

BROADBAND

INTRODUCTION

Access to broadband (or high-speed) internet has become an essential part of our daily lives, the need for which is almost on par with utilities like water and electricity. Broadband internet is a key ingredient in our personal lives and the health of our community. To promote economic development, businesses need fast internet service for e-commerce, data sharing, and communication. Emergency and other government services depend on the internet to communicate during hazardous weather conditions and to deliver rapid aid to those in need. Students rely on internet access to complete their daily assignments as well as to prepare them for higher education and the workforce. Telehealth care provided over video web conferencing and remote medical monitoring devices has made medical care more accessible to everyone, and in particular, to the growing senior population; however, all these services depend on reliable, fast internet in the home. In 2018, Section 15.2-2223 of the Code of Virginia was amended to require all localities to “consider strategies to provide broadband infrastructure that is sufficient to meet the current and future needs of residents and businesses” in their comprehensive plans. Reliable, fast broadband internet is already vital to the essential functions of York County’s government services, economic development, and improved quality of life for our citizens. Therefore, a robust plan to expand broadband access and leverage its capabilities is both necessary and logical for the continued health of the County.

BACKGROUND

The term “Broadband” describes internet that is fast because it uses wide (or broad) bandwidth to carry multiple signals at once. Bandwidth refers to the rate at which an internet connection can transmit data. The Federal Communications Commission (FCC) currently defines broadband internet as having at least twenty-five megabits per second (Mbps) download speed and three Mbps upload speed, though many connectivity uses already require far faster speeds than this. For context, the table below describes the bandwidth required for some common uses.

0–5 Mbps	5–40 Mbps	40–100 Mbps	100–500 Mbps
Works for:	Works for:	Works for:	Works for:
<ul style="list-style-type: none">• Checking email• Streaming music on one device• Searching on Google	<ul style="list-style-type: none">• Streaming video on one device• Video calling with Skype or FaceTime• Online gaming for one player	<ul style="list-style-type: none">• Streaming HD video on a few devices• Multiplayer online gaming• Downloading large files	<ul style="list-style-type: none">• Streaming video in UHD on multiple screens• Downloading files quickly• Gaming online for multiple players

Image Source: *How much internet speed do I need?* (2020, May 7). Retrieved from HighSpeedInternet.com: <https://www.highspeedinternet.com/how-much-internet-speed-do-i-need>, para. 6

HD = High Definition

UHD = Ultra High Definition

There are several broadband technologies currently available to the public, but they are not all created equal. Broadband is delivered through satellite, DSL, cable, fiber, and wireless technologies.

- **Satellite**

Satellite is widely available across the U.S. because it doesn't rely on physical cables to deliver service. Instead, the signal is beamed via radio waves from satellites. This means the signal is sometimes interrupted by thunderstorms, other weather events, or physical obstructions such as trees and tall buildings. Videoconferencing over satellite is difficult to impossible because of the time it takes for the signal to travel from satellites to Earth. Satellite internet speeds generally range from twelve to 100 Mbps download speed and up to three Mbps upload speed.

- **DSL (Digital Subscriber Line)**

DSL uses copper telephone lines to deliver Internet access. This option is less expensive because the infrastructure already exists in most locations; however, signals carried over copper lines weaken over distance. Common DSL download speeds are 0.5 to six Mbps, though they can range up to forty Mbps for people living very close to the equipment that generates the signal. Upload speeds are often below 1.5 Mbps and rarely exceed four.

- **Cable**

Cable internet is delivered through the same copper coaxial cables that deliver cable television. Speeds commonly vary from six to thirty Mbps download and one to three Mbps upload on standard tiers. Some cable companies offer 100 Mbps download and ten Mbps upload or even more for a premium; however, cable networks are shared, meaning one might not achieve the advertised speeds during periods of peak usage because of congestion from neighbors.

- **Fiber-Optic**

Fiber-optic (usually referred to as "fiber") broadband is the gold standard for internet connectivity. Fiber internet transmits data using lasers or pulses of light, which travel across very thin strands of glass. Fiber cables consist of hundreds of these glass strands.



Image Source: Admin. (2017, June 30). *A brief overview of fiber optic cable*. Retrieved from Fiber Cabling Solution: <http://www.fiber-optic-cable-sale.com/brief-overview-fiber-optic-cable.html>

Fiber-optic networks are reliable, resilient, and use technology that offers nearly unlimited expansion. They have fewer points of failure than copper and cable networks. Fiber strands last for decades and capacity can be increased by upgrading the lasers on each end without having to lay new fiber. The high cost of new fiber networks comes mostly from the labor involved in installing the cables on poles or in underground conduit; however, operating costs are lower than for cable, DSL, or wireless networks. Currently, fiber can offer download speeds in excess of 10,000 Mbps (10 gigabits per second) and identical upload speeds. Yet, it is important to note that there are different

methods of delivering fiber internet access to homes and businesses (“last-mile” connections). The “middle mile” refers to the network connection between the World Wide Web and the last mile connection. The image below defines and illustrates internet miles.

Internet "Miles"

