

Broadband Deployment Plan

For

Southern Maryland

2012

Final Draft



Tri-County Council for Southern Maryland

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Tri-County Council for Southern Maryland

Tri-County Council for Southern Maryland

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Table of Contents

Executive Summary.....	12
Introduction	18
Section I- Broadband in Rural Maryland	22
History of Efforts toward Universal Access:.....	22
Regional Plan Vision and Mission:	22
Section II- Strategies and Objectives.....	31
Short Term and Long term	31
Infrastructure Issues.....	32
Access Issues	42
Geography/Coverage Issues	42
User Category Issues	44
Speed Issues.....	44
“What is Broadband?”	45
Cost and Competition Issues	46
Rural Area Premium.....	46
Providers.....	48
User Coalitions	49
Partnerships	50
Cooperative.....	51
Technology Issues	52
Future Technologies	52
Energy and Environment Issues	66
Public Policy Issues.....	70
Section III- Strategies to Achieve Universal Access.....	74
Residential Users	74
Commercial/Industry User	77
Light/Heavy Users.....	79
Government/ NGO Users	80
K-12 and Higher Education / Library / Museums	81
Public Safety and Protection / Emergency Response	84
Healthcare.....	85
Local / County / State / Other Federal Administrative	87

Federal Military / Homeland Security	88
Section IV- Solutions to Implement Recommendations of Plan	89
Role of Major Stakeholders	89
Recommended Implementation Solutions and Associated Estimated Costs	90
Schedule for Short and Long-Term Implementation.....	97
Methods of Documenting Outcomes in Plan Implementation for Region	97
Industry Economic Development, Economic Strategies and Objectives	98
Last Mile Issues.....	102
Section V. - Future Direction for Broadband in Rural Maryland.....	104
Broadband Role in the Future.....	105
Section VI – Conclusion.....	107
Appendix A: Data Tables	108
Table 18: Calvert County Schools K-12 Anchor Institutions.....	108
Table 19: Calvert County Library Anchor Institutions.....	110
Table 20: Calvert County Medical – Healthcare Anchor Institutions	111
Table 21: Calvert County Public Safety Anchor Institutions	111
Table 22: Calvert County University – College Anchor Institutions	112
Table 23: Calvert County Community Support – Government Anchor Institutions	112
Table 24: Charles County Schools K-12 Anchor Institutions	115
Table 25: Charles County Library Anchor Institutions	117
Table 26: Charles County Medical-Healthcare Anchor Institutions	117
Table 27: Charles County Community Support - Non Government Anchor Institutions	117
Table 28: Charles County Community Support – Government Anchor Institutions	118
Table 29: Charles County Higher Education Anchor Institution	121
Table 30: Charles County Public Safety Anchor Institutions.....	121
Table 31: St. Mary’s County Schools/ k-12 Anchor Institutions	124
Table 32: St. Mary’s County Library Anchor Institutions	125
Table 33: St. Mary’s County Medical – Healthcare Anchor Institutions	126
Table 34: St. Mary’s County Public Safety Anchor Institutions	126
Table 35: St. Mary’s County University – College Anchor Institutions	126
Table 36: St. Mary’s County Community Support – Government Anchor Institutions.....	127
Table 37: Planned Number of Anchor Institutions Calvert County	128
Table 38: Planned Number of Anchor Institutions Charles County	131

Table 39: Planned Number of Anchor Institutions St Marys County	132
Table 40: Spectrum Licenses.....	134
Table 41: Provider Transmission and Speed Capability for Charles, Calvert and St Mary’s Counties	138
Table 42: Service Providers for Calvert, Charles and St. Mary’s	143
Table 43: Broadband Technologies for the Future	143
Table 44: Population Change in past 10 years.....	144
Table 45: Total Business Establishments in Calvert per Industry Per 2009.....	144
Table 46: Total Business Establishments in Charles per Industry Per 2009	145
Table 47: Total Business Establishments in St. Mary’s per Industry Per 2009.....	146
Table 48: Total Employment in Calvert, Charles and St. Mary’s per Industry	147
Table 49: Number of Paid Employees in Charles County.....	151
Table 50: Number of Paid Employees in Calvert County	153
Table 51: Number of Paid Employees in St. Mary’s County	154
Appendix B: Maps.....	156
Map 1 – Calvert County Population Density Map	157
Map 2 – Charles County Population Density Map.....	158
Map 3 – St. Mary’s County Population Density Map	159
Map 4 – Calvert County Businesses - 2005...	
Map 4 – Calvert County Businesses - 2005	160
Map 5 – Calvert County Cable Modem & DSL Coverage – 2005.....	161
Map 6 – Calvert County Businesses and Broadband Coverage – 2005	162
Map 7 – Calvert County Cable Modem Coverage - 2005	162
Map 8 – Calvert County DSL Coverage – 2005.....	164
Map 9 – Calvert County Cable Modem Coverage – 2011	165
Map 10 – Calvert County DSL Coverage – 2011	166
Map 11 – Calvert County Wireline Coverage - 2011.....	167
Map 12 – Calvert County Number of Wireline Providers – 2011.....	168
Map 13 – Calvert County Fiber Optic Coverage – 2011.....	169
Map 14 - Calvert County Mobile Wireless Coverage - 2011	170
Map 15 – Calvert County Other Copper Wireline Coverage -2011	171
Map 16- Calvert County Cable and DSL Broadband Services - 2011	172
Map 17 – Charles County Businesses – 2005	173
Map 18 – Charles County Cable Modem & DSL Coverage - 2005	174
Map 19 – Charles County Businesses and Broadband Coverage – 2005.....	175

Map 19 – Charles County Businesses and Broadband Coverage – 2005	175
Map 20 – Charles County Cable Modem Coverage - 2005.....	175
Map 21 – Charles County DSL Coverage – 2005	177
Map 22 Charles County, Broadband Services 2011	178
Map 23 – Charles County Fiber Cable Coverage - 2011.....	179
Map 24 – Charles County DSL Coverage – 2011	180
Map 25– Charles County Wireline Coverage - 2011	181
Map 26 – Charles County Number of Wireline Providers – 2011	182
Map 27 – Charles County Fiber Optic Coverage – 2011	183
Map 28 – Charles County Mobile Wireless Coverage – 2011	184
Map 29 – Charles County Other Copper Wireline Coverage -2011.....	185
Map 30 - Charles County Cable and DSL Broadband Services-2011.....	186
Map 31 – St. Mary’s County Businesses – 2005.....	187
Map 32 – St. Mary’s County Cable Modem & DSL Coverage - 2005	188
Map 33 – St. Mary’s County Businesses and Broadband Coverage - 2005	189
Map 34 – St. Mary’s County Cable Modem Coverage – 2005	190
Map 35 – St. Mary’s County DSL Coverage – 2005	191
Map 36 – St. Mary’s County Cable Modem Coverage – 2011	192
Map 37 – St. Mary’s County DSL Coverage – 2011	193
Map 38 – St. Mary’s County Wireline Coverage - 2011.....	194
Map 39 – St. Mary’s County Number of Wireline Providers - 2011	195
Map 40 – St. Mary’s County Fiber Optic Coverage - 2011	196
Map 41 – St. Mary’s County Mobile Wireless Coverage - 2011	197
Map 42 - St. Mary’s County Other Copper Wireline Coverage -2011.....	198
Map 43 - St. Mary’s County Cable and DSL Broadband Services-2011	199
Appendix C: Charts	200
Chart 1 – Calvert County Technology – December 31, 2010	200
Chart 2 – Calvert County Speed – December 31, 2010.....	200
Chart 3 – Calvert County Broadband Speed Test – December 31, 2010	201
Chart 4 – St. Mary’s Technology – December 31, 2010.....	201
Chart 5 – St. Mary’s County Speed – December31, 2010.....	202
Chart 6 – St. Mary’s County Broadband Speed Test – December 31, 2010	202
Chart 7 – Charles County Technology – December31, 2010.....	203

Chart 8 – Charles County Speed – December 31, 2010 203
Chart 9 – Charles County Broadband Speed Test – December 31, 2010..... 204
Appendix D: Best Practices..... 205
References 207
Glossary..... 215

Executive Summary

This Broadband Deployment Plan is part of the requirements of a State Broadband Initiative (SBI) grant for Broadband Mapping, obtained by the Maryland Broadband Cooperative (MdBC), funded by the American Recovery and Reinvestment Act (ARRA) and administrated by the National Telecommunications and Information Administration (NTIA) which is part of the U.S. Department of Commerce. The Tri-County Council for Southern Maryland is a sub-recipient of the Maryland Broadband Cooperative's grant and is responsible for the development of this plan. The purpose of the Broadband Deployment Plan is to bring attention to the disparities in broadband access for rural Maryland areas, including the Tri-County region of Southern Maryland. The primary objective is to continue and build on the ongoing efforts to bring high quality, low-cost, broadband service to rural Maryland. The Council has been assisted in the development of this plan by the Business, Economic and Community Outreach Network (BEACON) of the Franklin P. Perdue School of Business at Salisbury University.

The Council formed the Southern Maryland Broadband/IT Planning Committee consisting of telecommunication leaders from all three counties: Calvert, Charles, and St. Mary's to review, refine and recommend this plan to the Council's Executive Board and membership for approval. Once the draft is approved by the Council's Executive Board, the plan will be posted on the Council's website and a regional public meeting will be held to receive final public comment. The final plan will be presented to the full Council for approval in October of 2012.

Among the four rural regions, the Tri-County region of Southern Maryland is the clear leader in the deployment and planning for broadband. The region has already studied the issue in two reports and has already deployed enough broadband solutions to be able to provide access to three quarters of users. The creation of Maryland Broadband Cooperative is one of the positive outcomes of some of these earlier planning efforts.

While some price disparities still exist among the rural regions, the Southern Region enjoys the lowest disparity levels both within the region and when compared to the urban areas of the State of Maryland. This plan outlines ways to further increase broadband access and to reduce price disparities as a way to enhance the quality of life of the region's residents and to provide the required infrastructure to further support the region's economic and public anchor institution activities.

Some of the overarching goals addressed by this and previous broadband deployment plans for Southern Maryland are being accomplished through a current build-out which is part of a \$158M Broadband Technology Opportunity Program (BTOP) grant awarded through the ARRA to the State of Maryland's Department of Information Technology (DoIT). DoIT, as part of a public-private consortium, is deploying the One Maryland Broadband Network (OMBN) with the primary purpose of connecting 1,006 Community Anchor Institutions (CAI) throughout each region in the state. The project seeks to promote affordable and abundant broadband in each of Maryland's 24 jurisdictions. The nearly 650 miles of new fiber in the rural portions of the state would substantially improve public safety, government services, healthcare delivery, and education, offering Community Anchor Institutions access speeds between 10 Mbps and 10 Gbps (See glossary of abbreviations for this and other abbreviations used throughout this plan).

Another issue of concern in any regional plan is the impact of the planned activities on the environment. An Environmental Assessment conducted on behalf of OMBN concluded that fiber construction will not be hazardous to the construction sites' soil content nor will it cause harm to the water resources near the construction area. In fact, by enhancing the efforts to gather and use vast amounts of data required to attain high levels of technology mediated sustainability efforts, fiber optic construction in Southern Maryland will actually be a net contributor to a "Greener" future. The green future would be a result of the increased ability for employees to telecommute from home reducing gas emissions from their vehicles. Similarly, the employees would not need to travel long distances to attend a seminar

or conference because increased broadband access online seminar (webinar) and tele-conferencing would be possible. This would also result in reduced gas emission via any mode of transportation. Ability to work from home would lead to reduction in out-commute patterns of all three counties, especially Charles and Calvert County where 60 percent of workers commute out of county for employment.

Southern Maryland has been moving forward with its economic development for the past ten years. They experienced a population growth of 21.01% between 2000 and 2010 (Please refer to Appendix A, Table 44 for population change in past 10 years), and an increase of 28.23% (2000: \$60,711, 2010: \$77,848) in median household income which could be credited to raised number of jobs with a 20.2% increase in the number of business establishments. Clearly, availability and cost of broadband will continue to be a critical factor in continuing these successes. As broadband technology continues to change, the Southern Maryland Region will need to be agile and fiscally prepared to adapt to such changes.

In addition to technological adaptability and agility, issues such as infrastructure, geography, and service provider relationships will need to be considered on an ongoing basis for the success of continuous broadband deployment. Efforts to successfully implement fiber optic broadband will definitely be rewarded by narrowing of the technological gap between rural regions and metropolitan areas and allowing developing areas to compete for economic excellence on a level playing field.

The single most important determinant of how Southern Maryland will be able to succeed in implementing its broadband deployment plans is how “Last Mile” issues will be handled. Last mile issues connectivity is a significant challenge broadband access for rural Maryland. In many cases, service providers in the rural areas of the region are unable to financially justify the upfront investments required to provide last mile services due to low user densities.

The broadband stakeholders of Southern Maryland will need to continue to build and maintain public-private partnerships to consider ways in which the cost benefit equations are improved, using public support where required to reduce the difficulties inherent in providing last mile solutions. It is hoped that the findings and recommendations presented in this regional broadband deployment plan will be used by municipal, local, state and federal programs, in partnership with private and non-profit sector stakeholders, to advance the deployment of a universal public/private broadband network for Southern Maryland.

The planned activities towards universal broadband would improve the ability of the region to continue to support Naval and Federal operations in the region and enhance planned community, economic, and workforce development efforts. As the coverage issues are addressed through these activities, attention also needs to be focused on speed and capacity issues as demand increases and usage requires higher speeds and capacity. This plan has also addressed some user category issues by segmenting the broadband user market first between residential and organizational users, and second, by segmenting organizational users into light and heavy users.

A key development at this time is the continued technological change that is being captured by the Long Term Evolution (LTE) mobile technology which is based on the better utilization of existing radio frequency towers. LTE serves as a way to provide faster service over a larger area without the cost of fiber installation. This appears, at least at this time, to be the most feasible way to deal with some of the “Last Mile” issues. Verizon is in the process of deploying 4 G LTE throughout Maryland as many other last mile service providers in the future. This deployment will be part of a solution to the last mile service needs for residences, businesses and public anchor institutions. Fiber to the 4 GLTE Towers will continue to be required to support the quality and capacity of the wireless signals to various customers.

An important issue that is not yet fully resolved is the role of government in dealing with some of these current and potential impediments to universal

broadband access, including current and future speed and capacity issues, maintenance and control of infrastructure issues, and future planning efforts. It is recommended that the group of stakeholders that was assembled to the development of this document be maintained as a committee of the Tri-County Council for Southern Maryland to continue to address these issues and to make recommendations to the region's public policy decision makers in a timely and on-going basis.

As demand for broadband continues to increase, the upfront and future ongoing infrastructure investments' need for funding is critical. Occasional bursts of stimulus spending are not a sustainable way to accomplish this. Therefore, the question of a fiscal mechanism to provide the needed funds and the private-public mechanisms for deploying such funds need to be developed, sooner rather than later. The Maryland Broadband Cooperative, with over 70 members, will continue to work in the Southern Maryland region to provide middle mile service to the last mile service providers based on the business models of the members and the Cooperative. However, additional staff coverage for Southern Maryland is recommended to facilitate private sector solutions to last mile coverage and infrastructure planning and build out. Through the auspices of a federal grant administered by the Maryland Broadband Cooperative, the Tri-County Council will host a regional capacity building specialists through the end of 2014. Before the end of the grant funding for this resource, the Southern Maryland region must determine how to fund future regional planning and infrastructure needs.

The recommended implementation solutions and associated estimated costs section of this report contains a series of additional middle mile infrastructure fiber construction for each of the three counties. This is based on the core assumption that the franchise agreement with fiber service providers for St. Mary's and Charles Counties will continue into the future. If this is not the case, the fiber connections for existing public anchor institutions may require additional cost to install fiber connectivity to the public sector institutions. Statewide or regional grant

applications to fund the remaining gaps in middle-mile; public anchor institutions and federal facilities connectivity and levels of service are recommended for the next five years.

Finally, all plans require an evaluation and control mechanism. It is recommended that the aforementioned Southern Maryland Broadband/IT Planning Committee of the Council develop a series of dashboards to track and measure broadband deployment success during and after implementation.

Introduction

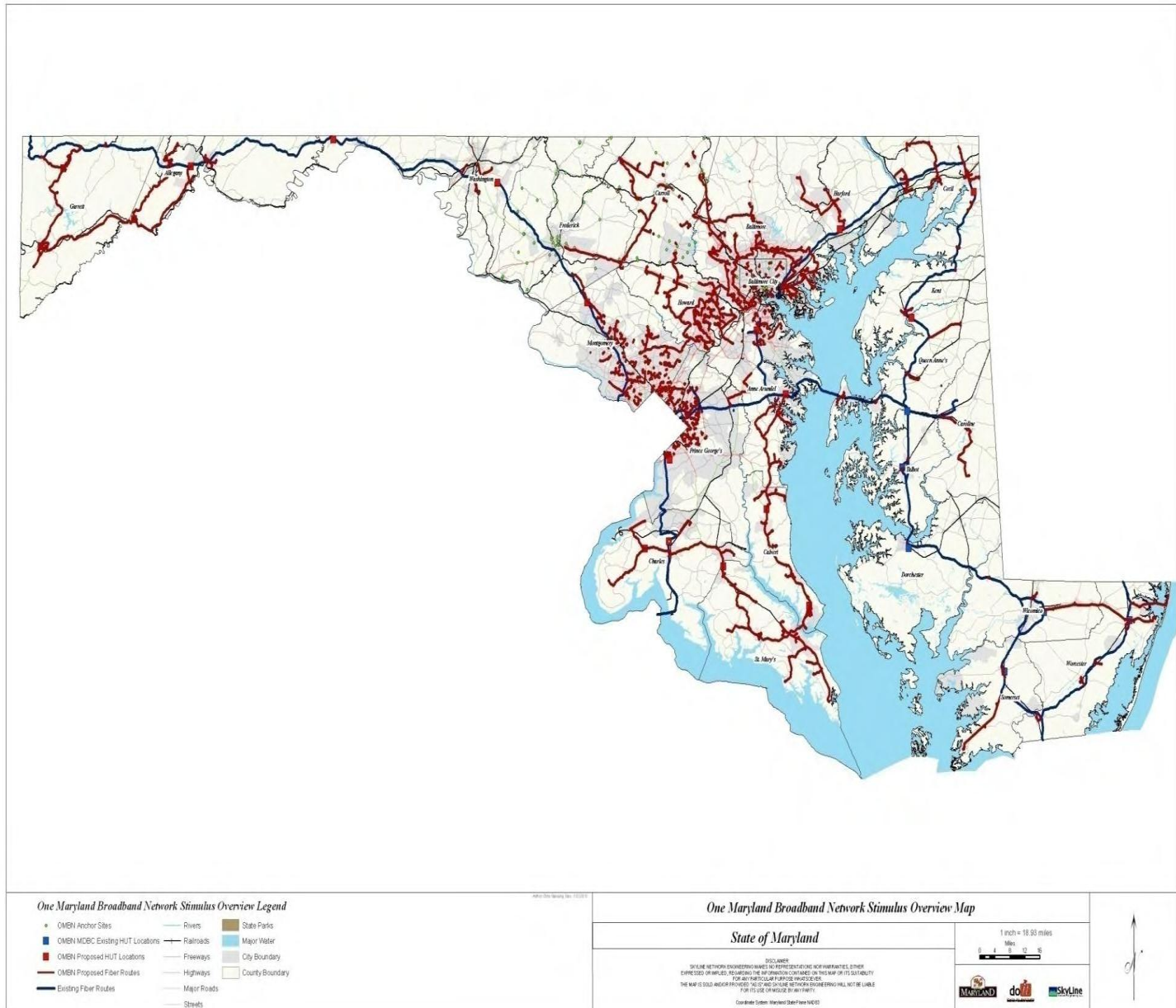
The Southern Maryland region, led by the Tri-County Council for Southern Maryland, commissioned the Business, Economic and Community Outreach Network (BEACON) of the Franklin P. Perdue School of Business at Salisbury University to develop this Broadband Deployment Plan. The project was awarded using American Recovery and Reinvestment Act (ARRA) funding through a State Broadband Initiative (SBI) grant obtained by the Maryland Broadband Cooperative (Mdbc). The SBI is a program administered by the National Telecommunications and Information Administration (NTIA), part of the U.S. Department of Commerce, for the purpose of increasing availability and quality of broadband data and planning throughout the country. The Tri-County Council for Southern Maryland is a sub-recipient of the Maryland Broadband Cooperative's grant that has enabled this planning activity¹.

This planning activity is timely in that it is being implemented concurrently with a \$158M Broadband Technology Opportunity Program (BTOP) grant awarded through the ARRA to the State of Maryland's Department of Information Technology (DoIT). DoIT, as part of a public-private consortium, plans to deploy One Maryland Broadband Network (OMBN) with the primary purpose of connecting 1,006 Community Anchor Institutions (CAI) throughout the region in the state, and seeks to promote affordable and abundant broadband in each of Maryland's twenty-four jurisdictions. The OMBN was established to serve broadband needs of the entire state. The project will link together and extend three independent networks: the state-run network Maryland; the Inter-County Broadband Network (ICBN), a 10-county consortium in Central Maryland led by Howard County; and the Maryland Broadband Cooperative (Mdbc), a rural, non-profit middle-mile provider. The nearly 650 miles of new fiber in the rural portions of the

¹ Environmental Assessment on behalf of One Maryland Broadband Network. (2011). Kensington, MD: Columbia Telecommunications Corporation.

state would substantially improve public safety, government services, healthcare delivery and education offering Community Anchor Institutions access speeds between 10 Mbps and 10 Gbps.² The following figure shows One Maryland Broadband Network Stimulus Overview Map.

Figure 1: One Maryland Broadband Network Stimulus Overview Map



² Maryland Department of Information Technology | BroadbandUSA - NTIA. (n.d.). Home | BroadbandUSA - NTIA. Retrieved February 23, 2012, from <http://www2.ntia.doc.gov/grantee/maryland-department-of-information-technology>

The National Broadband Plan describes the importance of universal broadband as follows:

“Like electricity a century ago, broadband is a foundation for economic growth, job creation, global competitiveness and a better way of life. It is enabling entire new industries and unlocking vast new possibilities for existing ones. It is changing how we educate children, deliver health care, manage energy, ensure public safety, engage government and access, organize and disseminate knowledge”.³

The deployment of publicly available fiber optic infrastructure in Southern Maryland will ultimately bring economic and social benefits and reduce the digital divide allowing for high economic success in the region. Through the connection of Community Anchor Institutions, many public facilities will benefit from increased broadband speeds and availability. Education and healthcare will likely see the greatest influx in technological capabilities through the use of e-learning and tele-care. The extraordinary resources available via the internet potentially allow for greater patient care and attention, as well as greater learning experiences for all Marylanders.

The overall findings from the BEACON study determined that universal broadband access brings benefits into all aspects of life including health care, education, public safety, state and local government and businesses. However, issues such as infrastructure, geography, future technologies and service provider relationships would need to be considered for the successful broadband implementation. Efforts to successfully implement fiber optic broadband will definitely be rewarded by narrowing of the technological gap between rural regions

³National Broadband Plan - Executive Summary. (n.d.). *The National Broadband Plan: Connecting America*. Retrieved February 23, 2012, from <http://www.broadband.gov/plan/executive-summary/?search=executive%2bsummary>

and metropolitan areas, allowing developing areas to compete for economic excellence on a level playing field.

