Year 15	$3,761,063
Year 16	$3,773,876

Note: Earnings meet capital total capital expenditures around year 9 or 10.

Other Considerations:

- Interest – Interest on debt will depend on the financing of the capital construction expenditures, grant funding or bonding. Debt service, if applicable, will become an additional operating expense with the interest going against the earnings.

- Taxes – Taxes will depend on the final structure of the organization but to keep operating costs in check and to provide the best possible product to the Town's residents, it is recommended that this entity reside under a non-profit 501C-3 status.

- Asset Depreciation - There are various depreciation rates that will need to be applied to different assets associated with the Internet Department. Per the USDA, the fiber cabling itself carries a depreciation rate of 5. This is the same for the telecommunications huts. The network equipment located in the central office and the brand office have a depreciation rate of 10 while the customer home equipment has a rate of 20.

- Amortization – Amortization of the intangible assets will need to be considered based on the overall financial plan of the Internet Department.

Funding

Some funding exists for broadband development from both New York State and the Federal Communications Commission however the standards are very low only allowing funding in areas slower than 10 Mbps download and 3 Mbps Upload. There are a few census blocks that are eligible for USDA funding, approximately 10 miles of distribution cabling. If Dryden chooses to move forward, Hunt can provide grant writing assistance to apply for the funds. Other funding from the USDA includes funds for telemedicine and emergency services. New York State has a

Broadband Program Office the has complete 3 phases of funding and is meeting on legislation for additional funding in the near future.

Part 10 – Conclusion

In this engineering report, the structure, revenue, operating costs and considerations are laid out to determine if a Town of Dryden Internet Service Department is feasible. It is our determination that this business model is feasible however there are a few challenges to consider as the business model is developed.

Challenges:

1. Capital Construction Funding – For the purposes of this report, capital construction costs have been spread out over 6 phases due to the large scope and rate by which subscribers will sign up for service. This creates six smaller project budgets and some flexibility in the way financing can be set up. If the ISP is earning a surplus by year 3, some earnings can be reinvested to fund a portion of the capital construction for Phases 3 through 6. USDA Re-Connect funding should be considered as well to offset the capital construction cost.

2. Cashflow Year 1(Gap Year) & Year 2 - Year 1 will be considered a gap year during which construction is taking place of the first phase of the network so no revenue will be generated. Year 1 operating costs can be minimized during the construction of the first phase.

   Year 2 will yield some revenue but will be limited by the number of subscribers as customers begin signing up. It is estimated that this will turn positive in year 3 and continue to grow rapidly until year 8 or 9 when growth will level off. This should be considered when structuring any debt service.

3. Controlling Operating Costs – Operating cost will need to be controlled in order to keep the project feasible. Two of the most significant operating costs encountered my ISPs are pole attachment fees (yearly) and wholesale bandwidth (monthly).

   To control the pole attachment costs, it is recommended that the town apply for the Certificate of Public Convenience and Necessity (CPCN) in order to reduce the pole attachment fees by 50%. An alternative would be a separate agreement between NYSEG & the Town of Dryden.

   Bandwidth should be sought through a Request for Proposal process every two years to get the most competitive rates possible. This process will also allow for periodic reassessment of the Internet Service Department's bandwidth needs.

4. Efficiency & Service – The volume and pace of service requests will be a challenge. To ensure quality customer service, it is critical to create and implement processes that will service the customer base well. Customer installations in particular, will need to be scheduled as frequently as possible but is done at the lowest cost when a group of about 20 residents are in a work order. This balance of scheduling work frequently but with cost efficiency in mind. A flow diagram should be developed outlining all processes, describing all of the subcontractor involvement and how each process is to be evaluated and reported on to the Town.

Next Steps: The following is a list intended to provide the Town with a general idea of task required if the decision is made to move forward.

1. Develop a final business plan and define roles.

2. Finalize financials considering the final business plan.

3. Obtain a legal consultation to review New York State Telecommunications laws and file required paperwork.

4. Develop a phasing strategy that fits with the available funding. Phase 3,4 & 5 should align with USDA Re-Connect Funding.

5. Finalize all funding sources (Grants, Bonds, Loans).

6. Begin a design of the network using phasing plan.

7. Survey pathways and determine feasibility of overhead and underground cabling.

8. Submit ROW & pole attachment applications.

9. Begin marketing campaign targeted to the phasing of the project. Also, all residents who requested to be contacted on their survey should be targeted with a subscription mailer.

10. Procure construction service to build the first phase of the project.

11. Begin implementing business processes.