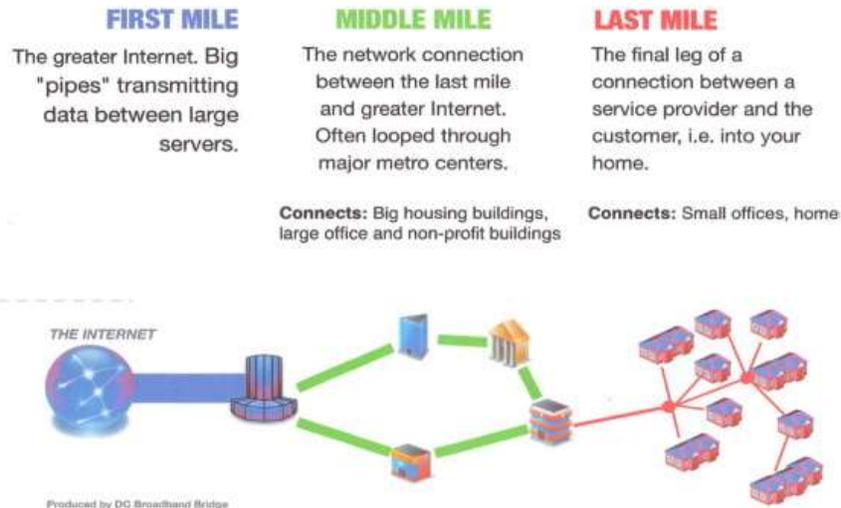


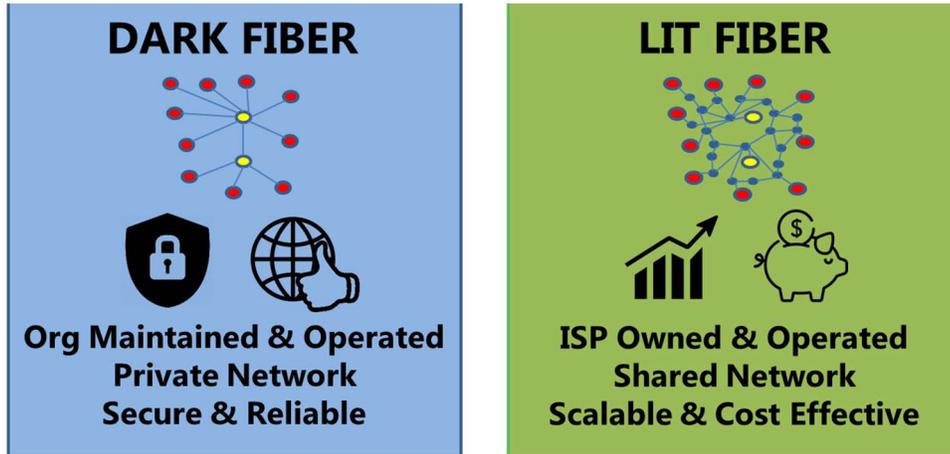
Image Source: Menon, S. (2016, October). Access to and adoption of a municipal broadband middle-mile network: The case of the community access network in Washington, D.C. Government Information Quarterly, 33(4), 757-768.

Last mile connections vary in reliability. The following are just a few common types:

- **FTTP** stands for fiber to the premises. As the name suggests, this internet connection uses a fiber cable from the network operator to the premises. This is the fastest and most reliable type of connection possible. It is also the most expensive to install.
- **FTTN** stands for fiber to the node or neighborhood. This type of connection can serve hundreds of customers within a one-mile radius. A fiber cable runs from the network operator to a street cabinet. From there, the connection to the premises is made using copper cable (DSL), or coaxial cable. This method is more cost-effective, but bandwidth speeds and reliability are reduced because signals weaken as they travel over copper lines.
- **FTTW** refers to fiber to wireless connections. For these types, the fiber cable runs from the network operator to a cell tower or antenna and then connections to users are made via wireless radio signals. FTTW can serve a great many customers within a particular radius but it is not always reliable as radio signals can be interrupted by physical obstructions or bad weather.

Organizations have different considerations than individual users, which leads them to rely on different fiber internet service solutions. Organizations rely on either “lit fiber” or “dark fiber” for fiber internet service. When an organization pays an internet service provider (ISP) for bandwidth, this is referred to as lit fiber. The ISP operates and maintains the network which provides service to all its customers. Each fiber strand in the network is shared among many customers. Lit fiber is scalable and cost-effective because the organization only pays for the bandwidth it needs. Dark Fiber is fiber that is leased or owned by an organization for private use. The organization essentially acts as its own ISP by operating and maintaining a private network. Fiber strands are

not shared with other customers, which increases network security. Dark fiber also provides more reliable service because the organization need not depend on the provider to repair connectivity issues. Both individual users and organizations rely on lit fiber networks while dark fiber is used almost exclusively by organizations large enough to come out on the positive side of a cost-benefit analysis for laying the fiber, or which need the greater reliability and security it provides.



- **Wireless**

Wireless internet access is a complement to wired connections rather than a substitute because it relies on cable or fiber networks to carry the signal to towers. Transmitters atop cell towers then send the signal via radio waves to routers in users’ homes, businesses, and internet-enabled devices within a certain radius (depending on the type of tower, the power of the transmitter, and its location). Wireless internet companies have robust disaster response plans that can include generators at cell tower sites, portable generators, mobile cell towers, and mobile data centers to maintain connectivity during natural disasters. However, like satellite, the signal can still be interrupted by weather or physical obstructions. There is no single wireless technology; rather, there are many different standards, speeds, and issues. Because of this, speeds vary widely, ranging between 5.5 Mbps and 2,000 Mbps download speed.¹

All of these technologies can offer broadband based on the FCC definition of twenty-five Mbps download speed; however, the purpose of the Comprehensive Plan is to lay out strategies based not just on current needs but on the needs of the future. Demand for bandwidth is already significant and has been growing exponentially. In fact, bandwidth for high-end users (e.g., businesses, universities, hospitals, laboratories) has been increasing at a rate of 50%, on average, every year since at least 1984.² For this reason, it is important to make a distinction between fast internet and other broadband technologies that fit the FCC definition. Anything over 100 Mbps is considered “fast” by industry standards.³ Fiber will more than likely remain the preeminent internet technology for decades to come. While legacy broadband technologies provide enough bandwidth to serve the needs of many residents today, the County’s bandwidth needs will continue to increase.