Additionally, an Environmental Assessment conducted on behalf of OMBN concluded that fiber construction will not be hazardous to the construction sites' soil content nor will it cause harm to the water resources near the construction area. From an environmental perspective, fiber optic construction in Southern Maryland will provide benefits far greater than the temporary environmental disruption.

To mitigate implementation risks associated with broadband deployment via fiber optics, the Tri-county Council of Southern Maryland should consider the recommendations advised by the broadband deployment plan. As a result of the BEACON study, last mile issues were identified as the probable threat to universal broadband access for rural Maryland. Last mile issues could stand as an obstacle to implementation because service providers still lack confidence in terms of cost benefit for providing access to rural areas. Altering this perception will be most challenging to achieving the goal of universal access. Promoting mutually beneficial relationships with service providers and rural area residents will encourage joint collaboration in bringing broadband to rural Southern Maryland.

Despite the potential obstacles, broadband is the key to the technological future and development of Southern Maryland and will transform economic conditions in rural Maryland into centers for achievement and innovation. The broadband deployment plan for Southern Maryland could be a very useful tool in providing guidance for connecting rural regions to universal broadband access and the benefits it will bring to Southern Maryland.

This Broadband Deployment Plan is being developed for the edit and review of the members of Southern Maryland Broadband Committee/IT Planning whose recommendations will be reviewed by the Executive Board of the Council for presentation to the full membership of the Tri-County Council for Southern Maryland. Upon adoption by the full Council, the regional broadband deployment

plan will be used by municipal, local, state and federal programs in partnership with private sector members to advance the deployment and completion of a universal public/private sector network in Southern Maryland.

Section I- Broadband in Rural Maryland

History of Efforts toward Universal Access:

Southern Maryland commissioned studies in 1998 and 2005 to map and determine future technological goals for the region. Brief information on the goals and recommendations from 1998 and 2005 study has been included under this section to emphasize the efforts of Southern Maryland in achieving universal access.

In 1998, the Southern Maryland Economic Development Strategy⁴ was released and provided a list of eight goals for technological development throughout Southern Maryland. The development initiative was designed to advocate the growing need for a strong technology supported infrastructure and promote economic growth in the Southern Maryland counties. The efforts for technological development were still in their infancy in 1998 and continued to transform with the growing demand for broadband in rural locations.

Regional Plan Vision and Mission:

In 1998, the vision for Southern Maryland determined by the Tri-County Council was to create “a dynamic, competitive, high-performance, economic region, a mid-Atlantic center of excellence committed to the steady enhancement of our quality of life and prosperity....”. The regional mission of the broadband deployment plan follows the vision set by the Tri-County Council in 1998, in that universal broadband will “enhance” and develop Southern Maryland’s ability to remain consistent with their vision. To effectively provide broadband through the

⁴ Southern Maryland Regional Strategy. (1998). Southern Maryland: Tri-County Council for Southern Maryland.

rural areas of the three counties in Southern Maryland a robust broadband infrastructure must be implemented. The following are the mission and vision of the broadband deployment plan.

Vision: Everyone in Southern Maryland has equal access to affordable and current information technologies.

Mission: To provide residential, business and public anchor institutions with the opportunity to be served by the evolving and most current information technologies available today.

Regional Plan revised Goals

The following are updated and revised goals developed in 2012 based on the historical goals that were determined in the 1998 development report. The revised goals reflect the progress that has taken place so far since the broadband initiative began.

1. Support Naval and Federal Operations in the Region

The Navy has been and will continue to be a major contributor to the economic strength of the region. Naval Air Station (NAS) Patuxent River and Naval Service Weapons Center (NSWC) at Naval Support Facility Indian Head Military base play key roles in current economic development activities in the region. The Naval Air Station at Patuxent River also has command and management over the inner and the outer Atlantic Test ranges critical to research, evaluation and testing functions of the Department of Defense and other federal programs. National Security and Cyber Security operations requiring advanced information technology access and security have also expanded into the Southern Maryland region. Increased emphasis of the Veteran Affairs on the use of telemedicine and electronic record sharing services in rural regions provide incentives for high speed internet connectivity. The region must continue to build on successful efforts to support the relocation and expansion of Naval operations at military and other federal facilities

including other federal programs based in our region.

2. Capitalize on the Unique Intellectual and Physical Assets of the Region's Naval Bases and Research Laboratories

The region has unique intellectual and physical assets associated with the Naval bases at Patuxent River, satellite facilities, and Naval Support Facility Indian Head. Marine research and college education state facilities are provided at the Chesapeake Biological Laboratory, Morgan State University Estuarine Center and St. Mary's College. State archaeological research and educational museums are present at Jefferson Patterson Park and Museum and Historic St. Mary's City. Science, Technology, Engineer and Math (STEM) programs are well developed at the region's K-12 institutions and linked to the naval bases. The College of Southern Maryland has three campuses and is anticipating a fourth regional campus in the Hughesville/Charlotte Hall central location. The Southern Maryland Higher Education Center in St. Mary's County provides essential degree programs with thirteen universities to offer over 130 graduate degree programs in a variety of disciplines to support the dynamic regional workforce. Other higher education institutional growth is anticipated to keep pace with growing populations and jobs in the decade ahead.

3. Focus Development Efforts on Specific Technology Clusters

An industry cluster is a geographic concentration of independent, internationally competitive firms in related industries. Over time, clusters lead to a concentration of skilled workers, specialized infrastructure and support services that perpetuate the growth of the cluster and create a critical mass of activity that establishes an economic identity for the region. Current and projected lead economic clusters for the Southern Maryland region, which are major drivers for the region's businesses and workforce are: Naval Bases with national commands for research, testing and evaluations; Naval bases and other federal programs associated businesses assisting in the advancement of federal programs mission; energy

generation of nuclear, gas, coal, solar power and distribution of energy providers of gas and electric power; medical facilities and service programs in each of the three counties; and other “outside the beltway” IT service provider and dependent businesses.

4. Develop a Sustainable Approach to Expanded Broadband Availability in Town Center/Priority Development Areas

Each county has varied approaches to balancing continued growth with preservation of natural, agricultural and historical areas. Town Centers, traditional industrial parks, and technology development districts connected with middle and last mile fiber optics provide core infrastructure needs for current and future businesses. The three major hospitals and associated support businesses are in the town centers of La Plata, Leonardtown and Prince Frederick with other town centers the location of other medical facilities. All town centers/development districts require current broadband availability, connectivity, and multiple service provider options.

5. Establish the High Speed Communication Infrastructure Needed to Support Regional Technological Development

The 21st century economic and educational success of Southern Maryland requires universal access to high speed information technology which allows college internet courses, telemedicine, tele-work, and home-based small businesses to access cutting edge secure communications of importance. In addition to the town center/development districts, the remaining areas of the region need high speed internet to allow business, education, health care and other communication services and connectivity. For Charles and Calvert Counties, over 60 percent of the workforce commutes daily outside of the region for jobs. Eliminating the remaining unserved or underserved areas of the region will provide alternatives to such trends. The suburban and rural populations need access to high speed internet for entertainment, communication, education, business and financial transactions. A

fiber backbone including other emerging technologies, which allows a full grid of total coverage of wireless applications for the region, is the goal to achieve universal coverage.

6. Stimulate and Support the Formation and Growth of Local Technology Based Businesses

Residents currently commuting outside the region for new technology, cyber and national security, federal government related programs and advanced technology applications require high speed internet connections to their work places. This will provide the potential for some of those types of work places to relocate to Southern Maryland once the broadband infrastructure is more competitive and linked with the metropolitan regions. For St. Mary's County, 80 percent of the population works at the Naval Base or with associated businesses in a support or service role to the base's operations. While small businesses tend to cluster in the defined town centers and development districts, many existing small businesses fall outside of these centers in rural preservation areas. Universal access for all businesses, community institutions and residences is needed to meet the business development, retention, and workforce training needs of the region.

7. Coordinate with Regional, State, Federal and other partners to insure the information technological assets and capabilities are considered in regional and national planning and promotion efforts.

Collaboration and coordination with the Maryland Broadband Cooperative will set the Southern Maryland plan with the statewide plan to ensure implementation success and cohesiveness. These relationships will be a key in nurturing the broadband initiative for years to come. As the demand for faster broadband and more Community Anchor Institutions increase, partnerships will be vital to infrastructure maintenance. Also, maintaining secure cyber activity will only be achieved through coordination with MdBC and the One Maryland Broadband Network.

In 2005, a Southern Maryland broadband study was completed by CCG Consulting Inc. The study revealed that 15 percent of the Southern region’s households were unserved/ underserved while 28 percent of businesses were found to be unserved/ underserved⁵. The following tables show the breakdown of the unserved and underserved businesses and household as per the county.

Table 1: Unserved and Underserved Businesses

	Total	Unserved /	Percent
	Businesses	Underserved	of Market
Calvert County	2,623	250	10%
Charles County	4,539	1,750	39%
St. Mary’s County	3,388	1,000	30%
Total	10,550	3000	28%

Table 2: Unserved and Underserved Households

	Total	Unserved /	Percent
	Households	Underserved	of Market
Calvert County	25,447	1400	6%
Charles County	41,668	9,000	22%
St. Mary’s County	97,757	14,400	15%

Source: 2005 CCG Report

The given data showed that Charles County had the greatest percentage of unserved/ underserved households and businesses. The 2005 report not only addressed geographical suggestions for broadband implementation, but also defined the threshold of bandwidth quality in respect to upload and download speeds. The study indicated, “by 2009, average households will need 57-72 Mb/s and that ‘tech savvy’ households consume nearly 100Mb/s.”

⁵ Stenberg, Peter; Morehart, Mtichell; Vogel, Stephen; Cromartie, John; Breneman, Vince; Brown, Dennis; Broadband Internet’s Value for Rural America; Economic Research Service; United State Department of Agriculture (USDA); August 2009; <http://www.ers.usda.gov/publications/err78/err78.pdf>

The following are the goals and objectives from the 2005 report, out of which some of them are achieved by now and some are still in progress.

1. Identify the needs for broadband for the various segments of the counties including large and small businesses, government, education, and residence / middle and last mile services.
2. Identify the extent and the cause of broadband service deficiency today in the counties by the various market segments.
3. Analyze the existing network infrastructure in the counties and State that could be used to deliver broadband.
4. Analyze the issues with delivering broadband with the incumbent providers – Maryland Department of Information Technology-networkMaryland, Maryland Broadband Cooperative with over sixty members, and private providers.
5. Identify the most promising technologies that could be used today and in the future to deliver broadband to the counties.
6. Look at specific network designs that could be used to bring broadband to the unserved / underserved parts of these counties.
7. Recommend specific solutions that will make broadband available to the remaining unserved and underserved parts of the counties.
8. Discuss the proper role of government in solving the digital divide issues associated with broadband.
9. Make specific recommendations on other broadband related topics.
10. Provide timelines that would assist the counties in implementing the proposed solutions.

Both reports have provided significant information to clarify the needs that

facilitate this plan. It is clear that the infrastructure has evolved over a period from 1998 to 2005, but an ever growing demand for broadband has sparked the need for a concise implementation plan.

Senate Bill 753 (2006): Rural Broadband Communication Services

“The State Highway Administration shall allow the use of any right-of-way for the installation of broadband communication infrastructure provided by nonprofit telecommunications services providers in rural areas and underserved areas of the state without imposition of any change for the use of the right-of-way.⁶”

The statute determined that essentially any nonprofit telecommunication firm could use broadband infrastructure regardless of who owned it. This is directly applicable to fiber installation and backbone utilization. This legislation in turn gave way to the establishment of Maryland Broadband Cooperative by support from the Tri-county councils in Maryland thus establishing the premise for a universal broadband deployment plan. The Rural Maryland Broadband Coordination Board, a nine member interagency board was also established by the senate bill 753 that is responsible for coordinating efforts to deploy broadband infrastructure in rural and underserved areas and for reviewing and approving all disbursements from the Broadband Assistance Fund, which is administered by the Department of Business and Economic Development (DBED).

Since passage of Senate Bill 753, the elected leadership of Southern Maryland has continued to work through the Council to pursue funding in cooperation with the MdBC, DoIT and private sector providers to advance state and federal funding for expanding the broadband infrastructure in Southern Maryland. The MDBC has been established as a successful statewide broadband cooperative and has taken on this role as envisioned by the 2005 regional broadband plan. This revised 2012 plan builds on the momentum of these previous efforts. The plan will

⁶ Maryland General Assembly (n.d.). Unofficial Copy of Senate Bill 753. *Department of Legislative Services*, from <http://mlis.state.md.us/2006rs/bills/sb/sb0753e.pdf>

be available in 2013 as the One Maryland Broadband Network is completed and made operational in 2013. The plan will inform the completion of the first statewide broadband plan in 2014. Continuation of the Southern Maryland Broadband/IT Planning Committee will facilitate additional monitoring, planning, grant writing and other activities required to fully achieve the recommendations of this plan.

Section II- Strategies and Objectives

Short Term and Long term

The short term strategies and objectives of the Broadband Deployment Plan are as follows:

- To determine the current status of the rural broadband expansion project
- To link 1,006 government facilities and “Community Anchor Institutions” throughout the region in the state
- To fulfill the goals for Broadband Technologies Opportunities Program (BTOP) applicable as per National Technology and Information Administration:
 - To support the deployment of broadband infrastructure, enhance and expand public computer centers and encourage sustainable adoption of broadband service
 - To deploy new or improved broadband Internet facilities (e.g., laying new fiber-optic cables or upgrading wireless towers)
- To identify the continuing barriers to investment in broadband deployment plan and adoption of the broadband itself
- To document the opportunity cost caused by a lack of adoption of broadband to date

The typical timeframe for achieving short term goals ranges from 2-3 years.

The long term goals of this project are given below:

- To develop five and ten year demand forecasts for broadband
- To create a set of action items to improve the adoption of broadband service statewide
- To collaborate with broadband service providers and information technology companies to encourage deployment and use

- To facilitate information exchange regarding use and demand for broadband services between public and private sector users

The typical timeframe for achieving long term goals could possibly range anywhere from five to ten or ten plus years.

Infrastructure Issues

Many of Maryland's rural communities have traditionally been served by telecommunications carriers through low-speed dial-up or limited-range DSL. Inadequate infrastructure has been a significant barrier to diversification of the rural economy and an obstacle to the development and recruitment of new industries. A major component of infrastructure that could support broadband includes a fiber optic backbone for broadband deployment, however, a continued review of emerging technologies must be considered. The following describes vital assets, including the networks that need to be considered when looking into the infrastructure of Southern Maryland⁷.

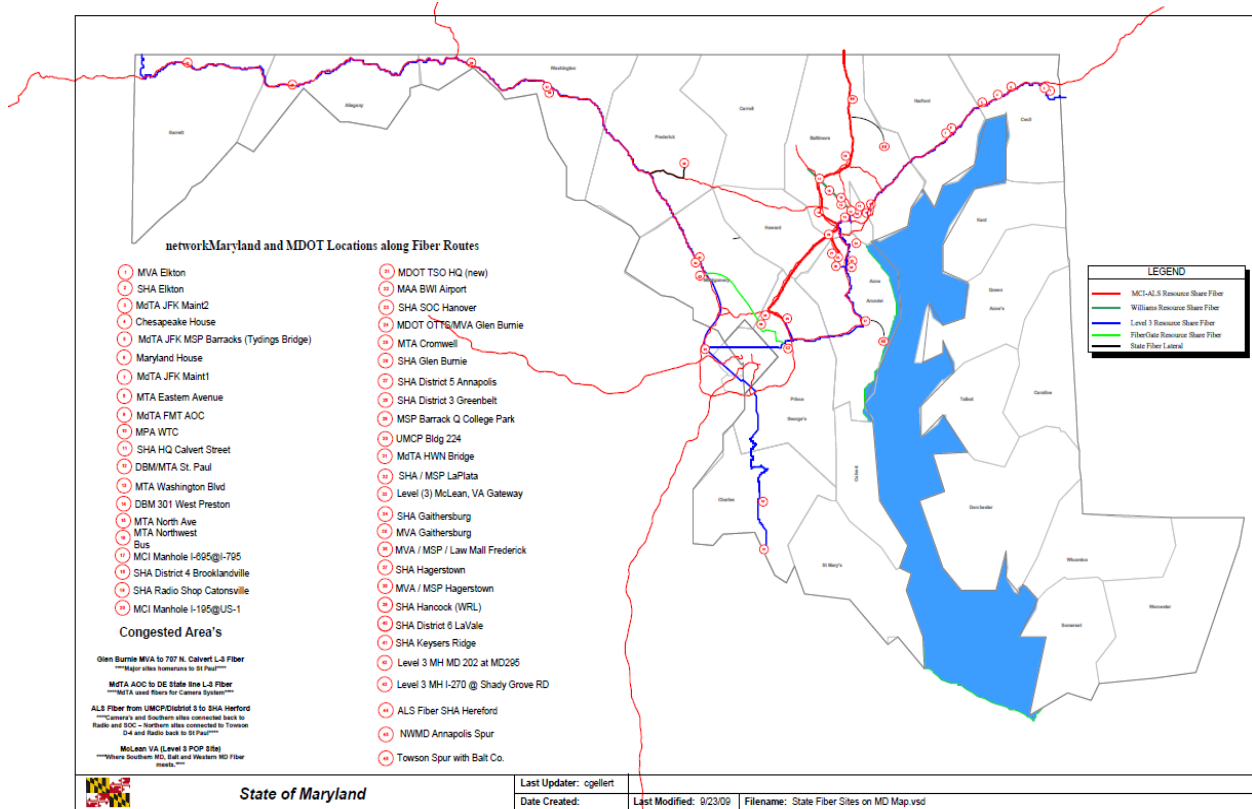
Fiber Optic

The criterion laid out in the environmental assessment project for One Maryland Broadband Network (OMBN), the middle mile infrastructure project, suggests that the traditional commercial services would not be able to fulfill the needs of the public sector CAIs (Community Anchor Institutions). Therefore, only a community-owned fiber optic based solution would satisfy the demand for low ongoing operational costs, scalable broadband services, and community access. Many companies own at least some fiber in Southern Maryland. These companies include Verizon, Comcast, Metro Cast, SMECO, and long distance companies like Qwest and AT&T. Additionally, there is some fiber owned by the U.S. Government to serve areas of the military and other government installations in the area. DoIT

⁷ Southern Maryland Broadband Study. (2005). Southern Maryland: CCG Consulting Inc

advises that Maryland currently has a fiber optic backbone totaling 2,456 miles. This includes the state-owned network Maryland and Maryland Broadband Cooperative (MdBC) network which will be introduced furthermore later. The following figure 2 shows the network Maryland and MDOT (Maryland Department of Transportation) locations along fiber routes as of 2009.

Figure 2: network Maryland Fiber Routes



The current anchor institutions in Southern Maryland will need to be connected using a fiber backbone that should have the ability to support last mile connectivity for the residences and businesses from other private investments. Currently there are a total of 1377 anchor institutions including both recent and planned ones in the region broken down as follows in Table 3.

Table 3: Number of Anchor Institutions in Southern Maryland

Categories	Number of Anchor Institutions
K-12 Schools	100
Libraries	22
Medical/Healthcare	941
Public Safety	104
Higher Education	13
Other Government	103
Other Non-Government	94
Total	1377

For detailed information regarding the location of these anchor institutions, please refer to Appendix A, Table 18 through Table 36 for Calvert, Charles and St. Mary's County. Also Appendix A, Table 37 through Table 39 provides the lists of planned anchor institution locations.

These anchor institutions represent a wide range of community organizations such as libraries, senior centers, and public safety and educational facilities. The fiber optics would need to be installed aurally on existing utility poles or placed underground in 2" conduits and contain fiber resources to be shared on an open-access basis with commercial operators (as required by BTOP). As of 08/14/2012, 52 miles of conduit and fiber are under construction at Charles County; fiber will be connected through route 2 from Northern Calvert to Anne Arundel County up to route 5 intersection and 75 percent of fiber construction is completed in St. Mary's County.

Wireless Antennas

The infrastructure required for a wireless system is communication towers, equipment shelters and microwave and/or fiber connectivity between sites. This would be an alternative to replace fiber optic cable hung on existing pole lines with radio towers and microwave radios. It would require construction of radio towers, each reaching a height of 40 to 400 feet above ground level. Multiple large antennas would have to be installed on the towers (six-foot dish antennas in some cases), and huts with radio gear and diesel generators would have to be installed at the base of each tower. Currently, the five identified hut locations in Southern Maryland as provided by MdBC are in Laplata, Leonardtown, Prince Frederick, Bryan Road, and Nanjemoy.

Every wireless provider that uses a licensed spectrum (such as cellular and PCS) in Southern Maryland must register the location of their transmitters with the FCC. Most companies that erected wireless towers make extra revenue by leasing tower space out to other wireless providers. It is not mandatory that tower owners share space, but it is beneficial that extra space is leased to others. In fact, the majority of towers in the U.S. is owned by investment firms that own towers, but does not offer wireless service.

The Counties take some role in tower ownership as well. Charles County has made its facilities available to wireless providers. Charles County leases six water towers and seven antennas through American Tower Corporation (ATC). ATC is the largest antenna manager in the country. Calvert County owns the land under most towers but does not own the towers whereas St Mary's County occupies space on 3 towers and owns the land that the Leonardtown Tower occupies and is deploying an upgraded 911 communications system that will add 2 water towers and 5 additional county owned towers.

One Maryland Broadband Network

The Department of Information Technology (DoIT), as a part of public-private consortium deployed One Maryland Broadband Network (OMBN) with \$115,240,581 in grant funding awarded in September 2010 for the purpose of connecting 1,006 Community Anchor Institutions (CAI) throughout the region. It seeks to promote affordable and abundant broadband in each of Maryland's 24 jurisdictions. The expectation is to build 1,294 miles of new high speed internet fiber optics which will directly connect and serve 1,006 community anchors and other points of interest including 458 schools (K-12), 262 public safety facilities, 189 government facilities, 44 libraries, 21 community colleges and other anchor and community support organizations. It includes three primary partners: networkMaryland (operated by Department of Information Technology), Inter-county Broadband Network (ICBN), and the Maryland Broadband Cooperative (Mdbc). These three partners are existing independent networks interconnected and extended through the OMBN project⁸.

networkMaryland

“networkMaryland is the State's private high-speed network that supports public sector data transport and common service delivery. It is built using a combination of existing fiber optic cable assets and the installation of additional fiber and wireless infrastructure. The network was created from an initiative to utilize resource shared fiber optic cable assets throughout the state to provide affordable, high-speed broadband to all areas of the state and to provide cost savings to the state of Maryland. It provides a cost effective solution for wide area connectivity, internet connectivity, the Statewide Government Intranet that allows agencies to host and share common applications and Intra-LATA transport services allowing the

⁸ Maryland Department of Information Technology (n.d.). One Maryland Broadband Network Scope.
doit.maryland.gov

customers to forego the long distance costs associated with a public network”⁹.

networkMaryland provides communication between the Internet and its internet service customers. networkMaryland’s Internet Service is analogous to the routed services provided by a traditional Internet Service Provider (ISP). networkMaryland will provide the routed infrastructure over which its internet service customers will communicate to the World Wide Web community. Currently, the project team of networkMaryland has completed the installation of an OC-48 SONET ring between the core PoPs (Points of Presence) of College Park and Baltimore and Annapolis. The fiber ring is designed with both hardware redundancy and fiber diversity to increase the overall reliability of the network. The network will continue to expand in the future, as customer demand increases. The future for fulfilling customer needs is positive with many ongoing discussions to connect the state data centers together for back up, to create an educational PoP in Baltimore and carry other agency traffic. Each of these projects requires high speed bandwidth and reliable connectivity that networkMaryland can deliver in the future. A DWDM ring has been created through a partnership with USM and MDOT. It provides an additional fiber route for diversity⁹.

networkMaryland is a resource for government agencies throughout the state. However, networkMaryland does not allow commercial uses of the network and it cannot be used to supply bandwidth to businesses.