¹ Mitchell, B. (2021, June 16). *How fast is a wi-fi network?* Retrieved from Lifewire: <https://www.lifewire.com/how-fast-is-a-wifi-network-816543>

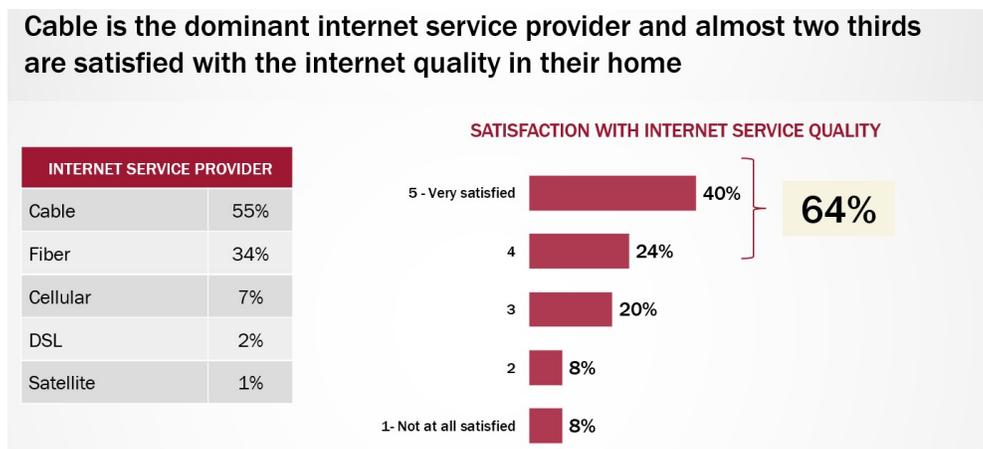
² Evens, T., Boudry, E., Verdegem, P., De Marez, L., Vanhauwaert, E., Casier, K., . . . Verbrugge, S. (2012). Killer applications for fiber to the home networks: Market potential, time horizons and user groups. *E-Business and Telecommunications*, 115-128.; Nielsen, J. (2019, September 27). *Nielsen's law of internet bandwidth*.

³ Cooper, T. (2021, May 3). *How much Internet speed do I need?* Retrieved from BroadbandNow: <https://broadbandnow.com/guides/how-much-internet-speed-do-i-need>

EXISTING CONDITIONS

Coverage

Census data from the American Community Survey for 2015 through 2019 show that about 90% of York County residents have a broadband internet subscription in their home, and according to the Comprehensive Plan citizen survey conducted in 2018 through 2019, almost two-thirds of County residents are satisfied with the quality of internet service in their home. Fifty-five percent of County residents use cable internet and 34% use fiber, while the remainder use cellular data, DSL, and satellite internet service.



Source: SIR. (2019). *York County Comprehensive Plan Study*, p. 53.

The survey also found that residents with fiber connections were 24% more satisfied with their service than cable internet users, and that lower County residents were 20% more satisfied with their internet service than those living in the upper County. This is likely because fiber internet service is more widely available to lower County residents as illustrated in the Broadband Provider Coverage Map.

FCC coverage data shows that all homes and businesses in York County have access to at least two broadband service providers; however, some of them are satellite ISPs.⁴ While satellite internet is considered broadband because it can provide speeds in excess of twenty-five Mbps, it is neither reliable nor fast. Viewing coverage in York County by all internet technologies other than satellite provides a more useful illustration. The coverage map above shows that most of the upper County has access to just one ISP, while the lower County has access to two and even three providers in some areas. Furthermore, some undeveloped areas of the County are “unserved” which is defined as having up to ten Mbps download and up to one Mbps upload speed.⁵ This information demonstrates two points: 1) Most York County residents have access to broadband internet that satisfies their current needs, but as demand for bandwidth increases, fiber will become essential to provide the bandwidth necessary to satisfy the increased demand, and 2) expanded access to undeveloped areas is needed for economic development.

Infrastructure

Many local governments have dark fiber networks that they use to connect their public facilities and assets to the Internet and each other. These localities absorbed the up-front cost of laying fiber but realize long-term savings by owning the infrastructure. Localities that own dark fiber networks often recoup some costs by leasing excess bandwidth to ISPs who utilize these networks as a “middle mile.” Internet service providers

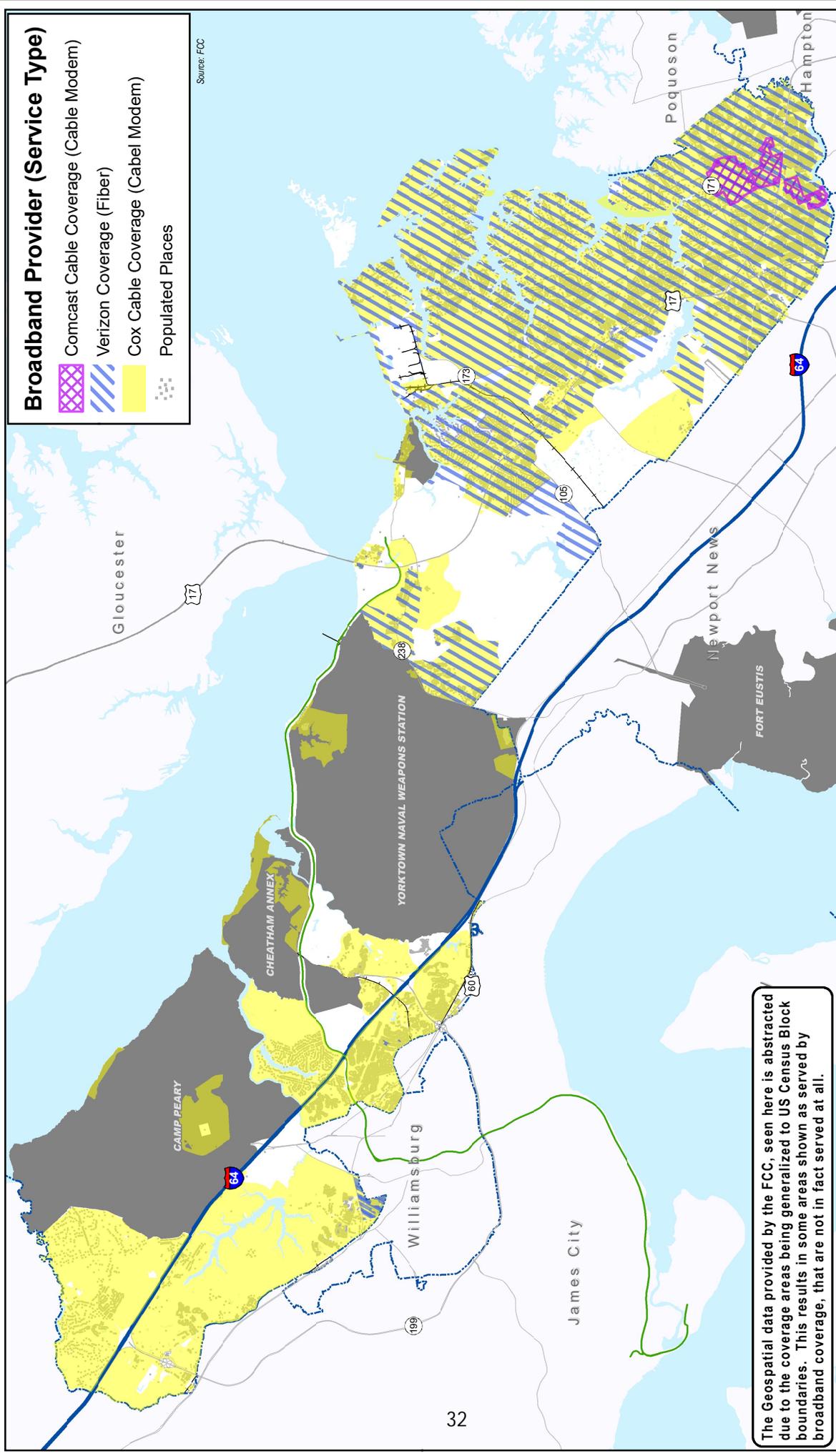
⁴ *Fixed Broadband Deployment*. June 2020. <https://go.usa.gov/x6yN6>.

⁵ *Virginia broadband availability map and integrated broadband planning and analysis toolbox*. (2019). Retrieved from Virginia Tech: <https://broadband.cgis.vt.edu/IntegratedToolbox/>

Broadband Provider (Service Type)

-  Comcast Cable Coverage (Cable Modem)
-  Verizon Coverage (Fiber)
-  Cox Cable Coverage (Cabel Modem)
-  Populated Places

Source: FCC



THIS IS NOT A LEGAL PLAT.
 This map should be used for information purposes. It is not suitable for detailed site planning.

*Broadband Provider Coverage
 York County, Virginia*

The Geospatial data provided by the FCC, seen here is abstracted due to the coverage areas being generalized to US Census Block boundaries. This results in some areas shown as served by broadband coverage, that are not in fact served at all.



simply construct the “last mile” to connect the end-user (such as one’s home or business) to the network. This reduces the cost of infrastructure for the ISPs, which encourages competition and gives them an incentive to provide service in areas that lack substantial coverage, and decreases the cost of service for customers.

Localities that lease their excess bandwidth capacity to ISPs can do this because they own all of the infrastructure including the fiber cables, which contain many fiber strands. York County does not own full fiber cables, so it does not have excess capacity to lease. Instead, the County has taken a moderate approach to satisfy its needs by purchasing and leasing dark fiber strands and renting bandwidth from lit fiber networks owned by ISPs. Though York County lacks excess bandwidth to lease, it can still encourage ISPs to establish networks in the County. York County has an opportunity to realize the economic development benefits of a government-controlled dark fiber network without assuming sole financial responsibility by committing funding to the Hampton Roads Regional Connectivity Ring, discussed below.

Though the County does not own fiber cables, it can still encourage ISPs to establish networks by investing in fiber for itself. The County has already done this in one location when it invested in fiber infrastructure to connect its own facilities located in the upper County. The County leases this bandwidth but needed to invest in the infrastructure because it did not already exist. This investment created an incentive for the company that laid the cable to install enough capacity to allow ISPs to lease or buy the remainder for the purpose of delivering fiber internet service to residents and businesses.

PLANNING ISSUES FOR THE FUTURE

The technological landscape is constantly changing. New technologies arise as quickly as current technologies become obsolete. New internet technologies like low-orbit satellite (which can provide internet service, without the delay issues of traditional satellite internet service, to areas without connectivity infrastructure) and quantum communication (which is capable of providing ultra-secure and instantaneous data transmittals) are likely to become prominent within the next twenty years. York County should maintain flexible policies that will allow it to adapt to the ever-changing landscape of new technologies; however, these technologies are either not fully formed or not deployed enough to plan for now. Other issues are closer to the forefront and require planning now. These include the acquisition of more dark fiber, the Hampton Roads Regional Connectivity Ring, and the impact of internet connectivity on economic development, public safety, government facilities, education, and the aging population.

Hampton Roads Regional Connectivity Ring

The Hampton Roads Planning District Commission (HRPDC), which is made up of all the local governments in the region, began construction of a regional fiber network ring in 2021. This network will leverage Virginia Beach’s digital port, which houses transatlantic fiber cables, to deliver unprecedented bandwidth to the region. The HRPDC plans to construct the connectivity ring in four phases, beginning by creating a Southside ring. Phase II will entail the creation of a ring through the Peninsula and Gloucester. The Southside ring will be connected to the Peninsula and Gloucester ring in Phase III, and the final phase will connect the rural areas (Surry, Smithfield, Isle of Wight, Southampton, and Franklin). The Peninsula connectivity ring is planned to connect institutions of higher education (e.g. Hampton University, Christopher Newport University, Thomas Nelson Community College, and the College of William & Mary), research laboratories (e.g. NASA Langley and the Jefferson Lab), hospitals, and other heavy data users. Internet service providers will be able to lease bandwidth from this middle-mile fiber backbone to deliver high quality service to businesses and residents as well. The map below illustrates the Hampton Roads Regional Connectivity Ring’s path, but it is a preliminary concept rather than a completed plan. Thus, the fiber may not ultimately be laid along the paths that are shown in the map below.