Maryland Broadband Cooperative (MdBC)

Maryland Broadband Cooperative is a member-owned and operated fiber optic network designed to deliver an advanced, world-class broadband network across the rural communities of the Eastern Shore and Southern and Western Maryland, fostering economic development, supported by its members who will provide Last

⁹ NetworkMaryland™ FAQ; Maryland / Department of Information Technologies; DoIT Home;
<http://doit.maryland.gov/support/Pages/nwmdFAQ.aspx>

Mile services. The MdBC is positioned to work with local communities and their regional councils, DBED and members to develop the full economic potential of this world class high-technology network. St. Mary's, Charles, and Calvert Counties are members of the MdBC. The role of MdBC is to provide advanced telecommunication network infrastructure via private/public partnership; construct manage and operate the network, which will include experienced telecommunications network providers, through strategic alliances. Similarly, it also provides a network architecture including a route that traverses the Eastern Shore, Southern and Western areas of Maryland, provides connectivity to industrial parks; brings economic development and quality-of-life benefits to the region including leveraged funds from the DBED, EDA, Department of Agriculture, and other State & Federal sources; and finally to create substantial economic development/competitive advantages for each region. On June 23, 2011, MdBC selected Infinera, an industry leading optical equipment manufacturer based in California for the statewide ROADM-based optical network because of its simplicity, scalability and efficiency in building regional and metro networks¹⁰.

As an open-access transport company, MdBC does not provide retail services to the public but provides the transport components to connect its' with Tier 1 internet providers. The members of MdBC may acquire competitively priced lit services from MdBC at speeds ranging from 10 Mbps to 100 Gbps. Under unique circumstances, members may acquire dark fiber optic strands on a long-term lease. MdBC can also solve deployment challenges by offering members access to an MdBC node facility for locating their equipment or a secure communications cabinet for backup data storage and retrieval. MdBC can leverage its existing right-of-way agreements to build new cost-effective open-access fiber spurs into end-customer premises. Through

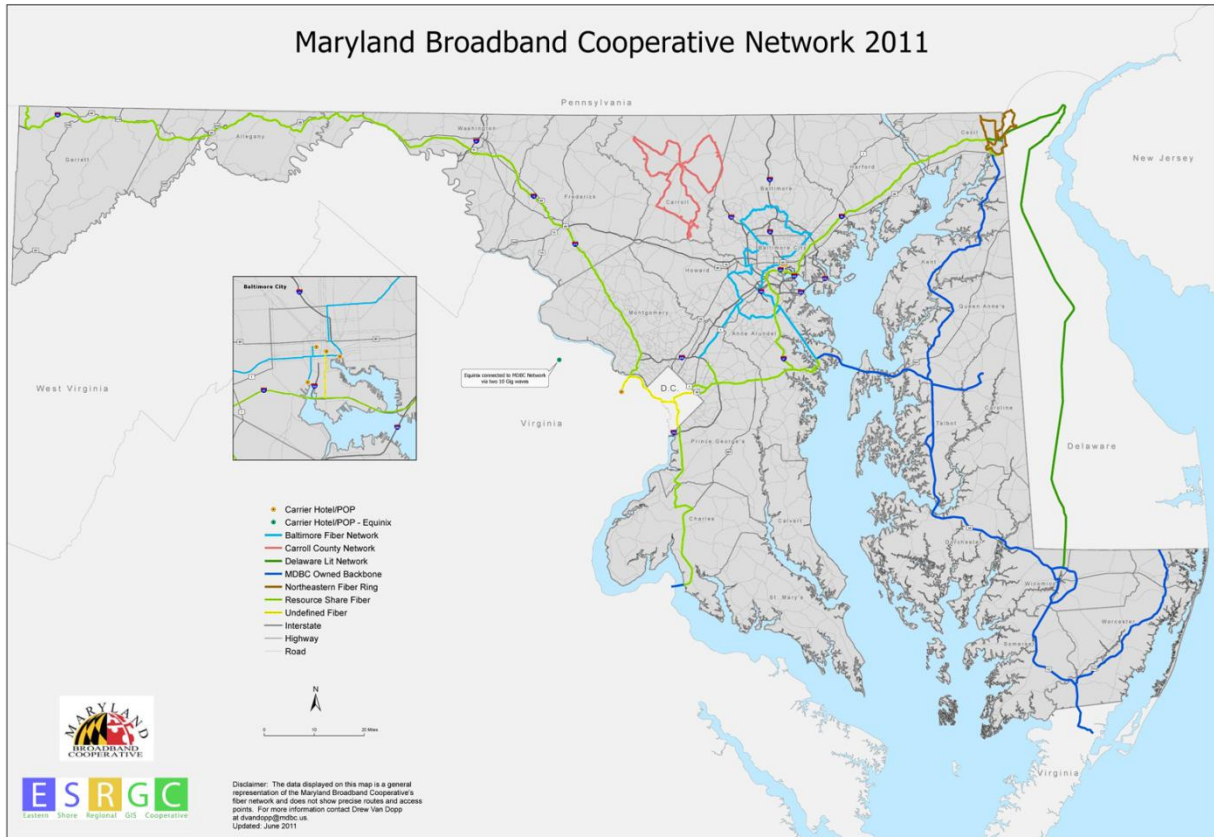
¹⁰ About MDABC | Maryland Broadband Cooperative. (n.d.). *Maryland Broadband Cooperative*. Retrieved February 23, 2012, from <http://www.mdbc.us/about/>

the MdBC network, members will be capable of providing the performance and flexibility necessary to broaden the global market for rural Maryland.

As a middle mile fiber provider, MdBC provides good layout of world-class infrastructure for enabling the providers to offer the services to the end users of broadband. It has access to both existing fibers and future fibers to be installed. “The Resource Share Agreement (RSA) between the State of Maryland and MdBC provides important fiber assets that will extend the reach of its members from the Delaware border to Southern Maryland to Keyzers Ridge (Western Maryland). It will also add to MdBC’s valuable network diversity with fiber hotel connections in Baltimore, McLean and Ashburn, Virginia”¹¹. As part of the OMBN project, MdBC is receiving grant funds to acquire telecommunications shelters (Points-of-Presence) and industry leading optical equipment to optimize the service value of existing and future fiber networks.

The following figure 3 shows various network and coverage throughout Maryland from MdBC in 2011, prior to the deployment of the One Maryland Broadband Network. See Figure 1 for the combined deployment of the fiber covered under the public/private sector resource share agreement between DoIT and MdBC that becomes fully operational in 2013. Neither of these maps shows the fiber routes for I-Net fiber for Charles and St. Mary’s Counties’ franchise agreements or other member fiber assets available to resource share through future agreements.

¹¹ Maryland Broadband and state government begin sharing fiber resources to benefit all of Rural Maryland. (2011). *Maryland Broadband Cooperative*; <http://www.mdbc.us/news/marylanbroadband-and-state-government-begin-sharing-fiber-resources-to-benefit-all-of-rural-maryland/>



In the end, to the extent that any of these existing networks today, or such networks constructed in the future might provide links that would be useful to a greater Southern Maryland network, then all networks discussed above would be considered part of the long term solution. Both legal and other restrictions can eventually be overcome as long as the issues have been identified and contingency plans have been developed.

Moving on to the potential infrastructure issues, the number of existing CAIs and utility poles might not be sufficient for providing broadband to all of rural Southern Maryland if fiber optic is to be installed aerially. Such issues can be avoided by restricting the aerial alternative route to places where utility poles already exist. However, since Southern Maryland focuses on the underground construction of fiber,

issues related to the aerial alternative are trivial. Moreover, regulations typically require pole owners to lease space for installation of additional cable to utilities such as, electric, telephone, and cable TV; but non-utilities such as, State and agencies and fiber owners can be denied. Other issues with utility poles could be that the heavy storms and wind may affect the reliability of the network and are aesthetically less attractive. (As previously mentioned, for detailed information regarding the location of these anchor institutions in Calvert, Charles and St. Mary's County, please refer to Appendix A, Table 18 through Table 36 and Table 37 through 39 for the lists of planned anchor institution locations). Besides mentioned issues, the new building construction in Southern Maryland will require additional infrastructure that again could make the project cost prohibitive and provide only a small fraction of the capacity produced by dedicated fiber optics for anchors and commercial operators. As per 2010 data, the number of new authorized housing units in Southern Maryland is 1203.

One of the other infrastructure issues is a finite amount of spectrum and a growing demand for it. "Spectrum is the range of electromagnetic radio frequencies used to transmit sound, data, and video across the country. It is what carries voice between cell phones, television shows from broadcasters to your TV, and online information from one computer to the next, wirelessly"¹². The problem is providers who hold spectrum license only serve selective markets and not necessarily the rural part of Southern Maryland. For more information on the list of providers holding spectrum license in the region and the market it serves, please refer to Appendix A, Table 40).

¹² About - Reboot.FCC.gov ; Spectrum Dashboard ; Reboot.FCC.gov;
<http://reboot.fcc.gov/reform/systems/spectrum-dashboard/about>

The recent agreement of US government to auction the wireless spectrum for better mobile service and to open up new frequencies for next-generation Wi-Fi networks provides hope for limited spectrum availability in Southern Maryland. As Time Magazine mentioned, “Mobile companies like AT&T and Verizon Wireless can buy chunks of wireless spectrum and then deploy it for next generation 4G networks to address the bandwidth crunch fueled by exploding wireless-data usage.” Access to such additional unlicensed spectrum implies faster, more reliable service for streaming movies, videos, games and other services requiring heavy bandwidth, also the mobile devices such as smart phones can connect to long-range super Wi-Fi networks¹³.

Access Issues

The issue of providing access to broadband for rural Southern Maryland is categorized into two sub issues. They are geography and user category issues that are explained below.

Geography/Coverage Issues

Southern Maryland is surrounded by the Potomac River and the Chesapeake Bay on three sides. The Patuxent River flows into the Bay and separates Calvert County from St. Mary's and Charles Counties. Southern Maryland has 1,082 square miles of land captured within 700 miles of pristine shoreline. The three counties of Southern Maryland are located in Atlantic Coastal Plain and are easily reached by water¹⁴. Calvert County is the smallest county in Maryland with only 213 square miles of land. It is bounded by the Chesapeake Bay on the East and the Patuxent

¹³ Wireless Windfall. (2012, March 5). *Time*, na, 11.

¹⁴ About the region; Regional Information; Tri County Council for Southern Maryland - TCCSMD; <http://www.tccsmd.org/index.cfm?content=63&Menu=3>

River on the west. Steep cliffs and woods are abundantly present on the bay side¹⁵. Charles County has area of 499 square miles and is bounded in the West and South by the Potomac River. Its surface is low and sandy. St. Mary's county is the oldest county in the state with 429 square miles of land. It forms a Peninsula on the southwest side by the Potomac River; by the Bay and Patuxent River on the Eastern side. This county is not very elevated, but is well drained by the creeks and branches. The south eastern side is mostly level and low whereas the North-Western side is higher elevations and undulating¹⁶.

Keeping the geography of Southern Maryland in mind, there could be issues with fiber optic underground construction for broadband implementation. For example, limited fiber will be constructed in areas where the wetlands are widely spread, which is throughout Charles County. The water, bridge and railroad crossings could be potential geographical issues as well for reaching all of rural Southern Maryland. The following table shows the existing number of water, bridge and railroad crossing in each county.

Table 4: Number of Water, Bridge and Rail Road Crossing in Southern Maryland

Counties	Water Crossing	Bridge Crossing	Rail Road
Calvert	10	13	-
Charles	5	6	3
St. Mary's	19	6	-

Source: Environment Assessment Report 2011

¹⁵ Calvert County Profile; Visitor Guide; Calvert County; <http://www.co.cal.md.us/visitors/profile/>

¹⁶ Martenet, Simon J.; *Charles County*; S.J. Martnet. Baltimore; David Rumsey Historical Map Collection; <http://www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~36618~1200505:-Text-Page---Charles-County->

User Category Issues

The broadband users/consumers including both household and businesses would like to be able to evaluate service offerings to see if they are likely to meet their needs. These services, which the consumers want, would need to be accepted as profitable, then developed, invested in and deployed by the providers. There could be issues with identifying the kinds of applications that users are likely to find useful and desirable, and also determining the benefits that different segments of the public anticipate from access to broadband services. With various applications that the users use, there would be a problem of providing high levels of bandwidth. For example, high capacity is a requirement as more users upload their content to the cloud to share and sync it across multiple devices. In addition to reliability issues for applications, affordability could be the another challenge as access requires owning a computer or device and having a connection which makes the ownership a bit costly¹⁷.

Speed Issues

As per the goal mentioned in the national broadband plan, “Every community should have affordable access to at least 1 gigabit per second broadband service to anchor institutions such as schools, hospitals, and government buildings.” However, in terms of Southern Maryland, it is not quite feasible yet due to various issues discussed in this report. The Counties’ schools are currently at capacity for Internet bandwidth, and are typically not interconnected except by high-cost, low-speed connections, not suitable to support the demand for network-based educational tools; its libraries may not have sufficient bandwidth to meet the public need for internet access; and its public safety entities, including fire houses and police stations, may not adequately meet their communication needs. Though 1 gbps could be an ultimate

¹⁷ Eisenberg, Jon; *Results from CSTB studies apropos broadband benchmarks*; The National Academies;
http://www.broadband.gov/docs/ws_benchmarks/eisenberg.pdf

goal, getting to the speed for heavy users that is 15 Mbps or above would be an initiating point for now since the area does not have access to required speed. In fact, considering the advancement in technology 10 gbps is going to be the next big technology, but it is not quite possible yet in rural areas of Southern Maryland. The following table shows average download and upload speeds for the counties in the region. Average download speed is the time it takes for a user to, for example, have a webpage up or stream a video. Average upload speed is the time it takes for a user to put any information, document or video up in the internet.

Table 5: Average Download and Upload Speed

Southern Maryland	Average Download(kbps)	Average Upload(kbps)
Calvert	11532	2764
Charles	11823	3132
St. Mary's	7772	1867

Source: mdbroadbandmap.org

For the detailed information on the speed as per the provider please refer to the Appendix A, Table 41.

“What is Broadband?”

In general, broadband refers to high-speed internet access, which is always on and faster than the traditional dial-up access. Broadband uses low-frequency electric signals to carry ordinary phone calls and higher-frequency signals to carry internet data. It provides higher-speed data transmission and allows more content to be carried through the transmission “pipeline.” The highest quality internet services such as streaming media, VoIP (Internet phone), gaming, and interactive services are feasible via broadband. It is increasingly necessary to access the full range of services and

opportunities that the internet can offer¹⁸. The definition of broadband may include identifying the kinds of applications that users are likely to find useful and desirable, and determining the benefits that different segments of the public anticipate from access to broadband services. Keep in mind, too limited a definition could result in a mismatch between expectations and capabilities, while an unrealistic definition could prompt inappropriate or poorly aimed policy interventions.

Cost and Competition Issues

The entities listed below are key components to ensuring the success of broadband implementation and each must be carefully considered when deploying the plan. Cost and competition issues could support in potential strategies for overcoming push-back from each entity listed below.

Rural Area Premium

The rural area premium alludes to additional costs for users of broadband in rural areas. Often rural area residents and business owners will have to bear the cost for a service provider to come to their area where service is limited and essentially build additions to the network to connect that particular user. For example, franchise agreements in Charles County clearly indicate that areas to be served are determined by population density. Increasing the fiber backbone would leverage the anchor institutions and/or connectivity which could reduce the extra charge for rural users in terms of construction/installation in order to acquire broadband. Due to the low population density in rural areas service providers have to charge the rural users for installation because there was no perceived cost benefit in servicing such regions.

¹⁸ About | Broadband USA – NTIA; Broadband USA; <http://www2.ntia.doc.gov/about>

Some of the findings from 2005 Southern Maryland Broadband Study conducted by CCG Consulting Inc. are still relevant issues regarding broadband implementation. The study found that, “Prices are perceived as being too high. Many businesses complained that prices in Southern Maryland are significantly higher than prices in the Washington, DC metropolitan area.” Prices are perceived to be higher because before the broadband initiative many service providers charged users with their installation and construction fees, thus greatly increasing prices. While the price gap for residents and business owners between Southern Maryland and the Washington, DC area may be smaller today, the perception is still current. The reality that residents perceive prices are higher in Southern Maryland than any other area may hinder the acceptance of adequate broadband coverage in their areas.

As high quality broadband is being made available to the public via Community Anchor Institutions, the residents will become more familiar with the services. As users’ awareness of broadband capabilities increases, there will be a greater demand for service as the value placed on adequate broadband rises as well once they incorporate it into their daily lives. Initially, residents may not perceive or understand the benefits of having adequate broadband so user education may be a separate community initiative in itself. In fact, the FCC has already begun programs to increase computer literacy and communicate the benefits of universal access.

One of the major selling points of the implementation initiative is the near elimination of installation fees charged to rural users. Following is an excerpt taken from 2005 study as an explanation of the costs charged by one of the providers to its consumers.

“The installation policy was seen as a significant barrier by many companies. As a result the cable modem solution was found to be uneconomical for most small and medium sized businesses. The provider essentially charges full construction costs to add a business customer to its network. Businesses installation quotes ranged from \$450 to \$30,000 in order to obtain service from this provider.”

While this information is specific, the perception of high installation rates was a major deterrent for businesses and residents. Employing broadband solutions in rural Southern Maryland will alleviate the initial resistance from residents and businesses who are hesitant to support universal broadband access due to the high cost perception. If metropolitan areas like Washington, DC are the benchmarks for adequate access pricing, removing or reducing the installation fees will assist in recognition and support of the OMBN infrastructure initiative.

Providers

While service provider involvement is one of the last mile issues to be solved, the presence of provider issues in the future is current and pertinent to evaluating the goals and objectives of successful broadband implementation.

Appendix A, Table 41 shows the current list of service providers in Southern Maryland Counties with associated download and upload speeds. While many of the listed providers have the capacity to provide adequate access, few of them reach their capacity in rural areas, if they provide any access at all.

Competition between service providers will be a key component to achieve the goals and objectives of the National Broadband Deployment Plan. A risk mitigation plan is recommended to manage the relationships of major service providers in the area once more customers become available due to broadband expansion. The risk lies in the possibility of a major service provider coming into rural areas and establishing a monopoly. Competition among service providers is needed to keep prices reasonable for users. To balance the risk there will be significant opportunities emerging for new smaller scale providers. Once Broadband access becomes widely available, new service providers may emerge to service smaller regions. In turn, this will ensure that prices remain competitive for rural users while also stimulating business growth in Southern Maryland.

One of the main issues facing provider competition risk as mentioned before is if one of the providers tries to establish a monopoly in the rural areas, and thus subjecting rural consumers to non-competitive prices. One way to mitigate the potential for monopoly is to encourage fiber sharing among providers. Fiber sharing will allow multiple providers to gain revenues from rural consumers, while keeping prices competitive and affordable for rural users. Ultimately, service providers will be the facilitators of access for rural users and relationships with each other as well as emerging providers after implementation must be considered throughout the entire process. MdBC's membership, which includes public sector entities, counties, government institutions and non-profit organizations and roughly 35 Internet Service providers ranging from small businesses to large firms will have equal access to all MdBC's cooperative assets in Southern Maryland and across the state.

In conjunction with emerging service providers as well as positive relationships among existing providers, the costs of broadband access should prove competitive with other metropolitan areas in the region such as Baltimore and D.C.

User Coalitions

The existing social coalitions may want to employ training initiatives for their members as adequate broadband becomes available in their areas. Encouraging the emergence of other user coalitions will ultimately increase margins for the cost-benefit analysis. Once user coalitions develop training, awareness will increase, thus increased demand for broadband will prove beneficial for providers. The coordination of user coalitions will help communicate the demand for their services to service providers once broadband solutions are implemented. MdBC can act as a demand aggregator for the private sector. End users can inform MdBC of their current and future service needs, which MdBC can then publish to its membership base. MdBC members that are providers can then compete with one another to provide the demanded services to the private sector.

Public and private user coalitions will also be stakeholders in implementation because they could be leaders in community awareness and outreach. Coalitions like Small Business Administration (SBA), SCORE, local committees and organizations that are tasked with the challenge of interpreting how broadband will impact their organization. One of the examples could be participation of a small business in seminar with the SBA to train their employees on the power and advantages of increased broadband access¹⁹.

Partnerships

The fourth recommendation provided by the 2005 study suggests that providers could partner up to share costs of fiber construction.

“Today commercial firms widely accept the idea of partnering on fiber construction. Thus, when a fiber route is desired, the best economic way to get fiber built is to find somebody who wants the same or a similar route. Sharing can be done in a number of ways. More than one party can share the cost of construction. Alternatively, one party can build the fiber along with a long term lease from the second party to offset the cost of construction. Companies also widely share in the operating and maintenance costs on fiber routes. Years ago many companies wanted to have 100% control over their networks while today most companies see the economic sense in sharing costs.”

For providers, the construction costs would already be covered as the broadband initiative is implemented, maintenance and equipment cost isn't inevitable. Partnerships between service providers would prove beneficial in the management and cost distribution of maintenance over time. For partnerships to be a viable option, service providers would have to work together in maintaining fiber

¹⁹ Chapter 13: Economic Opportunity; National Broadband Plan; Broadband USA;
<http://www.broadband.gov/plan/13-economic-opportunity/?search=user%2bcoalitions#r13-3> (1/31/12)

lines thus sharing business. Each county would have to communicate with its service providers to determine a maintenance schedule including financial estimates based on useful life of equipment.

A different type of partnership that could be beneficial to Southern Maryland is the public-private partnership to assist and train local users and businesses. Training classes and workshops are currently being spearheaded by the digital literacy initiative created by the FCC.

Partnerships between anchor institutions could also provide greater proficiency in broadband usage as well as reducing staff training costs for anchor institution employees. Particularly, during the implementation phase anchor institutions could assist each other in developing best practices for each county to increase connections after the first few are established.

Cooperative

The Maryland Broadband Cooperative (MdBC) is a non-profit organization created by the Tri-County Councils and others to promote broadband coverage to rural users. Broadly stated, MdBC's goal is to establish comprehensive access to world-class broadband services in every rural Maryland jurisdiction, so that its members, who provide commercial and residential services, may offer the public retail broadband products they need to promote economic development, enjoy the benefits of advancing technologies, and add to the quality of life for all Marylanders.

MdBC is strongly committed to expanding broadband coverage in the three counties of Southern Maryland. In fact, when the One Maryland Broadband Network project is fully deployed, MdBC will control over 200 miles of fiber assets in the three counties of Southern Maryland. MdBC will also have 5 Points-of-Presence (Prince Frederick, Leonardtown, La Plata, Naval Support Facility Indian Head, and

Nanjemoy), from which its members can reach out to provide competitive broadband products to the community.

Technology Issues

The utilization of Community Anchor Institutions is critical to the deployment of technology to rural areas. Community Anchor Institutions are the locations identified by networkMaryland to serve as hubs in the middle mile of broadband access. The Anchor Institutions serve as the catalyst to widespread adequate broadband access because they are centers for technology innovation in rural areas that are unserved or underserved. There will be additional costs that are associated with the Anchor Institutions as there will be follow up maintenance and equipment needs for each institution. As seen in Appendix A, Table 18 through 36 for Calvert, Charles and St. Mary's County, the list of Community Anchor Institution locations are spread throughout each county to create a blanket of broadband access to all areas of the county. Locations surrounding the institutions will be able to connect to their fiber either by splicing or other agreed upon terms with the institution. As locations surrounding Anchor Institutions seek to use their fiber they will be responsible for purchasing the additional equipment to splice the network. The public anchor institutional programs will need to enter into agreements with DoIT on annual expenses for being serviced by the network Maryland fiber broadband routes.