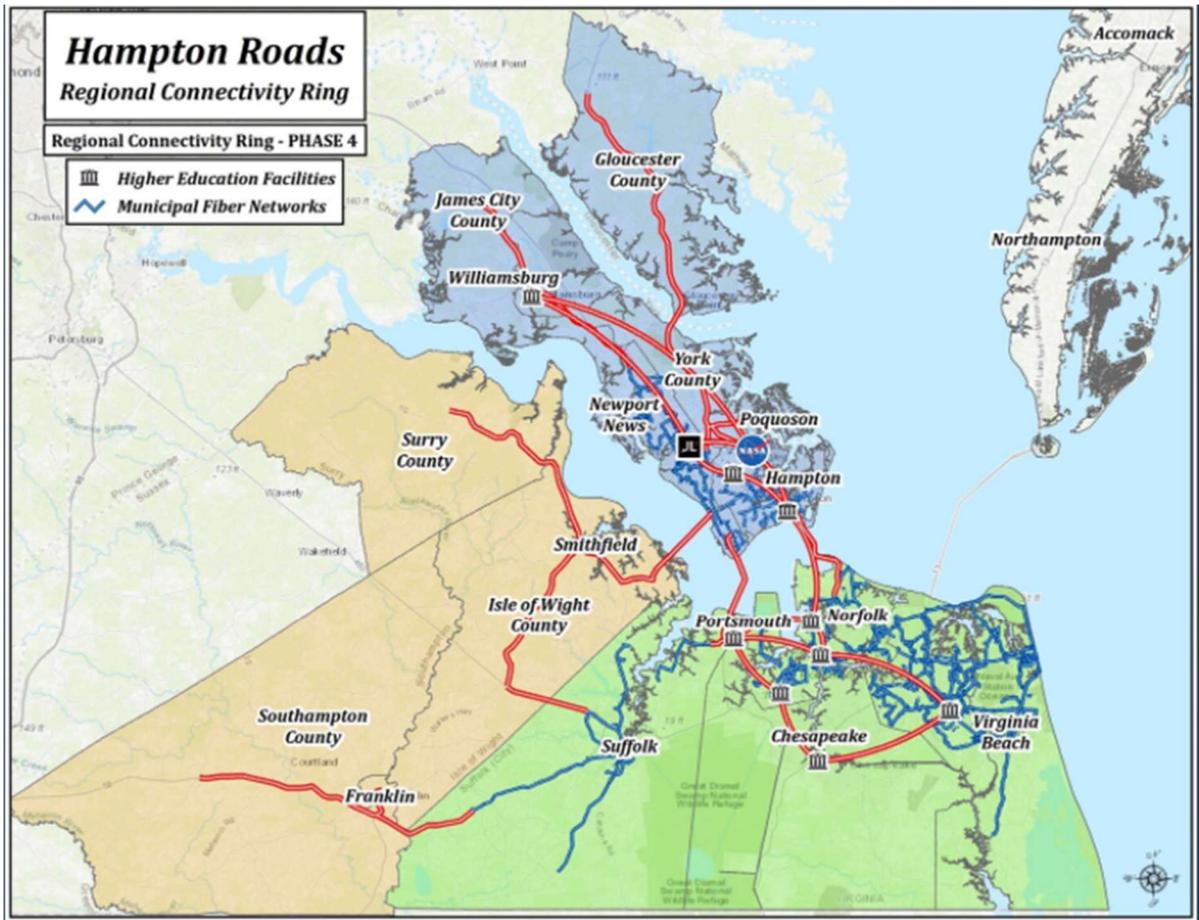


Image Source: Our five-year pathway to lower cost, faster service, and expanded broadband coverage. (2021). Retrieved from Southside Network Authority: <https://www.southsidenetworkauthority.com/timeline>

Economic Development

One of the Board of Supervisors’ six strategic priorities is “value-driven economic development.” To expand the County’s economic base, it is critical that areas zoned for business have access to fast broadband internet. As an example, data centers have been shown to have a positive impact on local economies. A report published by Oxford Economics found localities that hosted Google data centers realized “employment gains that went further than those directly connected to the data center campus.”⁶ Of the counties examined in the report, those located near cities saw the greatest employment gains. York County is strategically located near Virginia Beach, Norfolk, and Richmond. “In 2018 the data center industry in Hampton Roads directly provided approximately 1,322 full-time-equivalent jobs [and] ... taking into account the economic ripple effects generated by that direct impact ... 3,510 full-time-equivalent jobs.”⁷ Furthermore, York County serves as a halfway point between the transatlantic undersea cable port located in Virginia Beach and the QTS Richmond Network Access Point (NAP)⁸ in Henrico County. For this reason,

⁶ Levine, D. (2018). *Google Data Centers: Economic Impact and Community Benefit*. Oxford: Oxford Economics. Retrieved from <https://www.oxfordeconomics.com/recent-releases/d8d830e4-6327-460e-95a5-c695a32916d9>, p. 5

⁷ Mangum Economics. (2020). *The Impact of Data Centers on the State and Local Economies of Virginia*. Richmond: Mangum Economics. Retrieved from http://biz.loudoun.gov/wp-content/uploads/2020/02/Data_Center_Report_2020.pdf, p. 13.

⁸ A network access point (NAP) “is one of several major Internet interconnection points that serve to tie all the Internet access providers together so that, for example, an AT&T user in Portland, Oregon can reach the Web site of a Bell South customer in Miami, Florida. ... The NAPs provide major switching facilities that serve the public.” Source: TechTarget Contributor. (2005,

the firm Metro Fiber Networks has made its home in York County.⁹ York County's location makes it an ideal site for data centers and other technology based companies, thus it is critical for the County to ensure fiber internet availability in areas that can potentially house a data center or another tech company.