Future Technologies

The focus of this section will be to identify which technologies will determine the role of broadband in the future. Rather than identify where all existing technologies will be in the future, we will center the attention toward technologies that will have the most influence moving forward. The rapid growth in technology has already deemed some current mediums obsolete or soon to be obsolete. A brief

description will be given for each old technology, and a significant focus will be placed on technologies that will drive change for the next 10 to 15 years.

As new technologies continue to enter the market, the demand for a fiber backbone will still be present to support technological advances. Demand for wireless connectivity facilitated by a fiber backbone is driving investment in wireless capabilities by service providers. The ultimate goal for fiber backbone installation is to bring maximum service to its users. As seen in Appendix A, Table 43 several of the current technologies are described in depth and categorized based on viability and future availability.

First the existing technologies in the current market are described to show superiority of fiber as a backbone infrastructure in the present and future.

DSL

Below are the findings from the 2005 study conducted by CCG Consulting.

“DSL speeds are expected to increase over time with new innovations. In the labs there have been DSL technologies tested with speeds up to 50 Mbps. However, the high bandwidth DSL variants tend to have characteristics that drastically shorten the bandwidth with distance. Distances for very-high-speed DSL is 1,000 feet or less and is expected to be useful in conjunction with Fiber-To-The-Curb (FTTC) deployments. A FTTC system would still require fiber traversing every street, but would replace fiber drops with copper drops and DSL. FTTH costs more than a FTTC system today, but can deliver tremendously more bandwidth.

Development labs are working toward DSL that might be able to generate as much as 100 Mbps. However, in real life all of the problems with copper would drastically lower the bandwidth that can be delivered. However, one would think that in looking out over a 30-year window that DSL with speeds of 50 Mbps might be

possible. Thus, 25 years from now DSL might grow to deliver 1/10 as much bandwidth as FTTH can deliver today.”

Relative to rural areas, DSL is not as practical or efficient as some other means of internet because the distance limitation of 1000ft is not realistic for users that may own a significant amount of land with none or few other residences within 1000ft. Additionally, any developments in DSL could not out trump the advantages of fiber because DSL proves cost prohibitive when compared to fiber. One of the goals of the broadband initiative is to increase average broadband speeds in rural areas thus eliminating the use of slow DSL connections.

Cable Modems

The following is an excerpt from 2005 Southern Maryland Report about cable modem and its future.

“Implementation of the Maryland Broadband deployment plan will phase out cable modems and DSL as the capabilities of fiber eclipse potential speeds provided by cable and DSL. The future of cable modems is very limited because this technology is hardware intensive and again will prove cost prohibitive for users and providers alike. For cable modems to be competitive with Fiber optics, user costs would have to decrease which is not feasible because costs associated with hardware upgrades extensively exceeds operational costs to maintain fiber over time. Essentially, the use of cable modems is not sustainable enough to survive the rapidly growing broadband market.

Wireless

Wireless technologies such as Wi-Max and Gigabit wireless could be utilized to provide extended bandwidth via an antenna or transmitter which would facilitate broadband access. One of the benefits of wireless broadband is the allowance of hotspots which gives certain areas free Wi-Fi and anyone can connect to the internet.

Specific to Southern Maryland wireless is a feasible option to satisfy some of the last mile issues.

“A fiber network is needed behind a Wi-Max system to feed the needed bandwidth to each antenna. A Wi-Max antenna needs as much as two DS3s of base broadband in order to serve customers. This type of bandwidth will only make sense when coupled with a fiber system. If the transmitters and receivers of this technology were made at a low enough cost, such a wireless technology could replace the drop to the house and act just like having a fiber to your house.”

Wireless and cable modem technologies are not to be confused with technologies that actually connect the broadband. They are simply a means to an end and not an end in itself. Cable modems and wireless routers can only be utilized if copper, fiber, or satellite exists to connect to the broadband service. Thus wireless and cable modems hardware and installations can be considered a middle man to provide last mile services- broadband to the end user via a broadband hub.

Satellite

The 2005 Southern Maryland Broadband study determined the following findings about Satellite technology.

Satellite systems have some inherent issues that make it hard to design competitive data products. Some of these problems include:

- Propagation delay. Satellites have an inherent 280 msec propagation delay due to the location of geo stationary orbit of satellites.
- Jitter. Jitter quantifies the effect of network delay of packets arriving at the receiver in any Ethernet system. Jitter is calculated by measuring the inter-arrival time of successive packets. Advanced data services need low jitter.
- Packet loss. Packet loss causes degradation of any real time service. Packet

loss is measured using BER (Bit Error Rate) – and advanced services needs a low BER.

- QOS and traffic prioritization. Packet switched networks are subject to congestion since data traffic is typically “bursty”. Congested networks wreak havoc for real-time services.
- Compression techniques and standards. The standard encoding scheme used with most satellite data uses very inefficient overheads and headers and wastes valuable data space.

However, the biggest issue with satellite data is always going to be cost despite its lower service speed comparison to the broadband service. Today, an Internet T1 over satellite costs at least \$900 per month and that price is not likely to drop in the near future. Satellite is becoming a viable competitor in rural locations, but it is never likely to compete directly with any urban or suburban network. At this point, there are no major companies out promoting satellite data and in addition, it is very hard for the average customer to implement a satellite solution.

The findings from the 2005 report are still relevant in 2012 because the costs to the end user are still much greater than other alternative broadband technologies. Satellite could not become a major competition to fiber installation until costs for satellite are comparable and competitive with fiber while providing the same reliability of fiber. Moreover, it only makes sense to those customers who absolutely do not have a broadband option and would like connection speed greater than that of dial-up.

Fiber Optics

At this time, Fiber to the home (FTTH) is the future of fiber. The greatest benefit of fiber to the home is it is extremely adaptable as technologies evolve. Corning, the originator of fiber optics describes fiber as, “unlike traditional cable or

copper wire, optical fiber offered telecommunications service providers nearly limitless bandwidth that could support the world's growing demand for voice, data, and video communications”²⁰. Fiber optics offers a robust technology that will evolve with the technological market. Corning also describes the benefits of fiber and its compliments to other technologies.

“Optical fiber serves as the backbone of these networks, with companion technologies such as wireless, coaxial cable, and copper, with hardware and equipment providing the connections that ensure signals are delivered to the world around us.”²⁰

While the companion technologies described above facilitates broadband access, a fiber backbone will be a necessity continuing into the future.

The 2005 Southern Maryland Report reveals some risks with current fiber in the region that may prove to be an obstacle for the attainment of a fully connected fiber network.

“Many companies own at least some fiber in Southern Maryland. This includes Verizon, Comcast, Metro Cast, SMECO, and long distance companies like Qwest and AT&T. Additionally, there is some fiber owned by the US Government to serve areas of the military and other government installations in the area. There is also fiber owned by networkMaryland.

None of the fiber owners would give us permission to include details of their fiber networks in our study. In most cases they were unwilling to share any information on current fiber infrastructure. In a few cases they had security concerns about revealing details of their network to the outside world.”

These networks for the most part seem to be built for each company’s own

²⁰ *Corning Optical Fiber | Fiber Basics Overview*; Corning Incorporated | Home. Web. 16 Feb. 2012.
<http://www.corning.com/opticalfiber/fiberbasics/index.aspx>

purposes and the networks are largely not coordinated or interconnected. The current broadband initiative can help integrate all current fiber installations if owners of fiber are willing to integrate. While the exact amount of current fiber is unclear, there is an opportunity that existing fiber may solve some of the last mile issues that Southern Maryland faces.

Experts are confident that the future of broadband relies on fiber and have no doubt that fiber will be the global answer to digital divide gaps. Ericsson posted an interview with Chris Holden the President of FTTH council and his assurance in fiber remained unwavering. Ericsson determined, “Most homes will be connected to the world via fiber-to-the-home (FTTH) within five to ten years, predicts Chris Holden, President of the FTTH Council Europe. Speaking at this year’s Broadband World Forum in Paris, Holden says future bandwidth demands can be met by fiber”²¹.

While fiber will eventually be surpassed by wireless there will be a continuing necessity for a fiber backbone thus supporting the construction and usage of fiber routes in Southern Maryland.

Beyond the means to provide broadband, there are new technologies in the market that can only be utilized if sufficient internet access is available. The following have become a critical means of socioeconomic development.

²¹ *Everyone Will Have Fiber-to-the-home in 10 Years: Holden. Ericsson.com.* 5 Nov. 2010. Web. 16 Feb. 2012. http://www.ericsson.com/news/101105_ftth_244218599_c

The Future of Mobile Technology

While internet access to home computers is a luxury that not all rural inhabitants enjoy, the push toward mobile communications is ever increasing and a key element towards the national plan to “Connect America”²².

LTE Mobile Broadband

Long Term Evolution (LTE) is a mobile technology based on the utilization of legacy radio frequency towers. LTE technology is continuing to progress and increase speeds labeled as LTE Advanced which is considered the true 4G standard.

A study by Erricson Research concluded the following:

“Apart from the requirement on backwards compatibility, LTE-Advanced should fulfill and even surpass all the IMT Advanced requirements in terms of capacity, data rates and low-cost deployment. This includes the possibility for peak data rates up to 1 Gbit/s in the downlink and 500 Mbit/s in the uplink. However, more important than the peak data rates is the possibility to provide high data rates over a larger portion of the cell.”

The key take away from the excerpt above is LTE’s capability to provide faster service over a larger area. This feature is particularly suitable to rural Southern Maryland as it will increase bandwidth in such areas. LTE is not to be confused with 3GPP or 4G as these are both stems branching from the LTE technology. 4G or 4th Generation is the current status of LTE-Advanced technology but the technology itself is not limited to this generation or speed²³.

²² Broadband & Government Performance; National Broadband Plan by Issues: Government Performance; National Broadband Plan: Connecting America; <http://www.broadband.gov/issues/government-performance.html>

²³ LTE-Advanced- The Future of Mobile Broadband. (n.d.). *Teleca.com*. Retrieved March 7, 2012, from www.teleca.com/Renderers/ShowMedia.ashx?id=2a8fb418-6c6d

The clarification of LTE or 3GPP and a comparison to the capabilities of LTE-Advanced (or what is currently called 4G) is shown in the table below.

Table 6: 3GPP and LTE Advanced Comparison

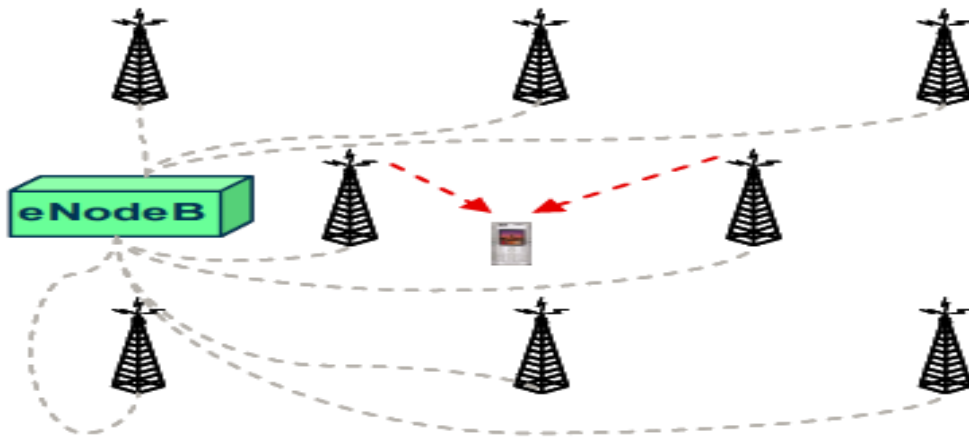
Performance Indicators	REL-8 LTE	LTE-Advanced
Peak data rate	Downlink- 300Mbps Uplink- 75 Mbps	Downlink- 1Gbps Uplink- 500 Mbps
Peak Spectrum Efficiency	Downlink- 15 [bps/Hz] Uplink- 3.75 [bps/Hz]	Downlink- 30 [bps/Hz] Uplink- 15 [bps/Hz]
Control Plane Latency	<100 ms	< 50 ms
User Plane Latency	<5 ms	< Rel-8 LTE
Scalable Bandwidth Support	Up to 20 MHz	Up to 100MHz
Capacity	200 Active users per cell in 5 MHz	600 Active Users per cell in 5 MHz

Source:Teleca.com

The table indicates that the emergence of LTE-Advanced will result in three times as much capacity in a cell as the former LTE technology and therefore will be able to serve more users in rural locations such as Southern Maryland.

One way LTE-Advanced is commercially distributed is via a multi-point transmission that increases speed and probability that a mobile device will acquire a signal.

Figure 4 Coordinated Multi-point transmissions



Speed capabilities of LTE Advanced technology substantially exceed the requirements of both light and heavy users and approach more closely the national goals for broadband access. The requirements of light and heavy users are discussed further in Section III. Sub-Section B.

Table 7: Data Speeds of LTE Advanced

LTE Advanced	
Peak Download	1 Gbit/s
Peak Upload	500 Mbit/s

Source: Teleca.com

LTE technology serves as both the greatest compliment and competition for fiber broadband. The peak download for LTE advanced is 1 Gbit/s and peak upload is 500 Mbit/s²⁴. Currently LTE capabilities in rural areas are growing thus instilling the

²⁴ Parkvall, Stefan; Dahlman, Erik; Furuskär, Anders; Jading, Ylva; Olsson, Magnus; Wänstedt, Stefan; Zangi, Kambiz (21–24 September 2008). "LTE Advanced – Evolving LTE towards IMT-Advanced" (PDF). Vehicular

advantages of broadband and bringing usage to mobile devices. Additionally, LTE 3G and 4G assists in the integration of a fully interconnected environment in rural areas. LTE capabilities also serve as a potential threat to effectiveness and reliance on a new broadband infrastructure because with the growing rate of mobile device reliance people are increasingly abandoning their desktops and laptops and increasing usage of mobile phones and tablets to serve their internet needs. It is unlikely mobile phones turn home computers obsolete, but the increasing demand for LTE capabilities and convenience may push for a faster adaptation to technological evolution than originally anticipated. In other words, LTE broadband has the potential to surpass fiber optics because the rate at which LTE has been gaining popularity with its fastest evolution is quicker than that of fiber²⁵.

LTE-Advanced is still a new and developing technology, while fiber is widely established and accepted by broadband users and providers. As previously mentioned fiber is also flexible and can easily adapt to changes in market expectations. It is unclear which technology will come out on top in the next 10-15 years but it is evident LTE and fiber optics will be subject to fierce competition. Additionally, the National Telecommunications and Information Administration (NTIA) comments,

“The Community Anchor Institutions map is the first map we are deploying for a mobile environment. Tap “Search” to enter an address and find the 25 closest facilities. The map will zoom to the request location, and each point will offer

Technology Conference Fall 2008. Stockholm: Ericsson Research. Retrieved 15 February 2012.

http://www.ericsson.com/res/thecompany/docs/journal_conference_papers/wireless_access/VTC08F_jading.pdf

²⁵ LTE Will Cannibalize Fiber, Promises EMobile | Telecom Asia." *News and Analysis for Asia's Telecom Operators* / Telecom Asia. Web. 15 Feb. 2012. <http://www.telecomasia.net/content/lte-will-cannibalize-fiber-promises-emobile>

information about the facility and any known broadband service details. Watch for additional maps to be included in the future”²⁶.

By making the broadband availability maps accessible via mobile device the notion of mobile broadband is applauded. Also, the broadband app continues to encourage the shift in usage of mobile broadband by all users. Another push for mobile apps comes from the FCC in their contest for community app submissions. Not only is mobile broadband usage encouraged by the FCC and NTIA it is being utilized as a tool for community development.

No matter the medium applied, the general public including users in rural regions will be using mobile broadband if they are not already employing it. Mobile broadband via fiber network is feasible and should be considered in attaining a competitive advantage against LTE and other future mobile technologies.

Cloud Computing

The National Institute of Standards and Technology describes cloud computing as a, “convenient, on-demand network access to a shared pool of configurable computing resources... that can be rapidly provisioned and released with minimal management effort or service provider interaction”²⁷. In short the cloud enables multiple users to access the same network simultaneously and to receive and view real-time data. One of the most simplistic and user friendly clouds is Google Docs where users can collaboratively create a document at the same time. Cloud computing is a rapidly growing tool for organizations to base their operations out of a

²⁶ "The National Broadband Map Goes Mobile." *Home Page / NTIA*. Web. 14 Feb. 2012.

<http://www.ntia.doc.gov/blog/2012/national-broadband-map-goes-mobile>

²⁷ The NIST Definition of Cloud Computing. (n.d.). *NIST National Institute of Standards and Technology*. Retrieved March 7, 2012, from <http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf>

web based site. The estimated cost savings for firms who utilize the cloud are almost unfathomable in that significant costs are eliminated just by using the cloud.

Again benefits of cloud utilization will trickle down to yield huge benefits for small to medium size businesses in rural areas as well as the anchor institutions. One example of the benefits seen in firms is the adoption of cloud email addresses in the account explained below.

“The Massachusetts-based company employs more than 9,000 people around the world. In examining ways to improve the efficiency of its technology and processes, Sensata's IT department decided to move its e-mail messaging into the cloud. Using Internet-based e-mail would slash the costs of its on-premise messaging infrastructure while actually improving reliability and scalability. Over a four-month period, Sensata Technologies migrated 5,000 mailboxes to the cloud. Employees gained the additional benefit of instantly upgrading to the most current version of the e-mail application, since the software is constantly maintained and updated by the provider in the cloud. The move to an online e-mail platform cut Sensata's e-mail costs in half, trimming \$500,000 from its IT budget and freeing up IT staff to focus on higher-value tasks”²⁸.

The implications of cloud utilization affect the bottom line of organizations by freeing up other resources to focus on other endeavors and continuous improvement. Cloud usage would be suitable for most businesses as a means to streamline processes securely and efficiently.

Further in Table 8 estimated speeds required to run the most common internet activities are listed. Operating a Cloud application would fall under real-time data

²⁸ Hodges, Craig. "Industry Week : Cloud Computing Rains Cost Savings, Productivity Benefits." *Industry Week - Connecting Manufacturing's Leaders*. Web. 17 Feb. 2012.

http://www.industryweek.com/articles/cloud_computing_rains_cost_savings_productivity_benefits_24337.aspx

collection which could require in excess of 100Mbps²⁹. At this point in time, Southern Maryland is not prepared to adopt such a data intensive application but with the endless bounds of fiber optics, it is likely that the cloud is not far away. Speed requirements for cloud operations greatly depend on the complexity of the cloud in question. For example, speed requirements will be much more forgiving if five people are simultaneously working on a document then if a firm of 2,000 people were concurrently reading, composing, and sending e-mails via a much more sophisticated cloud.

Table 8: Estimated Speed for the Common Internet Activities

Download Speed	Application	Minimum Broadband Technology
768K– 1.5 Mbps	Basic E-Mail, Web Browsing, VIOP- i.e. <i>Vonage</i>	Cable, DSL, BPL, Satellite
1.5 Mbps- 3 Mbps	Streaming Music, Standard Definition Video (SD), Remote Surveillance, Telecommuting	Cable, DSL, BPL, Satellite
3 Mbps- 6 Mbps	File Sharing (Small/Med Files), IPTV (Internet Protocol Television)	Cable, DSL, BPL, Satellite
6 Mbps- 10Mbps	Online Gaming, Video on Demand (i.e. Netflix)	Cable & DSL (>6 Mbps Only), Fiber, 4G LTE
10 Mbps- 25 Mbps	Telemedicine, Remote Education, IPTV High Definition (HD)	Fiber, 4G LTE
25 Mbps- 50 Mbps	HD Video Surveillance	Fiber, 4G LTE
50 Mbps- 100 Mbps	Video Conferencing (Multiple users), Remote Supercomputing	Fiber, 4G LTE, OC-1, OC-3
> 100 Mbps	Real-Time Data Collection, Real-Time Medical Image Consultation	Fiber, 4G LTE, OC-3

Source: Broadband Speed Guide

²⁹ Salway, David. "How Much Broadband Speed Do You Need?" *About.com Broadband*. 1 Oct. 2011. Web. 20 Feb. 2012. <http://broadband.about.com/b/2011/10/01/broadbandspeedtable.htm>

The significant gains to be had from applications such as cloud computing could only be enjoyed if broadband service is adequate enough to support the speeds required in optimizing such a tool. Additionally, sufficient broadband speeds are also required to operate more simplistic web-based tools such as social media networks that can be utilized as marketing techniques. The increased use of cloud computing, and social media are drivers that necessitate universal broadband access for rural users and especially for businesses.

The ever evolving technological environment will continue to challenge the speed and adequacy of fiber optic broadband, thus it is imperative that leading technological advances should reach rural Maryland.

Energy and Environment Issues

Much of the information available today is found via internet, aside from environmental benefits, universal broadband access will allow and promote rural area residents to educate themselves on energy efficient practices. Having the data at their fingertips will allow access to limitless educational tools for environmentally friendly initiatives. Increased broadband access will allow more rural residents to telecommute thus reducing toxins emitted into the environment from vehicles. Additionally, the information available on the web will again benefit the users and could potentially reduce electricity expenses for businesses and homes.

The environmental and energy issues discussed below are identified as key components in The National Broadband Plan: Ch.12 Energy and the Environment, as well as issues highlighted in the Recovery and Reinvestment Act of 2009.

Smart Grid

One of the many goals and objectives of the FCC's National Broadband Plan is to increase bandwidth to later support a Smart Grid to supplement the nation's reliance on foreign oil and fossil fuels. For a Smart Grid to be successful, there are

minimum speed requirements in all areas to utilize and contribute towards the nation's Smart Grid. The National Broadband Plan suggests:

“The amount of data moving across Smart Grid networks is modest today but is expected to grow significantly because the number of devices, frequency of communications and complexity of data transferred are all expected to increase. Various parties have attempted to estimate bandwidth requirements; none expect existing narrowband communications will be sufficient. Sempra Energy has found that it will require “pervasive mobile coverage of at least 100 kbps to all utility assets and customer locations.” Similarly, DTE Energy believes it will require connectivity of 200-500 kbps to support pole-mounted distribution devices”³⁰.

While the Smart Grid is not expected to be the main source of connectivity for several years, it is a foresight to be considered because the broadband initiative will thread closely with future speed requirements. However, as mentioned previously, estimating the future bandwidth needs is difficult as technology continues to rapidly evolve. It is difficult to pinpoint the exact needs in 15 to 20 years when a new technology could easily be introduced and become the preferred means of connectivity over fiber optics when considering speed capabilities.

As of 2012, Southern Maryland has been very proactive in exploring the capabilities and potential of a smart grid. SMECO has implemented an AMI Pilot Project of approximately 1,000 AMI meters in Charles County. Upon MD PSC approval, there is a plan to fully deploy AMI meters to the entire SMECO service territory (approximately 150,000 AMI meters) by 2014. As part of the AMI Project, SMECO plans to implement a Customer Web Portal, which will enable customers to

³⁰ Chapter 12: Energy and the Environment; National Broadband Plan; Broadband USA;
<http://www.broadband.gov/plan/12-energy-and-the-environment/>

obtain information regarding their electric usage and account. Additional “Smart Grid” initiatives will be explored and developed over the next few years.

Smart Homes and Buildings

There are a lot of “what ifs” in the technology industry with regards to changing the way we operate our lives. One of the objectives of Broadband Deployment Plan is to educate broadband users of the full potential broadband is able to provide with increased bandwidth. Smart homes and buildings are on the horizon for the general public and would compliment a Smart Grid in the future. Through the use of Mobile broadband, people can check their electricity usage regularly. The National Broadband Plan describes, “Even without price incentives, simply providing consumers better information about their energy use has been shown to reduce total consumption by 5-15%, equating to savings of \$60-\$180 per year for the average American household.³¹ Making better information widely available would result in billions of dollars in savings per year by consumers and businesses”³¹.

While smart homes and businesses are not in the immediate future for rural area users, there are major benefits to be enjoyed by the users of broadband that include aspects of smart homes and businesses. Broadband access would allow users to be more energy conscious, because they could see their usage in real-time correlating to less energy expenses for home and business owners. The overarching goal to achieve is to keep the future of broadband in the mind of rural users in Southern Maryland, and to explore the possibilities and luxuries it may bring to their everyday lives.

³¹ Average Monthly Bill Data by Census Division, and State 2008, attached to EIA, Electric Sales, Revenue, and Average Price 2008 (2010). <http://www.eia.gov/cneaf/electricity/esr/table5.html>

Future Sustainable Information Technology

Creating a sustainable communication channel through information technologies is also a clear objective of the National Broadband Plan. While broadband will bring unquantifiable benefits to the Southern Maryland Region, it is the responsibility of each region to consider ways to make the benefits sustainable. One way regions can begin managing a sustainable network is to be conscious of those electronics that use up unutilized energy. The approach to sustain energy is to first manage current energy sources and reduce the demand for unused energy. After energy consumption is managed the transmission of energy must become more efficient so that the use of broadband is feasible without drastically increasing the electric bill.

Environmental Issues

While there will be long term benefits in energy efficiency and greenhouse gas emissions, there will also be some temporary environmental concerns with fiber construction. The Environmental Assessment conducted by Columbia Telecommunications Corporation (CTC) on behalf of OMBN described potential environmental consequences of fiber installation in detail. The Environmental Assessment found that, “while maintenance of underground fiber is minimal, there may be slightly higher green house emissions during construction because of the additional time and equipment needed for burial where underground conduit is not available...any increase would be temporary and would cease after construction. Moreover, emissions would be lower than the CEQ threshold.” Additionally, the soil and geologic condition was evaluated to reveal that, “because all construction will be in public rights –of-way and the type of construction does not alter soil content, no impact is anticipated on the geology and soil in the construction area under the preferred alternative.”

Also, the state of water resources was considered as an element of the Environmental Assessment conducted by the CTC. The report has determined, “there is no anticipated impact on designated wetlands and associated buffers. The preferred alternative relies on existing conduit and bridge attachments, thereby minimizing the risk of diversion of waters, erosion, and construction runoff.” It will be the responsibility of OMBN to make sure construction is in compliance with best practices determined by the “2010 Maryland Standards and Specifications for Soil Erosion and Control.”

Implementation of fiber will prove beneficial to Southern Maryland as adequate broadband will add extensive values through energy efficiency and environmental risk management. Environmental risk mitigation for construction will yield a cohesive backbone that serves Southern Maryland with adequate broadband to serve unserved and underserved residents. Additionally, the increased ability for employees to telecommute from home will reduce greenhouse gas emissions from fewer vehicles. Inevitably, efficiencies gained by proficient energy sources and educational opportunities will bolster Southern Maryland’s economic standing with reduced energy consumption and costs.

Public Policy Issues

The intricacies of public policy could by far be the most controversial aspect of the broadband deployment initiative. The last mile issues that will be covered more in-depth in sub-section F of Section IV will also present a challenge in monitoring and controlling after the broadband is implemented. However, the public policy issues and strategies for Maryland have been derived on the basis of the practices to deploy the broadband nationwide in Canada and Singapore, both of which have similar initiatives. (More information on the benchmark that Maryland can follow is described under Appendix D)

Singapore's national broadband initiative, Next Generation Services Innovative Program (NGSIP), suggests that Retail Service Providers (RSP) will be the catalyst to connecting users with the broadband network. If Maryland chooses to adopt a similar strategy, service providers will indeed be the key players in the last mile connection portion of implementation. Therefore, service provider buy-in is critical to the execution of the Maryland broadband initiative.

Similarly, Georgia has explored and begun implementation of the potential of treating broadband as a utility³². The press release in Columbia County, Georgia highlights an interesting component of their broadband implementation,

“The Columbia County Community Broadband Network project will include 60 free Wi-Fi hotspots in public locations such as parks, the senior center, libraries and community centers. Also, privately-owned Internet carriers will be able to lease access to the network to provide services to areas of the county without broadband web access”³³

The implementation strategy employed in Columbia County Georgia could also be an option for Southern Maryland because service providers could distribute broadband while leasing fiber usage from MDBC. If a broadband utility company or group of companies emerged, it is likely they would assume the role of on-going maintenance and implementation success. A risk of moving broadband to a utility is higher prices charged to users, as well as monopolization of one broadband provider over the region. Similar to electricity, a sole provider would have total price control and could adjust prices based on terrain complications or population density.

³² Fetter, Donnie. "Grant Will Bring Broadband Service throughout County | Columbia County News-Times." *Columbia County News-Times | The Web Site for the Columbia County News Times*. 7 Mar. 2010. Web. 14 Feb. 2012. http://newstimes.augusta.com/stories/2010/03/07/new_569090.shtml

³³ Columbia County: Fiber Installation Project." *Columbia Count : Home*. Web. 14 Feb. 2012. <http://www.columbiacountyga.gov/Index.aspx?page=4100>

Observing the implementation plans of other broadband programs will allow Maryland to select best practices that most appropriately suit the needs of each county.

Role of Government

Similar to Singapore's broadband initiative there must be clear cut guidelines of government involvement. Southern Maryland has the opportunity to choose how much continued involvement from DoIT and the infrastructure providers such as networkMaryland, Maryland Broadband Cooperative will be feasible and realistic for the region. Communication channels and schedules must be drawn and agreed upon to ensure continued service to broadband access in rural Maryland. The physical infrastructure provided by networkMaryland and MdBC will serve only as the foundation for network opportunities for Southern Maryland but ultimately unleashing such opportunities and developing a functional plan to connect to the residents and businesses relies on the service providers' consent to take responsibility. The Canadian approach to government's role on the other hand is far less aggressive than Singapore's involvement. Southern Maryland may find that using MdBC as an adversarial resource during and after implementation will be beneficial to monitor program success following the Canadian Broadband initiative.

In short, in order to achieve the successful broadband initiative; the extent of the role of government should be determined. There could be several ways to do this. One example is for the government to set the goals for the industry, leaving the industry to determine how those goals are to be achieved. Another example is for the goals to be established by the government and future penalties or incentives associated with achieving or not achieving those goals. A third example is the government could simply set the regulations and leave the goals and ways to achieve them up to the industry, allowing the private sector stakeholders to drive the success of universal access throughout Southern Maryland.

Maintenance and Control

Whether or not Southern Maryland decides to adopt a program similar to that of Singapore or Canada, the topic of monitoring and control must be addressed, specifically, the plan to maintain fiber networks over time and who will be responsible for orchestrating such activities. If the infrastructure providers are going to be leading maintenance plans, then expected future equipment and costs must be considered in the budget. If the anchor institutions are to maintain the quality of fiber, then they will have to consider this in their annual budgets as well. Similarly, if service providers shall be responsible, their budgets will be affected and it is likely that consumers may suffer as a result of spiked monthly fees to account for such maintenance costs.

Another issue that may arise as broadband continues to increase in public demand is the presence of a “broadband tax” which requires federal resolution as a component of a rural area premium. Different from a broadband service tax charged to each customer by the provider alone, a broadband tax would be a federal or state mandated tax charged to each consumer to allow continued government support of the universal broadband initiative. Such a tax would facilitate service providers and anchor institutions with the means to offset costs incurred from maintenance and equipment expenditures. Users may have to increase in their bill to sustain a functional infrastructure. Depending on the infrastructure issues mentioned in Section II, Sub-Section B, the costs associated with maintenance may be extensive for certain areas. Counties that have more diverse landscapes could potentially be subject to a higher tax.

Additional issues include but are not limited to low population density, lack of infrastructure, and high installation costs that may remain after OMBN’s infrastructure initiative. Also, the franchise agreements between service providers and counties are ambiguous in that there are no specific mandates for broadband

coverage; therefore providers are ultimately the determining factor in providing access. The answer to these issues will be the emergence of wireless. In other words what is the methodology attached to a particular home having adequate broadband access on one road and a home five miles down the same road not having an access? These issues stem directly from the cost benefit perception of service providers; however, the increasing push toward wireless will mitigate the occurrence of such coverage issues.

It would be advantageous to each county if a schedule was developed to track and measure success during and after implementation. Also, a regular risk analysis provided by OMBN of potential threats must be evaluated to consider road blocks during deployment. Such threats indeed are identified in the bi-weekly progress report found on OMBN's website which also provides updated connectivity maps for each county.

Section III- Strategies to Achieve Universal Access

In order to achieve the universal access, the following list of the users must be considered as they are the integral part of a broadband target. It is important to understand their technological needs and how broadband can be beneficial to them.

Residential Users

The activities that a household would typically be involved in that could use broadband are communication, education, entertainment and conducting business. They would be classified under the light users to moderate users needing 1 to 2 Mbps for basic service which includes email, internet surfing, basic video streaming and 6 to 15 Mbps for medium service including high-demand application; online gaming

and streaming HD³⁴. The minimum download speed for these activities is shown below³⁵.

Table 9: Minimum Download Speed Required for the Internet Activities.

Activity	Minimum Download Speed (Mbps)
Email	0.5
Web browsing	NA
Job searching, navigating government websites	0.5
Interactive pages and short educational videos	1
Streaming radio	Less than 0.5
Phone calls (VoIP)	Less than 0.5
Watching video	NA
Standard streaming videos	0.7
Streaming feature movies	1.5
HD-quality streaming movie or university lecture	4
Video conferencing	NA
Basic video conferencing	1

³⁴ For Consumers - Maryland Broadband Map; Maryland Broadband Map;
<http://www.mdbroadbandmap.org/Consumers.aspx>

³⁵ Broadband Speed Guide | FCC.gov; Federal Communications Commission.gov;
<http://www.fcc.gov/guides/broadband-speed-guide>

HD video conference and tele-learning	4
Gaming	NA
Game console connecting to the Internet	1
Two-way online gaming in HD	4

Source: Broadband Speed Guide

The current household population as per the counties for 2010 comprised of both with access to broadband and/or underserved and the unserved ones are depicted below. Similarly, the total number of newly authorized residential buildings is included as well³⁶ which means there would be an increased number of residential users to be served.

Table 10: Population and New Residential Building in Southern Maryland 2010

	Population 2010	New Residential Buildings
SOUTHERN MARYLAND REGION	340,439	1,203
Calvert County	88,737	221
Charles County	146,551	576
St. Mary's County	105,151	406

Source: US Census Bureau 2010

Please refer to Appendix A, Table 44 for the population change in past 10 years in these counties.

Given the population and the number of new residential buildings in each county, implies an increased need for broadband. Therefore, the inclined need obviously raises aggregate demand which could attract the providers to an area where

³⁶ 2010 Census, United States Census 2010; <http://2010.census.gov/2010census/>

service is not yet available. If this is accomplished, there would be significant personal and professional benefits for Southern Marylanders in enhancing their productivity to perform the activities such as web surfing, downloading videos or games and communicating at home at the given speed or faster than a given speed. Working from a residence, doing school assignments online at home will be easier as well.

Commercial/Industry User

Any business or industry, from small to large, rural to urban, manufacturing to service could benefit from access to broadband. Technology is a significant part of economic development for any company, and broadband is one of the integral parts of technology. “Broadband opens the door to a wealth of tools that businesses can use to streamline workflows, remotely leverage Information Technology resources (such as cloud computing), and take advantage of emerging social media marketing technologies. Broadband access can also reduce overhead costs through telecommuting, Web and video conferencing, and by extending the recruiting range for highly skilled personnel. Broadband is especially important for small, rural, and home-based businesses, because it helps level the competitive playing field. Broadband promotes innovation, enables operational streamlining, allows flexibility within the supply chain and greatly expands the customer base for small businesses”³⁷.

The Southern region of Maryland has a total of 6,353 business establishments as per 2009 census which is broken down as per county below:

³⁷ For Businesses - Maryland Broadband Map; Maryland Broadband Map;
<http://www.mdbroadbandmap.org/Business.aspx>

Table 11: Number of Business Establishments in Southern Maryland

Counties	Number of Business Establishments
Calvert	1840
Charles	2701
St. Mary's	1741

Source: Bureau of Economic Analysis 2009

These business establishments consist of sectors like construction, manufacturing, retail trade, wholesale trade, finance and insurance, information, professional, scientific and technical services, management of companies and enterprises and others. (For detailed breakdown of the industry as per counties, please refer to Appendix A, Table 45 for Calvert County, Table 46 for Charles County and Table 47 for St. Mary's County). As per 2009 data for Calvert County, the number of construction businesses is the highest amongst all other sectors that is 354 and the second largest is professional, scientific and technical services with 200 establishments closely followed by retail sector with 199. Similarly, in Charles County, the number of establishments under the retail sector is the highest with 518 establishments followed by construction with 398 establishments. St. Mary's County, on the other hand, has 298 professional, scientific and technical services establishments which were the highest followed by retail with 295 establishments and 282 for construction. The following table shows the total employment data for the selected sectors in 2009 for these three counties³⁸.

³⁸ Career and Workforce Information – Division of Workforce Development and Adult Learning; Maryland Department of Labor, Licensing and Regulation; date of data: 2010; <http://www.dllr.state.md.us/lmi/index.shtml>

Table12: Total Employment Data for Top 3 Selected Sectors with High Number of Business Establishments

Total Number of Employment per Industry	Calvert County	Charles County	St. Mary's County
Construction	3,344	5,443	3,274
Retail Trade	4,054	9,716	5,652
Transportation and Warehousing	649	1,682	2,475
Professional, Scientific and Technical Services	2,171	3,707	10,671

Source: Bureau of Economic Analysis 2009

(Please refer to Appendix A, Table 48 for average employment data for other sectors).

Light/Heavy Users

Not all of the industrial/business sectors are fully technologically driven. For example, the construction industry might not have to use 15 Mbps above speed compare to the professional, scientific and technical service industry which places the construction industry in the category of light user. However, the implication is that all the businesses use communication technology to some extent. With a high number of establishments for the industry such as professional, scientific and technical services and retail in the counties employing the highest number of people, high speed broadband would be necessary for making the business operation efficient as these sectors come under the heavy user classification. The commercial/industrial user would be categorized under moderate user (6 to 15 Mbps) or heavy internet user (15 Mbps above). In fact, even amongst these users, some of the industries or smaller companies could fall under light user (1 to 2 Mbps). As an instance, small construction business would not necessarily need 15 Mbps above capacity of

broadband for basic functions of emailing, web surfing, or video conferencing. The reason these sectors could be categorized under light, medium or heavy user depend upon the activities they are involved in with the number of employees, who are the actual users. The following table shows the classification of the kind of user on the basis of the functions that a business carries out along with the number of users³⁹.

Table 13: Classification of the Users

	Light Use(Basic Functions only: email, web surfing, basic streaming video	Moderate Use (Basic Functions plus one high-demand application: streaming HD, video conferencing, OR online gaming	High Use (Basic Functions plus more than one high demand application running at the same time)
1 user on 1 device (e.g., laptop, tablet, or game console)	Basic	Basic	Medium
2 users or devices at a time	Basic	Basic	Medium/Advanced
3 users or devices at a time	Basic	Basic/Medium	Advanced

Source: Household Broadband Guide

Government/ NGO Users

The majority of anchor institutions are Government or Non-Government entities. Particularly, networkMaryland has been a resource to provide a high speed network to all government agencies throughout the state by utilizing resource share fiber optics. These institutions have been of assistance in increasing bandwidth to provide adequate coverage to the rural regions in Southern Maryland. The following entities are critical to the success of universal access as many of them serve as hubs to supply broadband to the region. Creating and maintaining support from each sector

³⁹ Household Broadband Guide | FCC.gov; Federal Communications Commission.gov;
<http://www.fcc.gov/guides/household-broadband-guide>

below and especially anchor institutions will also be critical to broadband deployment success.

Universal broadband access will allow institutions across Southern Maryland to become more efficient in their practices and enjoy greater economic strength in their communities.

K-12 and Higher Education / Library / Museums

By deploying broadband to schools, libraries and museums in the region, instructors will have an access to high-speed world-wide instructional materials. A new infrastructure can allow online assessments of students and give the counties quicker ability to gather information on its student population.

Relevant to the education system, both public and some private schools are centers for anchor activity. Approximately 100 of the current anchor institutions in Southern Maryland are within the education sector including St. Mary's College of Maryland and Colleges of Southern Maryland such as community colleges with campuses in Calvert, Charles and St. Mary's County. Broadband access will provide a plethora of new resources to educators as well as the school systems that support them. A strategy to encourage private school involvement in universal broadband access is to regard private schools as businesses and incorporate them into the connection process in near future depending on each school's private funding.

Teachers and professors will now be able to utilize live video-streaming for student benefit and provide an infinite knowledge-base for their students via the World Wide Web. Also, students will have the opportunity to empower themselves to keep up with the world around them and will subsequently become better prepared to make informed decisions later in life.

Table 14: Total Number of Public and Private Schools in Maryland

County	Number of Public Schools	Number of Private Schools
Calvert County	26	15
Charles County	37	30
St. Mary's County	28	37

Source: Maryland State Department of Education, 2010

[Note: Includes elementary, middle, combined, high, vocational-technical, special education, alternative and charter schools]

The data shown in Table 14 shows the number of schools that will be influenced by broadband availability. Several schools listed above are already anchor institutions but the ones that are considered underserved or unserved have to face the challenge of disparity in the quality of education being provided.

Specific to libraries and museums, Appendix A, Table 19 depicts the locations of anchor institutions in Calvert County, Table 25 in Charles County, and Table 32 in St. Mary's County. Also, Appendix A, Tables 37, 38, and 39 shows the planned anchor institutions in all three counties in Southern Maryland, which will increase overall broadband coverage.

Additionally, SAILOR started in 1989 is a service extended by Maryland's public libraries that provides broadband access for public libraries, schools and local government. SAILOR also provides Maryland public library patrons with access to an extensive collection of research databases. SAILOR began because of the "Maryland public libraries' recognition that the future of meeting their customers' needs for information was electronic access to materials within and beyond the walls of their buildings." This evolved into the development of the state wide SAILOR Network,

launched in 1994 while the providing of the SAILOR Research Databases began in 1996. The SAILOR Operations Center, which manages daily operations, is located at the Central Library of the Enoch Pratt Free Library in Baltimore, Maryland. Overall supervision is provided by the SAILOR Advisory Committee, a subcommittee of the State Library Resource Center Oversight Commission, and since 2001 funding has been provided by the State of Maryland as part of the grant enabling the Enoch Pratt Free Library to serve as the Maryland State Library Resource Center. The SAILOR program would also benefit exponentially from increased broadband access⁴⁰.

Interestingly, in 2011 more than 8.5 million people used the internet at Maryland public libraries (more than 23,000 each day). Adequate broadband speeds are especially essential to meet the needs of these library users because in many communities, the public library is the only provider of free internet access.

Every day in public libraries around the state there are lines of people waiting to use the free computers and high speed internet to search for work, create a resume and apply for jobs online. Broadband is an essential part of getting people the information they need quickly.

Similar advantages apply to museums in Southern Maryland. Broadband is bringing more plentiful opportunities to increase community awareness, data sharing, educational and events activities and trip planning. Access to broadband could allow higher feasibility for social media marketing and touring for local museums and libraries to attract greater community activity and education. Adequate broadband access will improve the speed in which users of schools, libraries, and museums can explore the online world of unlimited information in a timely manner.

⁴⁰ Sailor (n.d.). About Sailor. *Sailor Maryland Public Library* from <http://www.sailor.lib.md.us/about/Default.aspx?id=54282>

Public Safety and Protection / Emergency Response

A component of the National Broadband Plan to connect America includes an initiative to, “Create a nationwide interoperable public safety wireless broadband communications network.” The initiative is a three step process, the first of which is addressed in the preceding plan to achieve universal access. The National Broadband plan describes the first step as,

“An administrative system to ensure that public safety users of broadband spectrum have the capacity and service they require for their network; they also should be able to leverage commercial technologies to take advantage of the vast number of applications and devices that are being developed for commercial wireless broadband networks.”

The strategic elements that compile the system described above are essential outcomes of the broadband deployment in Southern Maryland, thus emphasizing the need for successful implementation.

Public safety is one of the government funded entities that will be impacted by universal access. (Please refer to Appendix A, Table 21, Table 30 and Table 34 in Calvert, Charles and St. Mary’s County respectively for public safety Anchor institutions). Particularly in rural locations, police departments and emergency response facilities including public libraries must work closely with each other to provide fast and efficient processes to ensure community well being. Libraries are also resources affected by broadband in public safety facilities because Southern Maryland utilizes libraries as centers for disaster recovery contingency plans. Again a significant portion of current and planned anchor institutions are public safety and emergency response facilities to provide suitable means for helping those in need in rural areas.

Specific to emergency response facilities, adequate broadband would provide faster response time by accurate location information and instant communication to those in need. Public safety as a whole could benefit from universal access by exploiting the availability of information to observe and collect data to influence policy decisions. A critical advantage to adequate broadband deployment is gathering real time data to improve and increase efforts to ensure public safety. Unexpected threats such as, natural disasters and the like could be better managed by broadband by communicating perceived risks to community members faster and more efficiently. The impacts of adequate broadband could reduce the severity of catastrophic incidences.

To increase adequate coverage successfully, rural Maryland’s public safety and emergency response entities must recognize how universal broadband can improve the population’s overall quality of life.

Healthcare

Table 15: Total Employment in Health Care Services

County	Total Number of Employment in Health Care and Social Assistance	Total Number of Employment in Education Services
Calvert County	4,327	344
Charles County	5,739	647
St. Mary's County	5,168	1,200

Source: Bureau of Economic Analysis 2009

The table above shows numbers of individuals working in healthcare institutions, as well as those working within the education facilities. These employees in the given industry will ultimately be the users of broadband upon successful implementation.

The need of broadband is significant in the industry such as health with greater number of employment that has ability to impact each and every member of the community. Specifically, the application of telemedicine in the health industry requires adequate broadband facilities which would prove beneficial to the Southern Maryland residents. Such advantages are: the patients will have access to advance medical services without need for excessive travel to specialists, and telemedicine will also be a wonderful way to transfer knowledge among the professionals while reducing cost and increasing their productivity.

Likewise, there are other numerous opportunities for our healthcare systems to benefit from universal access to broadband. E-care is a growing means to treat patients in remote locations and maintain costs for providers. The application of such a revolutionary practice would only be feasible if the rural areas obtained adequate broadband speed. The National Broadband plan also emphasizes that, “Broadband and health IT will transform health care, simultaneously enabling better outcomes and lowering costs. Electronic Health Records and Remote Monitoring technology could alone create over \$700 B in net savings over 15-25 years. With the support of the Southern Maryland Tri-County Council, the Charlotte Hall, VA medical outpatient clinic has also enjoyed increased benefits from telemedicine providing higher quality care to the nation’s veterans in Southern Maryland⁴¹. Also, the clinic has experienced increased efficiencies by converting all records to electronic versions which yields decreased data errors and patient information confusion⁴².