There are several unserved areas that are designated for business uses, including the undeveloped land on the west side of the I-64 Camp Peary/Route 143 interchange and Busch Industrial Park on Penniman Road. Other areas zoned for business are served by cable and DSL but would be better served with fiber. The undeveloped property in the northwest quadrant of the I-64 Lightfoot interchange, James-York Plaza shopping center on Merrimac Trail, and the King's Creek Commerce Center (former state fuel farm property) on Penniman Road are examples of this. These properties are all designated either Economic Opportunity or General Business.

The economy has been shifting towards entrepreneurial start-ups and home-based businesses, and the COVID-19 pandemic has likely accelerated this trend. In York County, approximately two-thirds of business licenses are for home-based businesses. The Comprehensive Plan citizen survey found that 69% of residents support the growth of home-based businesses in York County. Broadband internet is crucial for the day-to-day functions of both home-based businesses and remote workers. Consequently, the County should make it a priority to ensure residential communities have fast and reliable internet service.

Public Safety and Other Government Facilities

Another strategic priority of the Board of Supervisors is "exemplary public safety." Some of the County's fire stations rely on lit fiber networks. During major storm events, these networks sometimes go down because they lose power. A County-controlled dark fiber network would provide reliable communications and connectivity during those critical times because the County would ensure uninterrupted power through the use of backup generators. Also among the Board of Supervisors' strategic priorities is "quality technology investments." A supporting initiative is to "expand dark fiber connections to strategic locations." While public safety is the main reason for expanding the dark fiber network, the cost of running fiber to other locations during the construction process is less than it would be to create these connections as separate projects. The network should therefore be leveraged to serve other government functions, area businesses, and County residents.

Education

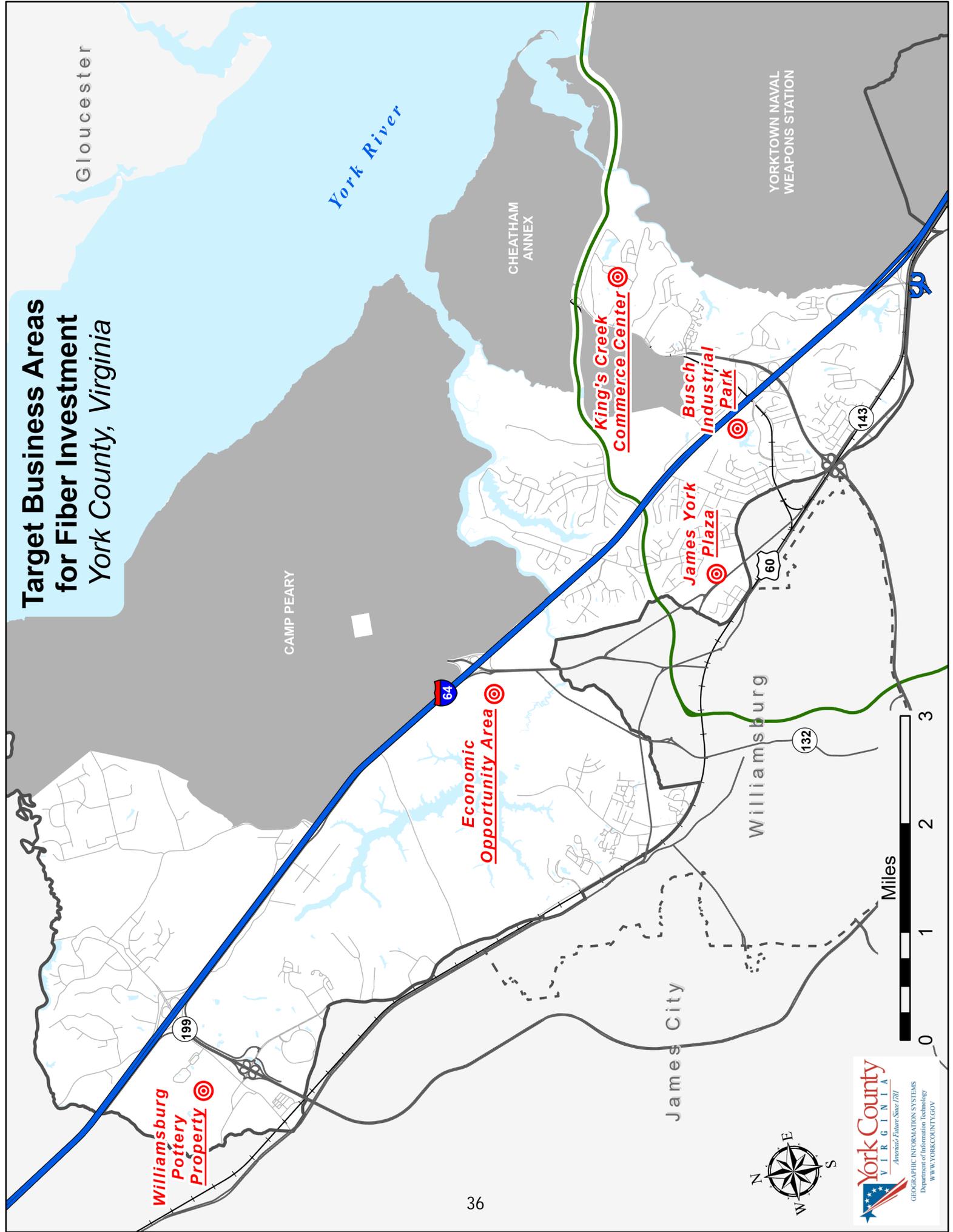
"Excellent educational opportunities" is also one of the Board of Supervisors' strategic priorities. Studies show that having broadband only at school is insufficient and that school children need broadband in their homes as well. "The Federal Reserve found that ... Children who don't have access to the Internet at home are less able to access educational opportunities than those who have broadband at their homes."¹⁰ All York County schools have broadband internet but it is important that all students in kindergarten through twelfth grade (including home-schooled and private school students) in the County have sufficient access to broadband internet and a computer in their homes. Likewise, the County's higher education students must have easy access to high speed internet to do research, write and submit projects, participate in interactive lectures, seminars, and projects, and communicate with professors and classmates. They need these capabilities even when they are home for short periods of time or vacations. The COVID-19 pandemic

April). *Network access point (NAP)*. Retrieved from TechTarget: <https://whatis.techtarget.com/definition/network-access-point-NAP>, para. 1-2.