The strategic take-away from the benefits described by the FCC (Federal Communications Commission) is that broadband cannot only decrease costs within

⁴¹ Tri County Council for Southern Maryland. (n.d.). *Tri-County Council for Southern Maryland - TCCSMD*. Retrieved March 27, 2012, from <http://www.tccsmd.org/index.cfm?Content=15>

⁴² Programs - VHA Office of Rural Health (ORH). (n.d.). VHA Office of Rural Health (ORH) Home. Retrieved March 27, 2012, from <http://www.ruralhealth.va.gov/programs>

the health services industry, but prevent spikes in healthcare costs for community members. Efficiencies seen within healthcare facilities will also be enjoyed by patients with better doctor-patient interactions and ease of information retrieval.

Local / County / State / Other Federal Administrative

Local, County, and State governments can benefit from the same efficiencies as all other sectors mentioned thus far. Online transactions and communications are a faster and more productive means of operations for all organizations but especially positive for government organizations. The FCC suggests, “Broadband holds the potential to move all government forms online, eliminating paperwork”, and, “through strategic use of broadband-enabled technologies, the federal government has the opportunity to become a model of efficiency and performance.” Again, streamlining processes will benefit employees working with local, county, and state governments as well as the inhabitants of such counties. Since broadband availability in the region would make it possible for the information, any paper work and task to be performed online; this would require cyber security efforts.

The following table 16 shows the number of government employees who will be affected by the availability of broadband. While broadband means each employee listed below will be more productive by improved processes, the numbers also represent employees that will have to be considered for training to learn new streamlined processes.

Table 16: Total Employment in Federal, State, and Local Governments

County	Total Employment, Federal, Civilian Government	Total Employment State and Local Government	Total Employment Military	Total Employment Govt. and Govt. Enterprises
Calvert County	150	4,022	302	4,474
Charles County	2,232	7,025	1,052	10,309
St. Mary's County	7,692	4,629	2,612	14,933

Source: Bureau of Economic Analysis 2009

As seen in the table above, nearly a third of St. Mary's county's employment is supported by government jobs. Each county must consider the impact broadband will have on each sector of employment so they can monitor support during and after implementation. Additional training may also be considered for streamlined processes so government employees understand how to utilize the improved broadband capabilities in order to be more productive. As a component of additional training, increased cyber security initiatives may accompany increased broadband access for federal, state, and local government entities.

Federal Military / Homeland Security

Military institutions such as the Naval Support Activity South Potomac (NSASP) at Indian Head already have sufficient broadband access; however, providing adequate access to more locations throughout Southern Maryland opens the opportunity for different military base locations. In addition to government facilities, all other Federal facilities will benefit from increased broadband availability. Faster communication and secure broadband networks will allow the government to communicate and respond to complicated circumstances quicker.

A risk that coincides with faster, more accessible broadband is a need for more and better security efforts. Particularly, military and homeland security facilities must have superior knowledge of the impacts adequate broadband will have.

Harnessing broadband support from all government and non-government entities will reduce implementation risk and ensure higher likelihood of success. User management and education will have to be an ongoing effort to build and maintain universal access in Southern Maryland. Communicating the benefits of broadband must be a consideration when designing a monitoring and control plan after implementation in order to facilitate continued coverage to rural users. By continuously promoting and suggesting ways government and non-government users can improve their jobs and increase efficiency and universal broadband deployment will be successful with the assistance and support of community.

Section IV- Solutions to Implement Recommendations of Plan

Role of Major Stakeholders

The Tri-County Council of Southern Maryland has an opportunity to decide the mix of roles and responsibilities in order to have control over the outcomes of Southern Maryland Broadband Deployment Plan. Stakeholders will be involved in processes regarding repairs to the network backbone, how quickly repairs will happen if there is damage, and what the recovery process entails. The key stakeholders may also determine connectivity of new Community Anchor Institutions in the future. Following are some of the stakeholders:

Federal Government

State Government

Maryland Broadband Cooperative (Mdbc)

One Maryland Broadband Network (OMBN)

Rural Users

Service Providers

Tri-County Council for Southern Maryland (TCCSMD)

Maryland Department of Information Technology (DoIT)

Broadband Technologies Opportunities Program (BTOP)

Recommended Implementation Solutions and Associated Estimated Costs

The Southern Maryland Broadband Committee came up with several recommendations to fill the gap in the future for middle mile and public anchor connectivity. Internet franchise agreement was one of the subjects touched on to come up with recommendations. Charles and St. Mary's County have franchise agreements with internet providers to deliver their public anchor connections. The following recommendations for future additional middle mile fiber and public anchor institution connection is based on the premise that the Internet franchise agreements will continue. Here are few recommendations from the committee for each county depending upon its IT infrastructure project needs regarding the fiber construction.

Calvert County

1. Connect fiber loop from Route 2/4, split in Sunderland along Route 4 to Route 301 and Route 4 intersection in Upper Marlboro where new fiber can be connected to the existing Network Maryland fiber. This will serve private and public sector users along with major transportation and town centers in the corridor and add second loop for Southern Maryland for redundancy in service.
2. Complete fiber connection along the Route 231 corridor from Calvert County 911, backup past the Calvert Industrial Park and under or over

the Patuxent River to connect to proposed new fiber to Benedict in Charles County. This will be important for connection of residences, Prince Frederick Campus of College of Southern Maryland and businesses in the corridor.

3. Extend Fiber from Chesapeake Beach to North Beach along Route 261 to connect Town Hall, other public anchor institutions and residences and businesses.
4. To resolve methods of connection to fiber or wireless service providers and DoIT such as Cove Point community with new or currently not connected public anchor institutions.
5. Work with over 70 members of the Cooperative following completion of the One Maryland Broadband Network to develop strategies and implement affordable last mile services for Calvert County residences, businesses and public anchor institutions.

Charles County

1. Connect Indian Head Navy base and town of Indian Head to the middle mile fiber network for both public anchor institutions and private sector.
2. Fiber connection along Route 231 at SHA Tower at Southern Maryland Animal Shelter location to town of Benedict and under or over the Patuxent River Bridge to connect to Calvert County; to create loop redundancy and connection to town center of Benedict.
3. Fill in Route 5 gap in middle mile fiber from Route 488 turn off to Route 301 at Waldorf. Major highway and transit corridor and loop system for middle mile network.
4. Place Route 301 fiber from Nice Bridge on Potomac River to Route 4 intersection in Prince George's County for private sector fiber

connection. Currently, networkMaryland provides four fibers for resource share agreement for Maryland Broadband Cooperative but much greater fiber capacity for private sector Cooperative members will be needed.

5. Build up fiber through Route 228 from Route 5 to Bensville Road. This is a major transit route, and fiber on this route is necessary for middle mile network.
6. Additional sites in need of connectivity in Charles County include all County parks, County landfill, White Plains Golf Course, Nanjemoy Community Center, Nanjemoy Creek Environmental Education Center, Crain Memorial Welcome Center, Doncaster Criminal Justice Training Academy, County wastewater treatment plants and recycling centers and the Tri-County Animal Shelter. These sites require connectivity for either/both network access and surveillance equipment.
7. Work with over 70 members of the Cooperative following completion of the One Maryland Broadband Network to develop strategies and implement affordable last mile services for Charles County residences, businesses and public anchor institutions.

St. Mary's County

1. Connect fiber gap along Route 235 between Oakville Elementary School to Hollywood Elementary School to create redundancy in loop and serve residences, businesses, and future public anchor institutions in this section.
2. Work with new or not connected public anchor institutions to resolve methods of connections and service fiber or wireless network providers and DoIT.

3. Work with over 70 members of the Cooperative following completion of the One Maryland Broadband Network to develop strategies and implement affordable last mile services for St. Mary's County residences, businesses and public anchor institutions.

Above are recommendations from 2012; however there are some recommendations from 2005 that are still relevant which should to be reviewed. Significant progress has been made in implementing the recommendations from the 2005 Regional Broadband report. Funding secured from state and federal grants to build out the core routes of the middle mile network and complete connection to public sector anchor institutions has played a major role in advancing these recommendations. As previously mentioned, one of the implemented recommendations from 2005 was the establishment of Maryland Broadband Cooperative which is a partner to all three counties of Southern Maryland. Each of the five rural councils, including the Tri-County Council for Southern Maryland (TCCSMD) has a permanent Board of Director seat (Class A Member) on the MdBC's Board. In addition, a second seat is allocated for each of the five rural regions from the public/private sector. The MdBC Board oversees the President and staff of the MdBC and general business operations, which fulfills the need for a coordinated, rural regional leadership as envisioned in 2005. The relevant recommendations for 2012 taken from the ones listed in the 2005 report are provided below.

- 1) Counties promote "Broadband Cooperative" to support in serving unserved and underserved residents.

The 2005 Southern Maryland Broadband study informed the passing of legislation in 2006 to create and fund, on a statewide rural basis, the Maryland Broadband Cooperative. The mission of the MdBC members including all of the cable and telephone providers in Southern Maryland is to support

broadband infrastructure to ultimately enable the providers to provide broadband service in the unserved and underserved areas. MdBC is positioned to address the needs of the unserved/underserved residents and businesses in 2012 and after as a middle mile infrastructure provider. The reasons for its positioning are: its access to data from the Mapping Initiative federal grant; last mile providers as its members; and its responsibilities as a sub-recipient of National Telecommunication Information Agency (NTIA) award of a Broadband Technology Opportunities Program (BTOP) grant to the Maryland Department of Information Technology (DoIT); and its own planned construction.

2) Today, fiber expansion is the solution.

Charles and St. Mary's counties have built a county-owned fiber network with Charles having connected the most public anchor institutions. The award of the One Maryland Broadband Network grant will, by 2012, allow the connection of all public anchor institutions in Southern Maryland. The same grant will allow all members of Maryland Broadband Cooperative to access middle mile fiber to expand last mile coverage for private and public sector customers of these member institutions. Also, existing privately-owned fiber will be integrated into the backbone of a fully connected network in Southern Maryland. Therefore, continuing to expand the fiber or share the resource fiber will be supportive in deployment of broadband. This recommendation in fact has been covered in 2012 as mentioned above.

3) Partnerships and facility swapping between county networks.

This is the business model which is effectively being implemented by the Maryland Broadband Cooperative and networkMaryland for public/private fiber resource share agreements. Since all three Southern Maryland Counties are members of MdBC, they are communicating on ways to realize cost sharing, new construction, maintenance, co-locating equipment and other

opportunities that will arise. The other two methods used by MDBC are leasing capacity for existing fiber asset owners and its own new construction of fiber to fill gaps in the Southern Maryland region and connect to the state and beyond.

4) Flexibility to the providers.

The Cooperative model allows members to apply their own business models and priorities to determine the type of services and fees. By providing greater access to shared middle mile fiber, the Cooperative anticipates expanded competition and reduced cost, which may be passed on to consumers at the discretion of the member. Promoting competition among providers is likely to result in more affordable pricing for rural users and business owners.

5) Counties need to propose robust fiber routes to heavy user locations to ensure service will be constant and reliable.

This recommendation is being addressed through communication between the economic development agencies and the MDBC. MDBC is aware of the Counties' target areas and has plans to address each through the BTOP grant or its own construction of laterals from the BTOP grant fiber networked expansion of the middle mile routes. MDBC has designed a scalable network through its electronic equipment acquisition that will meet customer needs of the members from 10Mbps to 100 Gbps.

Additional Recommendations

In addition to the above recommendation, the following may also be taken into consideration.

Speed Tests

The speed tests should be administered in each county to measure the effect of fiber installation. These speed tests could be served as a metric to compare counties in Southern Maryland against one another to measure the success of broadband

implementation. The frequency of speed test could be determined as per the funds available and decision of the stakeholders for broadband deployment plan. Similarly, the costs associated with speed tests, and maintaining fiber in each county in Southern Maryland could be determined by the stakeholders. Even though it is unclear as to who will be responsible for gathering and publishing the speed testing information, it may be reasonable to assume that the particular party responsible for gathering the information will absorb the costs associated with testing. If quarterly speed tests are to be considered, the summation of those reports will be compiled in a year-end report to measure the trend of average broadband speeds over time. Also, it is suggested that the speeds be reported by Anchor Institutions because a survey of the entire region would be cost prohibitive and unfeasible.

Promotional Campaign

A promotional campaign could be geared towards the providers and the end users. Raising community awareness about the benefits of broadband could assist in revenue generation for the providers. In fact, they could solicit their new and improved services to the previously unserved or underserved rural users and businesses. An increase in public awareness will educate and possibly encourage current users to upgrade their broadband devices. Subsequently, an increase in awareness which could help in generating more demand for service, hence increase in customer base and revenue could be an enticing factor for the providers. One of the subcomponents of the promotional campaign could be a detailed press release after completion of fiber installation; it should be issued to commend the hard work enlisted in this initiative and promote community awareness about broadband availability. The press release could compare the average speeds before and after implementation to signify the accomplishments made by the project.

Schedule for Short and Long-Term Implementation

Table 17: County Backbone Schedule for One Maryland Broad band Network

Counties	Sections (UG/Aerial)	Backbone CXM Completed	Backbone CXM Plan Begins	Backbone CXM Plan Ends
Calvert	12 (12 UG/0 Aerial)	0	Apr-19-2011	May-17-2013
Charles	14 (14 UG/0 Aerial)	5	Nov-28-2011	May-30-2012
St. Mary's	16 (16 UG/0 Aerial)	0	Mar-19-2012	Dec-5-2012

The short term goals relevant to BTOP regarding the fiber construction and community anchor institutions are still in its implementation phase as Table 17 depicts. Once the short term goals are on their way to achievement, long-term goal implementation would follow gradually. Presently, DoIT plans to have all the anchor institutions connected and operated by the August 2013 grant end date, and the construction in Southern Maryland is expected to be completed at the end of the second quarter in December 2012.

Methods of Documenting Outcomes in Plan Implementation for Region

To achieve complete success of the implementation plan for Southern Maryland, the implementation progress and before and after must be documented.

Each county must coordinate with MdBC to align time lines with the rest of the state in terms of progression documentation. By a means of performance measurement, timely reports should be submitted by each county to the Southern Maryland Tri-County board to communicate that plan to the cooperative. The plan should consist of expected dates of construction areas, anchor institution connections, and percentage completion of the entire project. Additionally, each plan should

indicate specific risks to the next segment of progression and identify actions taken to mitigate those risks. Timelines will allow each county to stay on track and maintain and foresight of what is coming in the near future. In addition to timelines provided, it is strongly recommended that each county review previous timelines to increase learning and continuously improve processes. This method of documentation will ensure a timely completion of implementation and provide broadband to rural users as fast as possible with exceptional quality. The reports will be very similar to the progress reports released by One Maryland Broadband Network, however this timeline will be from a holistic viewpoint that considers the “big picture” in terms of completion. Each county should be able to tell how far away they are from completion and what obstacles may stand in their way.

Industry Economic Development, Economic Strategies and Objectives

The goal of every industry is to progress and make profits, and internet has been an integral part for fulfilling its objectives. Almost every business/industry needs internet to conduct their business from simple emails, payments, billing, advertisement to decision making. In order to carry out these business functions properly, appropriate internet speed is necessary, and access to the high speed internet is what broadband technologies is trying to provide to rural areas. The business market area expands as the internet expands leading a business to go national from local and international from national. For example, there are banks that now operate on international levels compared to the traditional ones in the past that were limited to holding deposits from locals, loaning to the local business community and farmers. This also increases the competition in the market providing the consumers best products at reasonable prices.

Broadband internet availability may lead to increased efficiency in various industrial sectors since there is an access to updated information, knowledge, change, individual perception of products and services, convenience in communicating and

transacting. The relationship between particular industries and broadband in terms of achieving their economic goals is briefly explained below:

Rural Retailers

The number of business establishments within retail industry is significant in all of the three counties. As previously mentioned, there are 199, 518 and 295 retail establishments in Calvert, Charles and St. Mary's County respectively per 2009 data. The use of the broadband makes it easier for the retailers' operational efficiency, strategic positioning, and market niche exploitation will help them to achieve their economic progress.

Farm Businesses

This industry could take an advantage of broadband in gathering information, price tracking, and becoming efficient in E-Commerce. The farming industry can improve its farm purchase by making it online, keep track of its supplies and strengthen its relationship with the suppliers. As of 2009, there are total of only twenty forestry, fishing, hunting, and agriculture support establishments in entire Southern Maryland.

Health Care

Providing adequate health care has been a challenge in rural areas. However, broadband availability could reduce the given challenge via tele-medicine and tele-health. More accessible health information, products and services could be provided to the people that will help in reducing transportation time and expenses. Similarly, the medical technologies can be utilized well to provide proper health care facilities to the residents. The number of health care services in Charles County is 307, 180 number in Calvert County and 158 in St. Mary's.

Education

Education is a significant contributor for the economic development in any region. The education sector in Southern Maryland includes 37 schools in Charles County, 19 in Calvert County, and 25 in St. Mary's. Availability of broadband in the education sector helps students in daily learning, parents in connecting with the universities and assists universities with connecting with outside resources. For those in the working world, broadband gives them the opportunity to take part in distant learning to complete their course of study which will also be beneficial for the schools and the universities in reducing the overhead.

Broadband accessibility will ultimately make it easier for the aforementioned industries to achieve their goals and objectives. Following are a few recommendations on how these industries and broadband be connected. These recommendations are derived from a 2005 report which is still in progress, hence emphasizing the importance of their implementation.

1. Facilitate bandwidth and other connectivity needs of archaeological, environmental and other academic/museum research laboratories in the region to share research and educational efforts between institutions and technology transfer to the private sector.
2. Encourage technological transfer between federal facilities and programs with associated contract and businesses with broadband capacity to meet changing needs of information technology.
3. Link all remaining public sector anchor institutions within development districts and adjacent to link industrial parks, technological parks and other major institutions along the network.
4. Work with broadband service providers to encourage resource sharing and other methods to advance delivery of last mile service to all businesses, institutions and

- homeowners in the Southern Maryland region.
5. As expanded high speed services are achieved throughout the region, promote Southern Maryland as a successful virtual region open for small and large business and educational opportunities and tourism tied to the cultural and natural attractions.
 6. Develop and implement technology focused entrepreneurship training programs to be delivered in key locations within the region. Leaders in such efforts currently include the three campuses of the College of Southern Maryland, the Southern Maryland Higher Education Center, St. Mary's College and IT training businesses located in all three Counties. The Tri-County Council's Workforce Investment Board provides funding for and approval of educational training classes. The Board also reviews changing training needs to reflect changing job demands for a vast evolving technology driven workforce across all sectors of the economy.
 7. Encourage completion of last mile high speed broadband service availability in all parts of the region to allow for retention and expansion of existing businesses, attraction of new businesses, and high speed connectivity between homes and schools.
 8. Revise the broadband regional plan on a minimum of five and maximum of ten year cycle given the rapid pace of changing capacity, connectivity and demand for services for the worldwide web and its many and diverse applications.
 9. Build on cooperative partnerships between academic, military, Counties government, and State agencies. The Maryland Broadband Cooperative is to take advantage of future broadband grants, resource share agreements, cooperative understandings or business opportunities to achieve universal high speed broadband access throughout the region.

10. Work with the Counties economic development offices, federal and private sector partners in different business sectors to develop coordinated public relations and marketing campaigns and expand on line services to promote effective marketing of the region to the state and world.

Last Mile Issues

The completion of anchor institutions and the middle mile fiber construction will not necessarily mean that the end users will have immediate access to broadband because there are other steps that need to be completed beforehand. For example, laterals for community anchor institutions and huts need to be built for securing the electronic equipments involved in the network and the connection to the backbone is necessary to offer the services to the public and residences. As a result, there would be few challenges to overcome while fulfilling these steps which are the last mile issues.

Last Mile issues for deploying broadband in Southern Maryland could be the availability of the providers to offer services to the consumers and businesses and limited infrastructure. Providers may be hesitant to utilize the middle mile network provided by the MdBC. The reasons for them being reluctant could simply be the lack of economic benefits and perception of high cost associated with offering services in rural areas. Rural areas with low population density in comparison to the urban areas have lower economic scale for the providers because fewer people in the given geographic region share the cost of infrastructure. “Renkow found that population density was more important than income in driving broadband deployment. The relative insensitivity of local income to patterns of broadband deployment may indicate that broadband providers perceive demand as being highly income inelastic. If so, cost of physical infrastructure would be the primary consideration in extending capacity into unserved or underserved areas.”

Considering the given quote, as the population and the number of business establishments in Southern Maryland is increasing (Please refer to Appendix A, Table 44 for population change in past 10 years), resulting in rise of demand, the issue of high cost could be properly addressed. Moreover, the broadband cooperative's effort of providing the middle mile network and bearing the initial cost of operation for the providers is also supportive in solving the high cost issue. Nevertheless, there is a necessity of persuading the providers to be involved in participating in access of broadband to the rural population and businesses. One of the ways this could be accomplished is by hosting a conference to emphasize all of the benefits of offering services to rural areas to the providers. Similarly, as mentioned before, the promotional campaign could be another way to raise community awareness that could lead to increased demand which could ultimately allure the providers. If, for instance even four out of ten providers participate, the competition eventually will be created that will increase interest of remaining providers. In turn, the competition will provide competitive pricing that will increase adoption among lower income households as well.

Likewise, one of the other approaches to solve this last mile issue is considering the LTEs. As explained under the future technology section of this report, with its capability of providing faster service over a large area, LTE may prove very useful in providing internet service to the rural area in Southern Maryland. This may be an answer to the providers for offering internet service to the residences in the rural area without a worry of lower population density and the cost benefit issues. In fact, Verizon Wireless is launching 4G-LTE in 38 U.S. markets and planning on full nationwide coverage in 2013. It intends to utilize 700 MHz to deploy 4G-LTE that will cover the entire lower 48 states and Hawaii. "To provide access to the 4G LTE network to more of the U.S. population living in rural areas, Verizon Wireless plans to work with rural companies to collaboratively build and operate a 4G network in

those areas using the tower and backhaul assets of the rural company and Verizon Wireless' core LTE equipment and 700 MHz spectrum.”⁴³

Section V. - Future Direction for Broadband in Rural Maryland

Southern Maryland has seen rays of economic development in the past five years with its population growth of 21.01% between 2000 and 2010 (Please refer to Appendix A, Table 44 for population change in past 10 years), and an increase of an increase of 28.23% (2000: \$60,711, 2010: \$77,848) in median household income which could be credited to increased number of jobs with a 20.2% raise in the number of business establishments. The core industries of defense and technology with NAS Pax in St. Mary's, SMECO, Mirant (Chalk Point and Morgantown), Constellation Energy (Calvert Cliffs), and Dominion (Cove Point) have remained strong to support the economic development of Southern Maryland. Similarly, the school enrollment for the region has gone up by 7.7% since 2000⁴⁴. Broadband is and will continue to be a significant factor in the economic development of rural Maryland including Southern Maryland by providing a plane level field in terms of resources to the residents of Maryland for their progress. Currently, broadband is more focused on effective deployment in rural areas and in the future, it will have a more focused effort on sustainability of broadband technologies.