⁹ QTS Realty Trust, Inc. (2019, September 24). *QTS and Metro Fiber Networks announce availability of strategic dark fiber network at the QTS Richmond NAP*. Retrieved from Cision PR Newswire: <https://www.prnewswire.com/news-releases/qts-and-metro-fiber-networks-announce-availability-of-strategic-dark-fiber-network-at-the-qts-richmond-nap-300924370.html>

¹⁰ Commonwealth Connect. (2019). *Report on Commonwealth Connect: Governor Northam's Plan to Connect Virginia*. Retrieved from <https://rga.lis.virginia.gov/Published/2019/RD109/PDF>, p. 30

Target Business Areas for Fiber Investment York County, Virginia



demonstrated this need.

Having access to broadband in the home serves no purpose without a computer to access it. Students need sufficient time on a computer to complete their homework. According to Census data, 4.5%, or about 1,166 residents of York County do not have a computer. Even families that have a computer may find that one shared family computer is not enough to allow students the time they need to complete their homework. About one-fifth of teenagers (aged 13 to 17) nationwide “are often or sometimes unable to complete homework assignments because they do not have reliable access to a computer or internet connection.”¹¹ The type of computing device matters too. Over 6% of York County residents rely solely on a smartphone or tablet and have no other type of computing device.¹² Smartphones and tablets are not optimized for word processing, creating spreadsheets, and other essential learning activities. These activities are considerably easier to complete on a desktop or laptop computer.

It is important that all students have access to a computer and internet service. The York County School Division has integrated the use of computers and other devices into daily instruction and homework assignments. The Division expects all students to complete their work using a computing device and to carry it to school every day. All students must have their own devices that they do not share with anyone else. Students in kindergarten and first grade use a tablet, while second through fifth graders use a two-in-one (a laptop/tablet hybrid). Students in grades six through twelve use a laptop. The School Division loans devices to students who are unable to purchase them. Home-schooled and private school students are not required to adhere to this technology curriculum and are not eligible to receive a loaned computing device. Fortunately, many ISPs and non-profit organizations offer low-cost or free computers to low-income households.

Aging Population

Studies show that most seniors wish to age in place. One study found that “76% of Americans age 50 and older” would prefer to stay in their homes as they age.¹³ York County’s senior population (aged sixty-five and older) has more than doubled in size over the past twenty years while the total population increased by only about 20%. According to the Weldon Cooper Center’s population projections, the senior population is expected to increase into 2030 with the aging of the Baby Boom population. The growing senior population will increase the demand for accessible medical care. As a result, telehealth services that are accessed through reliable broadband in homes will become increasingly important to serve the aging population. Telehealth reduces the need to travel to doctors’ offices and the physical toll those trips can take on seniors. Regular check-ups can be performed over video web conferencing (which uses a significant amount of bandwidth) and doctors can check basic vitals and more using remote medical monitoring devices which send information back to the doctor instantly. In addition, the County should look to expand existing computer classes and services for seniors at the libraries and the Senior Center so that older residents will know how to access the telehealth services that are available to them.

¹¹ Auxier, B., & Anderson, M. (2020, March 16). *As schools close due to the coronavirus, some U.S. students face a digital 'homework gap'*. Retrieved from Pew Research Center: <https://www.pewresearch.org/fact-tank/2020/03/16/as-schools-close-due-to-the-coronavirus-some-u-s-students-face-a-digital-homework-gap/>, para. 6

¹² *Types of computers and internet subscriptions*

¹³ Binette, J., Vasold, K., & AARP Research, para. 1

GOAL, OBJECTIVES, AND IMPLEMENTATION STRATEGIES

Goal: Expand access to fast and reliable internet (using fiber where possible) for residents, businesses, and government facilities to promote economic development, contribute to a reliable emergency communications system, improve government functions, maintain a high standard of education, make health care more accessible to the aging population, and enhance the quality of life for York County residents.

Objective 1: Expand access to fast and reliable internet for residents, businesses, and government facilities.

1. Create an initiative to bring more fiber infrastructure to the upper County.

The upper County is less densely populated than the lower County, which is a possible explanation for internet service providers' reluctance to invest in infrastructure there. The County should ensure the residents and businesses of the upper County have access to the same opportunities afforded by fiber internet as those in the lower County through several means: The County has already taken action on this matter by investing in fiber cables that deliver fast internet to the upper County. The County can offer economic incentives for ISPs to invest in last-mile connections in the upper County. It can also ensure the permitting process is as streamlined as possible while maintaining government oversight.

2. Expand the County's dark fiber network.

The County should commit funding and resources to expand its dark fiber network. Some of the County's facilities are already connected with lit fiber, including the Bruton and Skimino fire stations, but County-controlled dark fiber would provide a more reliable and secure connection. These connections could also be leveraged to serve residents and promote economic development. For example, a connection to the Bruton fire station could be leveraged to provide dark fiber to Magruder Elementary School, the Griffin-Yeates Center (home of the Head Start program), and the adjacent Public Works Utility Shop. From there, ISPs could use the infrastructure to connect the adjacent residential areas. Connections to the Skimino fire station 5 in and the new Mooretown Road station could be leveraged to deliver dark fiber to Victory Village Shopping Center (which includes a Voter Registrar office) and surrounding neighborhoods. The County plans to provide open wireless broadband internet service along the Yorktown waterfront. Providing access to broadband at other parks and recreational facilities would improve their utility to the citizens. Since installation is the biggest expense, all new dark fiber infrastructure should have capacities well beyond current or foreseen needs in order to provide room for growing demand and the ability to accommodate unforeseen requirements for years to come without the need for new installations.