After the Broadband Deployment Plan is completed for the state of Maryland the Tri-County Council for Southern Maryland will remain a review body at least 1-2 years after the 2014 state plan is finalized. The Tri-County Council will serve as an

⁴³ 4G is here: LTE and WiMAX take public safety communications into the future. (2011, January). *Public Safety IT Magazine*, na, na. Retrieved March 28, 2012, from <http://www.hendonpub.com/resources/articlearchive/details.aspx?ID=208218>

⁴⁴ *Southern Maryland as Employment Center - Southern Maryland Headline News*. (n.d.). *Southern Maryland Online™ - Your on-line community for Calvert, Charles, and St. Mary's Counties.™*. Retrieved August 21, 2012, from <http://somed.com/news/headlines/2009/>

advisory group, as an implementation review entity of follow-through past the state plan adoption. As of 2012, it is unclear as which members of the community will be invited to join the Council after implementation. Additional participants may include representatives from public safety, higher education, public and private schools, hospitals and Veterans Affairs.

Broadband Role in the Future

The ultimate goal of the broadband initiative is to sustain broadband coverage throughout rural Southern Maryland now and in the future. Access will be available for all rural areas with quality and competitive speeds. The role of broadband is to help connect rural communities and allow rural Maryland to compete in the same realm with organizations located in major cities in the state. To emphasize the role of broadband in the future, the following initiatives must be maintained and considered to achieve sustainable access.

To maintain sustainable broadband in the future, new technologies and coverage must constantly be assessed. For instance, as technology continues to evolve the “range” of adequate service will evolve along with it. Efforts to attain sustainability will consider the rate at which technology is evolving and how much bandwidth users need to utilize common functionalities on the Internet. As previously alluded to, there is not a great demand for operating cloud systems at this time; however broadband speeds will need to be fast enough in the future to accommodate such activities. If adequate access is not monitored on a regular basis, rural Maryland will see the emergence of more and more underserved and unserved residents and businesses thus proving the initiative in itself futile. Additionally, even if average speeds remain adequate, the quantity of unserved and underserved users must be observed. If coverage remains the same, over time it will inevitably become outgrown by the regions. Once adequate broadband is established, more people will migrate to the region and will be able to operate businesses and other entities in the

rural areas. As previously mentioned, the increased population growth will ultimately increase demand for broadband access, thus altering the percentage of unserved and underserved population if their demand isn't met. Therefore, to sustain a robust broadband network the pulse of new technologies and user needs must be addressed to eliminate unserved and underserved rural areas.

As a component of accessing adequate service, a benchmark will have to be considered to evaluate how much speed is adequate. This translates into the role of broadband across the country because monitoring the state of broadband elsewhere will correlate to the lag in rural Maryland. If speed tests are adopted as per the recommendations listed in Section IV, the results from speed tests can be compared to average speed in other counties in Maryland, as well as other states across the country. The frequency of speed tests will be contingent upon funds available and ownership of such speed tests will have to be determined by the Tri-County Council. The comparison will allow Southern Maryland to be alerted if the average speed of other counties suddenly increases due to new technology implementation. Speed comparisons will serve as a check to monitor the digital divide in Southern Maryland.

Another factor essential to a sustainable broadband network is to monitor the provider services. A monitoring system should be put in place to ensure that service providers are in fact providing the service to the rural users on a consistent basis. Providers should have the same services available to rural users as they would in other counties and metropolitan areas as long as bandwidth permits the service. Also, the monitoring system should serve to make sure the prices charged to rural users will be competitive with other regions to maintain and support the vision of bringing "affordable broadband to rural America." With assistance of MdBC in supporting good relationships with service providers rural users may in turn receive exceptional service. As additional providers emerge in the marketplace, involvement from MdBC will help advocate for new service providers to start servicing Southern Maryland and promote a competitive environment among providers.

By demonstrating the benefits of broadband as suggested, rural users will now understand how broadband can enhance their lifestyles. The emphasis on benefits of broadband will instill the mindset that broadband in the future will be a vital organ in all types of operations. Broadband will become a necessity to a productive working environment and the checks and balances proposed will serve as the catalysts to achieving a sustainable broadband network to support the growing need.

Section VI – Conclusion

Moving along with advancing technology is a significant factor for economic development in any area. Therefore, deployment of broadband is necessary to create equal opportunity for the residents and all types of businesses in Southern Maryland to move forward. Broadband would make it convenient for carrying out many activities from simple to complex that will lead to an enhanced quality of life for the people in Southern Maryland. These activities include but are not limited to the ability to communicate via email, enhancing knowledge and learning through web surfing, distance learning for students, access to abundant books and materials from the library, the ability to work from home for those who are self employed, video conferencing and training, reduction in expenses such as transportation, access to advance medicine via tele-medicine, and more efficient business operation. There certainly are issues to overcome in order to successfully implement broadband and enjoy such advantages; however those issues are addressed by players such as DoIT, networkMaryland, and MdBC as they solve the middle mile issues and let the providers play a significant role in connecting to the residential and commercial users. Availability of broadband, which brings opportunity for economic progress, will attract more numbers of residents and businesses that will additionally benefit both the providers and the end users in terms of cost and ability to use varieties of application through broadband. Lastly, the issues and the cost for deploying broadband are trivial in comparison to the benefits to all the users and for overall economic development of Southern Maryland.

Appendix A: Data Tables

Current Number of Anchor Institutions

Maxaddown stands for Maximum Advertised Downstream Speed and Maxadup stands for Maximum Advertised Upstream Speed. These numbers simply imply the speed of the maximum speed of downloading and uploading. The numbers depicted under the Maxaddown and Maxadup on right hand side columns included in the anchor institution tables are the speed tier code which implies their respective tier range as given below.

Speed Tier Code	Tier Range
1	<200kbps
2	> 200kbps < 768kbps
3	> 768kbps < 1.5mbps
4	> 1.5mbps < 3mbps
5	> 3mbps < 6mbps
6	> 6mbps < 10mbps
7	> 11mbps < 25mbps
8	> 25mbps < 50mbps
9	> 50mbps < 100mbps
10	> 100mbps < 1gbps
11	> 1gbps

Table 18: Calvert County Schools K-12 Anchor Institutions

ANCHORNAME	ADDRESS	CITY	MAXADDOWN	MAXADUP
APPEAL ELEMENTARY SCHOOL	11655 HG TRUEMAN RD PRINCE FREDERICK MD 20657	PRINCE FREDERICK	7	7
BARSTOW ELEMENTARY SCHOOL	295 JW WILLIAMS RD PRINCE FREDERICK MD 20678	PRINCE FREDERICK	7	7
BEACH ELEMENTARY SCHOOL	7900 OLD BAYSIDE RD PRINCE FREDERICK MD 20732	PRINCE FREDERICK	7	7

CALVERT COUNTRY SCHOOL	1350 DARES BEACH RD BARSTOW MD 20678	BARSTOW	7	7
CALVERT ELEMENTARY SCHOOL	1450 DARES BEACH RD PRINCE FREDERICK MD 20678	PRINCE FREDERICK	7	7
CALVERT HIGH SCHOOL	600 DARES BEACH RD SOLOMONS MD 20678	SOLOMONS	7	7
CALVERT MIDDLE SCHOOL	435 N SOLOMONS ISLAND RD PRINCE FREDERICK MD 20678	PRINCE FREDERICK	7	7
DOWELL ELEMENTARY SCHOOL	12680 HG TRUEMAN RD OWINGS MD 20657	OWINGS	7	7
HUNTING CREEK ANNEX SCHOOL	4105 OLD TOWN RD HUNTINGTOWN MD 20639	HUNTINGTOWN	7	7
HUNTINGTOWN ELEMENTARY SCHOOL	4345 HUNTINGTOWN RD HUNTINGTOWN MD 20639	HUNTINGTOWN	7	7
HUNTINGTOWN HIGH SCHOOL	4125 N SOLOMONS ISLAND RD PRINCE FREDERICK MD 20639	PRINCE FREDERICK	7	7
MILL CREEK MIDDLE SCHOOL	12200 SOUTHERN CONNECTOR BLVD OWINGS MD 20657	OWINGS	7	7
MT HARMONY ELEMENTARY SCHOOL	900 W MOUNT HARMONY RD SUNDERLAND MD 20736	SUNDERLAND	7	7
MUTUAL ELEMENTARY SCHOOL	1455 BALL RD NORTH BEACH MD 20676	NORTH BEACH	7	7
NORTHERN HIGH SCHOOL	2950 CHANEYVILLE RD OWINGS MD 20736	OWINGS	7	7
NORTHERN MIDDLE SCHOOL	2954 CHANEYVILLE RD LUSBY MD 20736	LUSBY	7	7
PATUXENT ELEMENTARY SCHOOL	35 APPEAL LN HUNTINGTOWN MD 20657	HUNTINGTOWN	7	7
PLUM POINT ELEMENTARY	1245 PLUM POINT RD	HUNTINGTOWN	7	7

SCHOOL	HUNTINGTOWN MD 20639			
PLUM POINT MIDDLE SCHOOL	1475 PLUM POINT RD ST. LEONARD MD 20639	ST. LEONARD	7	7
SAINT LEONARD ELEMENTARY SCHOOL	5370 SAINT LEONARD RD SOLOMONS MD 20685	SOLOMONS	7	7
SOUTHERN MIDDLE SCHOOL	9615 HG TRUEMAN RD PRINCE FREDERICK MD 20657	PRINCE FREDERICK	7	7
SUNDERLAND ELEMENTARY SCHOOL	150 CLYDE JONES RD OWINGS MD 20689	OWINGS	7	7
WINDY HILL ELEMENTARY SCHOOL	9550 BOYDS TURN RD OWINGS MD 20736	OWINGS	7	7
WINDY HILL MIDDLE SCHOOL	9560 BOYDS TURN RD OWINGS MD 20736	OWINGS	7	7
CALVERT CAREER AND TECHNOLOGY ACADEMY	330 DORSEY RD PRINCE FREDERICK MD 20678	PRINCE FREDERICK	7	7
PATUXENT HIGH SCHOOL	12485 SOUTHERN CONNECTOR BLVD LUSBY MD 20657	LUSBY	7 , > or = 10 mbps , < 25 mbps	7 , > or = 10 mbps , < 25 mbps
BOARD OF EDUCATION CENTRAL OFFICE	1305 DARES BEACH RD PRINCE FREDERICK MD 20678	PRINCE FREDERICK	11 , > or = 1 gbps	11 , > or = 1 gbps

Note: The ideal speed for the school would be greater than 1 gb/second.

Table 19: Calvert County Library Anchor Institutions

ANCHORNAME	ADDRESS	CITY	MAXADDOWN	MAXADUP
CALVERT LIBRARY-SOUTHERN BRANCH	13920 HG Trueman RD Solomons MD 20688	LUSBY	7	4 , > or = 1.5 mbps , < 3 mbps
CALVERT LIBRARY-TWIN BEACH BRANCH	3819 HARBOR RD CHESAPEAKE BEACH MD 20732	CHESAPEAKE BEACH	7	4 , > or = 1.5 mbps , < 3 mbps
CALVERT LIBRARY-	8120 SOUTHERN	OWINGS	7	4 , > or = 1.5

FAIRVIEW BRANCH	MARYLAND BLVD OWINGS MD 20736			mbps , < 3 mbps
CALVERT LIBRARY- PRINCE FREDERICK (MAIN) BRANCH	850 COSTLEY WAY PRINCE FREDERICK MD 20678	PRINCE FREDERICK	10 , > or = 100 mbps , < 1 gbps	10 , > or = 100 mbps , < 1 gbps

Table 20: Calvert County Medical – Healthcare Anchor Institutions

ANCHORNAME	ADDRESS	CITY
CALVERT MEMORIAL HOSPITAL	100 HOSPITAL RD PRINCE FREDERICK MD 20678	PRINCE FREDERICK

Table 21: Calvert County Public Safety Anchor Institutions

ANCHORNAME	ADDRESS	MAXADDOWN	MAXADUP
PRINCE FREDERICK SHA TOWER	100 HALLOWING POINT RD PRINCE FREDERICK MD 20678	-	-
DMSP SOUTHERN REGIONAL OFFICE	200 DUKE ST PRINCE FREDERICK MD 20678	6	6
CALVERT COUNTY SHERIFF'S OFFICE	30 CHURCH ST PRINCE FREDERICK MD 20678	11 , > or = 1 gbps	11
CALVERT COUNTY BACKUP 911 CENTER	340 STAFFORD RD PRINCE FREDERICK MD 20678	10 , > or = 100 mbps , < 1 gbps	10 , > or = 100 mbps , < 1 gbps
DMSP BARRACK U - PRINCE FREDERICK	210 MAIN ST PRINCE FREDERICK MD 20678	11 , > or = 1 gbps	11 , > or = 1 gbps
COMPANY 2 PRINCE FREDERICK VFD	450 S SOLOMONS ISLAND RD PRINCE FREDERICK MD 20678	3	3
CHANEYVILLE POLICE SUBSTATION	8120 SOUTHERN MARYLAND BLVD LUSBY MD 20736	4 , > or = 1.5 mbps , < 3 mbps	4 , > or = 1.5 mbps , < 3 mbps
COMPANY 1 NORTH BEACH VFD	8536 BAYSIDE RD PRINCE FREDERICK MD 20714	4 , > or = 1.5 , < 3 mbps	4 , > or = 1.5 , < 3 mbps
COMPANY 10 CALVERT ADVANCED LIFE SUPPORT	60 SECURITY BLVD PRINCE FREDERICK MD 20678	4 , > or = 1.5 mbps , < 3 mbps	4 , > or = 1.5 , < 3 mbps
COMPANY 3 SOLOMONS VFDRS	13150 HG TRUEMAN RD SOLOMONS MD 20688	4 , > or = 1.5 mbps , < 3 mbps	4 , > or = 1.5 mbps , < 3 mbps
COMPANY 4 PRINCE	755 S SOLOMONS ISLAND RD	4 , > or = 1.5 mbps,	4 , > or = 1.5

FREDERICK VRS	PRINCE FREDERICK MD 20678	< 3 mbps	mbps, < 3 mbps
COMPANY 5 DUNKIRK VFDRS	3170 W WARD RD DUNKIRK MD 20754	4 , > or = 1.5 mbps , < 3 mbps	4 , > or = 1.5 mbps , < 3 mbps
COMPANY 6 HUNTINGTOWN VFDRS	4030 OLD TOWN RD HUNTINGTOWN MD 20639	4 , > or = 1.5 mbps, < 3 mbps	4 , > or = 1.5 mbps, < 3 mbps
COMPANY 7 SAINT LEONARD VFDRS	200 CALVERT BEACH RD ST LEONARD MD 20685	4 , > or = 1.5 mbps, < 3 mbps	5 , > or = 3 mbps, < 6 mbps
SOLOMONS ISLAND POLICE SUBSTATION	14484 S SOLOMONS ISLAND RD LUSBY MD 20688	4 , > or = 1.5 mbps, < 3 mbps	4 , > or = 1.5 mbps, < 3 mbps

Table 22: Calvert County University – College Anchor Institutions

ANCHORNAME	ADDRESS	CITY	MAXADDOWN	MAXADUP
UNIVERSITY OF MARYLAND CES - CHESAPEAKE BIOLOGICAL LAB	1 WILLIAMS ST SOLOMONS MD 20688	SOLOMONS	10 , > or = 100 mbps , < 1 gbps	10 , > or = 100 mbps , < 1 gbps
COLLEGE OF SOUTHERN MARYLAND, PRINCE FREDERICK CAMPUS	115 J.W. WILLIAMS ROAD PRINCE FREDERICK MD 20678	PRINCE FREDERICK	7	7
COLLEGE OF SOUTHERN MARYLAND, PRINCE FREDERICK CAMPUS	115 J.W. WILLIAMS ROAD PRINCE FREDERICK MD 20678	PRINCE FREDERICK	7	7
COLLEGE OF SOUTHERN MARYLAND, CENTER FOR NUCLEAR/ENERGY TRAINING	2192 S SOLOMONS IS RD STE 2 PRINCE FREDERICK MD 20678	PRINCE FREDERICK	7	5

Table 23: Calvert County Community Support – Government Anchor Institutions

ANCHORNAME	ADDRESS	CITY	MAXADDOWN	MAXADUP
AQUATIC CENTER	130 AUTO DR BARSTOW MD 20678	BARSTOW	7	7
BATTLE CREEK NATURE CENTER	2880 GRAYS RD CHESAPEAKE BEACH MD 20678	CHESAPEAKE BEACH	1, < 200 kbps	1, < 200 kbps
CALVERT COUNTY DETENTION	325 STAFFORD RD PRINCE FREDERICK MD 20610	PRINCE FREDERICK	7	7

CENTER				
CALVERT MARINE MUSEUM	14220 S SOLOMONS ISLAND RD PRINCE FREDERICK MD 20688	PRINCE FREDERICK	7	7
CALVERT PINES SENIOR CENTER	450 W DARES BEACH RD PRINCE FREDERICK MD 20678	PRINCE FREDERICK	7	7
CALVERT SOIL CONSERVATION DISTRICT	65 DUKE ST PRINCE FREDERICK MD 20678	PRINCE FREDERICK	7 , > or = 10 mbps , <25 mbps	7 , > or = 10 mbps , <25 mbps
COMMUNITY RESOURCES BUILDING	30 DUKE ST NORTH BEACH MD 20678	NORTH BEACH	11	11
COUNTY SERVICES PLAZA	150 MAIN ST PRINCE FREDERICK MD 20678	PRINCE FREDERICK	11	11
COURTHOUSE	175 MAIN ST PRINCE FREDERICK MD 20678	PRINCE FREDERICK	11	11
COURTHOUSE ANNEX	176 MAIN ST PRINCE FREDERICK MD 20678	PRINCE FREDERICK	11	11
COURTHOUSE SQUARE	205 MAIN ST LUSBY MD 20678	LUSBY	11	11
COVE POINT PARK/POOL	750 FUN WAY LUSBY MD 20657	LUSBY	7	7
FLAG PONDS NATURE PARK	1400 FLAG PONDS PKWY PRINCE FREDERICK MD 20657	PRINCE FREDERICK	1 , <200 kbps	1 , <200 kbps
FLEET MAINTENANCE	251 SCHOONER LN BARSTOW MD 20678	BARSTOW	4 , > or = 1.5 mbps , <3 mbps	4 , > or = 1.5 mbps , <3 mbps
HIGHWAY MAINTENANCE	335 STAFFORD RD HUNTINGTOWN MD 20610	HUNTINGTOWN	10 , > or = 100 mbps , <1 gbps	10
LOUIS GOLDSTEIN BUILDING/STATE OFFICE BUILDING	200 DUKE ST LUSBY MD 20678	LUSBY	11	11
MDP JEFFERSON PATTERSON PARK &	10515 MACKALL RD ST. LEONARD MD 20685	ST. LEONARD	-	-

MUSEUM				
MVA-PRFRED	200 DUKE ST PRINCE FREDERICK MD 20678	PRINCE FREDERICK	-	-
NORTH BEACH COMMUNITY CENTER	4025 4 th STREET, NORTH BEACH, MD 20714	NORTH BEACH	4 , > or = 1.5 mbps , < 3 mbps	4 , > or = 1.5 mbps , < 3 mbps
NORTH BEACH SENIOR CENTER	9010 CHESAPEAKE AVE NORTH BEACH MD 20714	NORTH BEACH	4 , > or = 1.5 mbps , <3 mbps	4 , > or = 1.5 mbps , <3 mbps
NORTHEAST COMMUNITY CENTER	4075 GORDON STINNETT AVE OWINGS MD 20732	OWINGS	4 , > or = 1.5 mbps , < 3 mbps	4 , > or = 1.5 mbps , < 3 mbps
SHA	100 HALLOWING POINT ROAD PRINCE FREDERICK, MD 20678	PRINCE FREDERICK	-	-
SOUTHERN COMMUNITY CENTER	20 APPEAL LN LUSBY MD 20657	LUSBY	7	7
SOUTHERN PINES SENIOR CENTER	20 APPEAL LN LUSBY MD 20657	LUSBY	7	7
SOUTHERN REGIONAL SERVICE CENTER	6904 HALLOWING POINT RD PRINCE FREDERICK MD 20678	PRINCE FREDERICK	3	3
MT HOPE COMMUNITY CENTER	100 PUSHAW STATION RD SUNDERLAND MD 20689	SUNDERLAND	10 , > or = 100 mbps , < 1 gbps	10 , > or = 100 mbps , < 1 gbps
KINGS LANDING NATURE PARK	3255 KINGS LANDING RD , HUNTINGTOWN MD 20639	HUNTINGTOWN	4 , > or = 1.5 mbps , < 3 mbps	2 , > or = 200 kps , < 768 kbps

Table 24: Charles County Schools K-12 Anchor Institutions

ANCHORNAME	ADDRESS	CITY
ARTHUR MIDDLETON ELEMENTARY SCHOOL	1109 COPLEY AVE WALDORF MD 20602	WALDORF
BENJAMIN STODDERT MIDDLE SCHOOL	2040 SAINT THOMAS DR WALDORF MD 20602	WALDORF
BERRY ELEMENTARY SCHOOL	10155 BERRY RD WALDORF MD 20603	WALDORF
C. PAUL BARNHART ELEMENTARY SCHOOL	4800 LANCASTER CIR WALDORF MD 20603	WALDORF
DANIEL OF ST. THOMAS JENIFER ELEMENTARY SCHOOL	2820 JENIFER SCHOOL LN WALDORF MD 20603	WALDORF
DR. GUSTAVUS BROWN ELEMENTARY SCHOOL	421 UNIVERSITY DR WALDORF MD 20602	WALDORF
DR. JAMES CRAIK ELEMENTARY SCHOOL	7725 MARSHALL CORNER RD POMFRET MD 20675	POMFRET
DR. SAMUEL A. MUDD ELEMENTARY SCHOOL	820 STONE AVE WALDORF MD 20602	WALDORF
DR. THOMAS L. HIGDON ELEMENTARY SCHOOL	12872 ROCK POINT RD NEWBURG MD 20664	NEWBURG
EVA TURNER ELEMENTARY SCHOOL	1000 BANNISTER CIR WALDORF MD 20602	WALDORF
F. B. GWYNN EDUCATIONAL CENTER	5998 RADIO STATION RD LA PLATA MD 20646	LA PLATA
GALE-BAILEY ELEMENTARY SCHOOL	4740 PISGAH MARBURY RD MARBURY MD 20658	MARBURY
GENERAL SMALLWOOD MIDDLE SCHOOL	4990 INDIAN HEAD HWY INDIAN HEAD MD 20640	INDIAN HEAD
HENRY E. LACKEY HIGH SCHOOL	3000 CHICAMUXEN RD INDIAN HEAD MD 20640	INDIAN HEAD
INDIAN HEAD ELEMENTARY SCHOOL	4200 INDIAN HEAD HWY INDIAN HEAD MD 20640	INDIAN HEAD
J. C. PARKS ELEMENTARY SCHOOL	3505 LIVINGSTON RD INDIAN HEAD MD 20640	INDIAN HEAD

J. P. RYON ELEMENTARY SCHOOL	12140 VIVIAN ADAMS DR WALDORF MD 20601	WALDORF
JOHN HANSON MIDDLE SCHOOL	12350 VIVIAN ADAMS DR WALDORF MD 20601	WALDORF
LA PLATA HIGH SCHOOL	6035 RADIO STATION RD LA PLATA MD 20646	LA PLATA
MALCOLM ELEMENTARY SCHOOL	14760 POPLAR HILL RD WALDORF MD 20601	WALDORF
MARY B. NEAL ELEMENTARY SCHOOL	12105 ST. GEORGE'S DR WALDORF MD 20602	WALDORF
MARY MATULA ELEMENTARY SCHOOL	6025 RADIO STATION RD LA PLATA MD 20646	LA PLATA
MATTAWOMAN MIDDLE SCHOOL	10145 BERRY RD WALDORF MD 20603	WALDORF
MATTHEW HENSON MIDDLE SCHOOL	3535 LIVINGSTON RD INDIAN HEAD MD 20640	INDIAN HEAD
MAURICE J. MCDONOUGH HIGH SCHOOL	7165 MARSHALL CORNER RD POMFRET MD 20675	POMFRET
MILTON M. SOMERS MIDDLE SCHOOL	300 WILLOW LN LA PLATA MD 20646	LA PLATA
MT HOPE/NANJEMOY ELEMENTARY SCHOOL	9275 IRONSIDES RD NANJEMOY MD 20662	NANJEMOY
NANJEMOY CREEK ENVIRONMENTAL EDUCATION CENTER	MD, 20662	NANJEMOY
NORTH POINT HIGH SCHOOL	2500 DAVIS RD WALDORF MD 20603	WALDORF
PICCOWAXEN MIDDLE SCHOOL	12834 ROCK POINT RD NEWBURG MD 20664	NEWBURG
ROBERT D. STETHEM EDUCATIONAL CENTER	7775 MARSHALL CORNER RD POMFRET MD 20675	POMFRET
T. C. MARTIN ELEMENTARY SCHOOL	6315 OLIVERS SHOP RD BRYANTOWN MD 20617	BRYANTOWN
THEODORE G. DAVIS MIDDLE SCHOOL	2495 DAVIS RD WALDORF MD 20603	WALDORF
THOMAS STONE HIGH SCHOOL	3785 LEONARDTOWN RD WALDORF MD 20601	WALDORF
WALTER J. MITCHELL ELEMENTARY	400 WILLOW LN LA PLATA MD 20646	LA PLATA

WESTLAKE HIGH SCHOOL	3300 MIDDLETOWN RD WALDORF MD 20603	WALDORF
WILLIAM A. DIGGS ELEMENTARY SCHOOL	2615 DAVIS RD WALDORF MD 20603	WALDORF
WILLIAM B. WADE ELEMENTARY SCHOOL	2300 SMALLWOOD DR W WALDORF MD 20603	WALDORF

Note: The ideal speed for the school would be greater than 1 gb/second.