3. Commit funding to the Peninsula portion of the Hampton Roads Connectivity Ring.

In 2017, the Board of Supervisors passed "a resolution to support and participate in a broadband initiative proposal as a regional economic development initiative". As demand for bandwidth increases over time, it is crucial that the County continue to retain and attract businesses. A government-controlled fiber backbone would be carrier-neutral, as any ISP could lease bandwidth from it. This would reduce installation costs for ISPs to deliver fiber internet to areas that currently do not have it (e.g., much of the upper County) because they would need only to install last-mile connections to the premises. This fiber backbone would serve as a financial incentive for ISPs to deliver service to less densely populated areas and drive down consumer costs by promoting competition. It would also reduce the amount of digging, which is disruptive to business, traffic, and pedestrians, because there would not be a need to create separate networks.

4. Institute a “dig once” policy.

Much of the cost of providing fiber optic services is absorbed by the process of digging trenches in the right-of-way and under streets, which is disruptive and labor-intensive. Other entities such as Newport News Waterworks, Dominion Energy, Verizon, and Cox also need to dig. Combining needs and sharing costs could significantly reduce overall expenses and minimize inconvenience to County residents. Whenever the ground must be disturbed for new development, roadwork, repairs, or the installation of water, sewer, electricity, natural gas, or sidewalks, advance notice should be encouraged so the County could assist in coordinating digs. For example, if Dominion Energy needs to dig, York County could contact local ISPs so they could lay fiber in the same trench.

Wherever possible, the County should also encourage the developers of new subdivisions and commercial developments to work with ISPs to install fiber infrastructure during the construction phase when the other utilities are installed. If fiber cannot be installed during construction, the County should investigate incentives (e.g. tax abatements) for developers to install conduit so fiber can be added into the conduit without digging at a later date. Like sewer infrastructure, conduit could be laid by the developer and subsequently maintained by the County and leased to ISPs thereafter. Another way to reduce installation costs and disruption to citizens could be to encourage utility companies to lease excess space in their existing conduits to ISPs. The County could also encourage utility companies to include excess conduit in new construction projects which the County would maintain and lease.

5. Take advantage of state and federal funding programs designed to assist the development of broadband infrastructure.

There are many federal grant programs available to aid in the deployment of broadband infrastructure. In addition, former Governor Northam dedicated resources and funding through a program called the Virginia Telecommunications Initiative (VATI). Though this program focuses on unserved areas and most of the County is served by ISPs, VATI provides free advisors and other resources to connect local governments with federal and state funding. The County should tap into these grant programs.

Objective 2: Promote economic development through the expansion of fiber and other broadband infrastructure.

1. Ensure that all York County businesses have access to the bandwidth they need.

York County’s Department of Economic and Tourism Development maintains a relationship with the owners of many of the County’s home-based and commercially-based businesses by offering training, networking opportunities, and financial assistance. The Department should use its relationship with the business community to ensure that all businesses have enough bandwidth to serve their needs. If not, the County can utilize County-controlled fiber to promote infrastructure in those underserved locations.

2. Deliver access to fiber internet in areas zoned for business, especially those that are currently unserved by broadband providers.

There are several areas designated in this Plan for designated for business uses that either are unserved or are served by cable and DSL but would be better served with fiber. Broadband infrastructure is a necessity for virtually all businesses today; therefore, the County should encourage the development of a fiber network in the area by purchasing fiber strands for County use. Internet service providers could leverage the network to deliver broadband service to these unserved areas.

Objective 3: Maintain storm-resilient communications systems.

1. Ensure that all wireless communications towers in the County have access to backup generators.

Most wireless ISPs already maintain disaster response plans that include backup power generators permanently installed at cell tower sites or portable generators that can be positioned quickly to maintain connectivity during natural disasters. Before any new wireless communication tower can be constructed in York County, the plans must be submitted to the County for approval. The County should require telecommunication companies to submit a disaster preparedness plan so the County can review its efficacy.

Objective 4: Maintain York County's high standard of education.

1. Ensure that school-aged children have access to broadband internet service and a computer.

Students require the bandwidth capacity to video conference and live stream videos, both of which require large amounts of bandwidth. Students need ample access to a computer and preferably, their own. There are charity organizations and government programs designed to help families experiencing financial hardship get free or affordable broadband internet service and a computer. Many ISPs have programs that do the same. York County should initiate an awareness campaign to connect all families with school-aged children (including private school and home-schooled students) to the services they need. Staff should disseminate information at County schools, libraries, parks and recreation facilities, and through York County's Public Affairs office, which includes the County's social media platforms, television channel, and Citizen News publications.

Objective 5: Make health care services more accessible to the County's growing senior population.

1. Ensure that senior citizens have access to broadband internet service and a computer.

Seniors will need a computer and access to broadband internet to access telehealth services. Many charity organizations and services already exist to provide affordable or free access to broadband internet and computers to those in need. York County can disseminate information about these programs through our senior center, the libraries, and the County's Citizen News publication.

2. Offer and promote technology training classes and seminars at the York County Senior Center and public libraries.

County staff can coordinate with area health care providers to offer technology training classes that focus on internet-based health care topics like video conferencing with doctors and using remote medical monitoring devices. Coordinating efforts would ensure that classes align with the technologies they have and are pursuing. Staff would also encourage area health care advocates who are familiar with these technologies to lead classes for the citizens.

3. Offer home visiting technical support to seniors who cannot afford private services.

Technology continues to develop at a rapid pace and the systems are often complex. This can lead to considerable difficulty for senior citizens who are unfamiliar with health care and other technologies. The County should solicit volunteers and/or contract tech support for seniors who are unable to afford private technical support services.