Maxadup and Maxaddown data for Charles County Schools are not currently available.

Table 25: Charles County Library Anchor Institutions

ANCHORNAME	ADDRESS	CITY	MAXADDOWN	MAXADUP
LA PLATA BRANCH	2 GARRET AVE LA PLATA MD 20646	LA PLATA	9	6
P.D. BROWN MEMORIAL LIBRARY BRANCH	50 VILLAGE ST WALDORF MD 20602	WALDORF	9	6
POTOMAC BRANCH	3225 RUTH B. SWAN DR INDIAN HEAD MD 20640	INDIAN HEAD	9	6
WALDORF WEST BRANCH	10405 O'Donnell Place	WALDORF	-	-

Table 26: Charles County Medical-Healthcare Anchor Institutions

ANCHORNAME	ADDRESS	CITY	MAXADDOWN	MAXADUP
CIVISTA MEDICAL CENTER	5 GARRETT AVENUE LAPLATA MD 20646	LAPLATA	9	6

**Table 27: Charles County Community Support - Non Government Anchor
Institutions**

ANCHORNAME	ADDRESS	CITY	MAXADDOWN	MAXADUP
AMERICAN RED CROSS, SOUTHERN MARYLAND CHAPTER	9255 W&W INDUSTRIAL RD LA PLATA MD 20646	LA PLATA	5	3

Table 28: Charles County Community Support – Government Anchor Institutions

ANCHORNAME	ADDRESS	CITY	MAXADDOWN	MAXADUP
BENSVILLE PARK	6980 BENSVILLE RD WHITE PLAINS MD 20695	WHITE PLAINS	-	-
BEL ALTON WASTEWATER TREATMENT PLANT	9225 TWINBERRY DRIVE, MD 20611	BEL ALTON	8	7
BREEZE FARM (RECYCLING CENTER & WW TREATMENT PLANT)	15950 COBB ISLAND ROAD, MD 20625	COBB ISLAND	-	-
BRYANTOWN SPORTS COMPLEX	5665 BRYANTOWN RD BRYANTOWN MD 20617	BRYANTOWN	-	-
CHARLES COUNTY BOARD OF EDUCATION	5980 RADIO STATION RD LA PLATA MD 20646	LA PLATA	10	10
CHARLES COUNTY COURT HOUSE/CIRCUIT COURT	200 E CHARLES ST LA PLATA MD 20646	LA PLATA	9	6
CHARLES COUNTY COURTHOUSE/BLDG 2	11 WASHINGTON AVE LA PLATA MD 20646	LA PLATA	9	6
CHARLES COUNTY CRIME LAB	10 KENT AVE LA PLATA MD 20646	LA PLATA	7	6
CHARLES COUNTY DEPT. OF COMMUNITY SERVICES	8190 PORT TOBACCO RD PORT TOBACCO MD 20677	PORT TOBACCO	9	6
CHARLES COUNTY DEPT. OF HUMAN SERVICES PARTNERSHIP	6 GARRET AVE LA PLATA MD 20646	LA PLATA	9	6
CHARLES COUNTY DEPT. OF PUBLIC FACILITIES	1001 RADIO STATION RD LA PLATA MD 20646	LA PLATA	9	6
CHARLES COUNTY DEPT. OF SOCIAL SERVICES	200 KENT AVE LA PLATA MD 20646	LA PLATA	9	6

CHARLES COUNTY DEPT. OF UTILITIES	5310 HAWTHORNE RD LA PLATA MD 20646	LA PLATA	9	6
CHARLES COUNTY DETENTION CENTER	6905 CRAIN HWY LA PLATA MD 20647	LA PLATA	7	6
CHARLES COUNTY ECONOMIC DEV. & TOURISM	105 CENTENNIAL ST LA PLATA MD 20646	LA PLATA	9	6
CHARLES COUNTY ELECTION BOARD	201 E CHARLES ST LA PLATA MD 20646	LA PLATA	9	6
CHARLES COUNTY GOVERNMENT	200 BALTIMORE ST LA PLATA MD 20646	LA PLATA	9	6
CHARLES COUNTY HEALTH DEPT.	4545 CRAIN HWY WHITE PLAINS MD 20695	WHITE PLAINS	9	6
CHARLES COUNTY JUDICIAL SERVICES	6845 CRAIN HWY LA PLATA MD 20646	LA PLATA	7	6
CHARLES COUNTY LANDFILL	12305 BILLINGSLEY RD WALDORF MD 20601	WALDORF	3	3
CHARLES COUNTY PUBLIC SCHOOLS MAINTENANCE SHOP	5965 RADIO STATION RD LA PLATA MD 20646	LA PLATA	10	10
CHARLES COUNTY STATE'S ATTORNEY'S OFFICE (DARE BLDG)	200 E CHARLES ST LA PLATA MD 20646	LA PLATA	9	6
CHARLES SOIL CONSERVATION DISTRICT	101 CATALPA DR LAPLATA MD 20646	LAPLATA	4	4
CRAIN MEMORIAL WELCOME CENTER	12480 CRAIN HIGHWAY, MD 20664	NEWBURG	-	-
DMSP BARRACK H - LA PLATA	9500 MITCHELL RD LA PLATA MD 20646	LA PLATA	3	3
FRIENDSHIP FARM PARK	4705 FRIENDSHIP LNDG NANJEMOY MD 20662	NANJEMOY	-	-
GILBERT RUN PARK	13140 CHARLES ST LA PLATA MD 20646	LA PLATA	3	3
GREATER WALDORF	3090 CRAIN HWY	WALDORF	9	6

JAYCEES CENTER	WALDORF MD 20601			
INDIAN HEAD SENIOR CENTER	100 CORNWALLIS SQ INDIAN HEAD MD 20640	INDIAN HEAD	9	9
LAUREL SPRINGS PARK	5940 RADIO STATION RD LA PLATA MD 20646	LA PLATA	-	-
MALLOWS BAY PARK	1440 WILSON LANDING ROAD, MD 20662	NANJEMOY	-	-
MDTA NICE ADMIN	9665 ORLANDPK DR NEWBURG MD 20664	NEWBURG	-	-
MVA WALDORF	11 INDUSTRIAL PARK DR WALDORF MD 20602	WALDORF	-	-
MYRTLE GROVE WMA	5625 MYRTLE GROVE RD LAPLATA MD 20646	LAPLATA	3	3
OAK RIDGE PARK	13675 OAKS ROAD, MD 20637	HUGHESVILLE	-	-
PISGAH PARK	6645 MASON SPRINGS RD PISGAH MD 20640	PISGAH	-	-
PISGAH RECYCLING CENTER	6645 MASON SPRINGS RD PISGAH MD 20640	PISGAH	3	3
RICHARD R. CLARK SENIOR CENTER	1210 CHARLES ST LA PLATA MD 20646	LA PLATA	9	6
ROBERT STETHEM PARK	4250 PINEY CHURCH RD WALDORF MD 20602	WALDORF	-	-
SHA LAPLATA	5725 WASHINGTON AVE LAPLATA MD 20646	LAPLATA	-	-
SOUTHERN MARYLAND CRIMINAL JUSTICE ACADEMY	7682 ACADEMY PL FAULKNER MD 20632	FAULKNER	3	2
SOUTHERN PARK	15884 WILSON ROAD, MD 20664	NEWBURG	-	-
SWAN POINT WASTEWATER TREATMENT PLANT	1200 SWAN POINT ROAD, MD 30664	NEWBURG	8	7
TRI-COUNTY ANIMAL SHELTER (CALVERT,	6707 ANIMAL SHELTER RD HUGHESVILLE MD	HUGHESVILLE	3	3

CHARLES, ST. MARY'S)	20637			
TURKEY HILL PARK	9430 TURKEY HILL ROAD, MD 20646	LA PLATA	-	-
WALDORF GYMNASIATIC CENTER	2745 OLD WASHINGTON RD WALDORF MD 20601	WALDORF	9	6
WALDORF NATURAL RESOURCES POLICE SOUTHERN REGIONAL	2160 OLD WASHINGTON RD WALDORF MD 20601	WALDORF	4	4

Table 29: Charles County Higher Education Anchor Institution

ANCHORNAME	ADDRESS	CITY	MAXADDOWN	MAXADUP
COLLEGE OF SOUTHERN MARYLAND, CENTER FOR TRADES/ENERGY TRAINING	17 IRONGATE DR WALDORF MD 20602	WALDORF	3	3
COLLEGE OF SOUTHERN MARYLAND, TRUCK DRIVING RANGE	5825 RADIO STATION RD LA PLATA MD 20646	LA PLATA	11	11
COLLEGE OF SOUTHERN MARYLAND, WALDORF CENTER	3261 OLD WASHINGTON RD WALDORF MD 20602	WALDORF	11	11
COLLEGE OF SOUTHERN MARYLAND, LA PLATA CAMPUS	8730 MITCHELL RD LA PLATA MD 20646	LA PLATA	9	9

Table 30: Charles County Public Safety Anchor Institutions

ANCHORNAME	ADDRESS	CITY	MAXADDOWN	MAXADUP
CHARLES COUNTY FIRE DEPT., IRONSIDES VOLUNTEER RESCUE SQUAD	6120 PORT TOBACCO RD LA PLATA MD 20646	LA PLATA	3	3
CHARLES COUNTY FIRE DEPT., NANJEMOY VFD	4260 PORT TOBACCO RD NANJEMOY MD 20662	NANJEMOY	3	3
CHARLES COUNTY, DENTSVILLE EMS & AUXILIARY	12135 CHARLES ST LA PLATA MD 20646	LA PLATA	3	3
UNIVERSITY OF MARYLAND FIRE SERVICE	5975 RADIO STATION RD	LA PLATA	9	6

EXT.	LA PLATA MD 20646			
TOWN OF LA PLATA POLICE DEPARTMENT	5 GARRET AVE LA PLATA MD 20646	LA PLATA	7	6
CHARLES COUNTY FIRE DEPT., NEWBURG VOL RESCUE SQUAD & FD	12265 ROCK POINT RD NEWBURG MD 20664	NEWBURG	9	6
CHARLES COUNTY FIRE DEPT., WALDORF FIRE STATION 3	3245 OLD WASHINGTON RD WALDORF MD 20602	WALDORF	9	6
CHARLES COUNTY FIRE DEPT., WALDORF EMS STATION 3	1069 ST. IGNATIUS DR WALDORF MD 20602	WALDORF	9	6
CHARLES COUNTY MICU	10700 BILLINGSLEY RD WALDORF MD 20695	WALDORF	9	6
CHARLES COUNTY FIRE DEPT., BEL ALTON VFD/EMS	9765 BEL ALTON NEWTOWN RD BEL ALTON MD 20611	BEL ALTON	9	6
CHARLES COUNTY FIRE DEPT., WALDORF FIRE/EMS STATION 12	7000 ST. FLORIAN DR WALDORF MD 20603	WALDORF	9	6
CHARLES COUNTY FIRE DEPT., POTOMAC HEIGHTS VFD & RS	73 GLYMONT RD INDIAN HEAD MD 20640	INDIAN HEAD	9	6
CHARLES COUNTY FIRE DEPT., COBB ISLAND VFD & EMS	13290 MAIN AVE COBB ISLAND MD 20625	COBB ISLAND	8, > or = 25 mbps, < 50 mbps	5, > or = 3 mbps, < 6 mbps
CHARLES COUNTY FIRE DEPT., INDIAN HEAD VFD & RS	4095 INDIAN HEAD HWY INDIAN HEAD MD 20640	INDIAN HEAD	9	6
CHARLES COUNTY SHERIFF'S OFFICE - WALDORF DISTRICT STATION	3670 RT 5 WALDORF MD 20601	WALDORF	7	6
CHARLES COUNTY FIRE DEPT., BRYANS ROAD VFD	3099 LIVINGSTON RD BRYANS ROAD MD 20616	BRYANS ROAD	9	6
CHARLES COUNTY BACKUP 911 CENTER	6855 CRAIN HWY LA PLATA MD 20646	LA PLATA	9	6

CHARLES COUNTY SHERIFF'S OFFICE HEADQUARTERS	6915 CRAIN HWY LA PLATA MD 20646	LA PLATA	7	6
CHARLES COUNTY SHERIFF'S OFFICE - TOWNE CENTER	11110 MALL CIR WALDORF MD 20603	WALDORF	7	6
CHARLES COUNTY FIRE DEPT., 10TH DISTRICT VFD	7035 POOR HOUSE RD MARBURY MD 20658	MARBURY	9	6
CHARLES COUNTY FIRE DEPT., LA PLATA VFD	911 WASHINGTON AVE LA PLATA MD 20646	LA PLATA	9	6
CHARLES COUNTY FIRE DEPT., BENEDICT FIRE, EMS & MARINE	18210 HYATT AVE BENEDICT MD 20612	BENEDICT	8, > or = 25 mbps < 50 mbps	5, > or = 3 mbps, < 6 mbps
CHARLES COUNTY 911 CENTER	10425 AUDIE LN LA PLATA MD 20646	LA PLATA	9	6
CHARLES COUNTY FIRE DEPT., HUGHESVILLE FIRE & EMS	15245 PRINCE FREDERICK RD HUGHESVILLE MD 20637	HUGHESVILLE	8, > or = 25 mbps, < 50 mbps	5, > or = 3 mbps, < 6 mbps
CHARLES COUNTY SHERIFF'S OFFICE - INDIAN HEAD DISTRICT STATION	4401 INDIAN HEAD HWY INDIAN HEAD MD 20640	INDIAN HEAD	7	6

Table 31: St. Mary's County Schools/ k-12 Anchor Institutions

ANCHORNAME	ADDRESS	MAXADDOWN	MAXADUP
BENJAMIN BANNEKER ELEMENTARY SCHOOL	27110 POINT LOOKOUT RD LOVEVILLE MD 20656	3	3
BENJAMIN BANNEKER ELEMENTARY SCHOOL	27180 POINT LOOKOUT RD LOVEVILLE MD 20656	-	-
BETHUNE ELEMENTARY SCHOOL	22975 COLTON POINT RD BUSHWOOD MD 20618	11	11
BOARD OF ED BUILDING	23160 MOAKLEY ST LEONARDTOWN MD 20650	11	11
CARVER ANNEX	47450 LINCOLN AVE LEXINGTON PARK MD 20653	11	11
CARVER ELEMENTARY SCHOOL	46155 CARVER SCHOOL BLVD LEXINGTON PARK MD 20653	3	3
CHAPTICO HIGH SCHOOL	25390 COLTON POINT RD MECHANICSVILLE MD 20659	11	11
CHESAPEAKE CHARTER SCHOOL	20945 GREAT MILLS RD LEXINGTON PARK MD 20653	-	-
DYNARD ELEMENTARY SCHOOL	23510 BUSHWOOD RD CHAPTICO MD 20621	3	3
ESPERANZA MIDDLE SCHOOL	22790 MAPLE RD LEXINGTON PARK MD 20653	11	11
EVERGREEN ELEMENTARY SCHOOL	43765 EVERGREEN WAY CALIFORNIA MD 20619	-	-
FAIRLEAD ACADEMY	20833 GREAT MILLS RD LEXINGTON PARK MD 20653	-	-
GREAT MILLS HIGH SCHOOL	21130 GREAT MILLS RD GREAT MILLS MD 20634	11	11
GREEN HOLLY ELEMENTARY SCHOOL	46060 MILLSTONE LANDING RD LEXINGTON PARK MD 20653	3	3
GREENVIEW KNOLLS ELEMENTARY SCHOOL	45711 MILITARY LN GREAT MILLS MD 20634	3	3
HOLLYWOOD ELEMENTARY SCHOOL	44345 JOY CHAPEL RD HOLLYWOOD MD 20636	3	3

LEONARDTOWN ELEMENTARY SCHOOL	22885 DUKE ST LEONARDTOWN MD 20650	3	3
LEONARDTOWN HIGH SCHOOL	23995 POINT LOOKOUT RD LEONARDTOWN MD 20650	-	-
LEONARDTOWN MIDDLE SCHOOL	24015 POINT LOOKOUT RD LEONARDTOWN MD 20650	-	-
LETTIE DENT ELEMENTARY SCHOOL	37840 NEW MARKET TURNER RD MECHANICSVILLE MD 20659	3	3
LEXINGTON PARK ELEMENTARY SCHOOL	46763 SHANGRI LA DR LEXINGTON PARK MD 20653	-	-
MARGARET BRENT MIDDLE SCHOOL	29675 POINT LOOKOUT RD MECHANICSVILLE MD 20659	3	3
MECHANICSVILLE ELEMENTARY SCHOOL	28585 THREE NOTCH RD MECHANICSVILLE MD 20659	3	3
OAKVILLE ELEMENTARY SCHOOL	26410 THREE NOTCH RD MECHANICSVILLE MD 20659	3	3
PARK HALL ELEMENTARY SCHOOL	20343 HERMANVILLE RD LEXINGTON PARK MD 20653	3	3
PINEY POINT ELEMENTARY SCHOOL	44550 TALL TIMBERS RD TALL TIMBERS MD 20690	3	3
RIDGE ELEMENTARY SCHOOL	49430 AIREDELE RD RIDGE MD 20680	3	3
SPRING RIDGE MIDDLE SCHOOL	19856 THREE NOTCH RD LEXINGTON PARK MD 20653	3	3
TOWN CREEK ELEMENTARY SCHOOL	45805 DENT DR LEXINGTON PARK MD 20653	3	3
WHITE MARSH ELEMENTARY SCHOOL	29090 THOMPSON CORNER RD MECHANICSVILLE MD 20659	3	3

Note: The ideal speed for the school would be greater than 1 gb/second

Table 32: St. Mary's County Library Anchor Institutions

ANCHORNAME	ADDRESS	CITY	MAXADDOWN	MAXADUP
LEXINGTON PARK LIBRARY	21677 FDR BLVD LEXINGTON PARK MD 20653	LEXINGTON PARK	11	11
LEONARDTOWN BRANCH	23250 HOLLYWOOD ROAD LEONARDTIWB MD 20650	LEONARDTOWN	11	11
CHARLOTTE HALL	37600 NEW MARKET ROAD	CHARLOTTE	11	11

BRANCH	CHARLOTTE HALL MD 20622	HALL
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Table 33: St. Mary’s County Medical – Healthcare Anchor Institutions

ANCHORNAME	ADDRESS	CITY
SAINT MARYS HOSPITAL	25500 POINT LOOKOUT RD LEONARDTOWN MD 20650	LEONARDTOWN
CHARLOTTE HALL VETERANS HOME	29449 CHARLOTTE HALL ROAD, CHARLOTTE HALL MD 20622	CHARLOTTE HALL

Table 34: St. Mary’s County Public Safety Anchor Institutions

ANCHORNAME	ADDRESS	CITY	MAXADDOWN	MAXADUP
DPSCS	23150 LEONARD HALL DR LEONARDTOWN MD 20650	LEONARDTOWN	-	-
LEONARDTOWN MSC	23110 LEONARD HALL DR LEONARDTOWN MD 20650	LEONARDTOWN	-	-
LEONARDTOWN SHA TOWER	26720 POINT LOOKOUT RD LEONARDTOWN MD 20650	LEONARDTOWN	-	-
MD STATE POLICE	23200 LEONARD HALL DR LEONARDTOWN MD 20650	LEONARDTOWN	3	3
ST MARY'S COUNTY BACKUP 911 CENTER	41655 COURTHOUSE DR LEONARDTOWN MD 20650	LEONARDTOWN	-	-
ST. MARY'S COUNTY DEPARTMENT OF PUBLIC SAFETY	41880 BALDRIDGE ST LEONARDTOWN MD 20650	LEONARDTOWN	9	7

Table 35: St. Mary’s County University – College Anchor Institutions

ANCHORNAME	ADDRESS	CITY	MAXADDOWN	MAXADUP
COLLEGE OF SOUTHERN MARYLAND, LEONARDTOWN CAMPUS	22950 HOLLYWOOD RD LEONARDTOWN MD 20650	LEONARDTOWN	6	6

DR. JAMES A. FORREST CAREER AND TECHNOLOGY CENTER	24005 POINT LOOKOUT RD LEONARDTOWN MD 20650	LEONARDTOWN	11	11
SOUTHERN MD HIGHER ED CENTER	44219 AIRPORT RD CALIFORNIA MD 20619	CALIFORNIA	-	-
ST. MARY'S COLLEGE	18952 E FISHER RD ST MARYS CITY MD 20686	ST MARYS CITY	8	8

Table 36: St. Mary's County Community Support – Government Anchor Institutions

ANCHORNAME	ADDRESS	MAXADDOWN	MAXADUP
CIRCUIT CT	41605 COURTHOUSE DR LEONARDTOWN MD 20650	11	11
COMMUNICATION TOWER	41675 BALDRIDGE ST LEONARDTOWN MD 20650	11	11
DHMH	21580 PEABODY ST LEONARDTOWN MD 20650	-	-
DMSP BARRACK T - LEONARDTOWN	23200 LEONARD HALL DR LEONARDTOWN MD 20650	4	4
ELECTIONS OFFICE	41650 TUDOR HALL RD LEONARDTOWN MD 20650	11	11
GREAT MILLS POOL	21100 GREAT MILLS RD LEXINGTON PARK MD 20653	11	11
LEONARDHALL REC CENTER	23115 LEONARD HALL DR LEONARDTOWN MD 20650	11	11
MSDE	41670 COURTHOUSE DR LEONARDTOWN MD 20650	-	-
MVA	27351 POINT LOOKOUT RD LEONARDTOWN MD 20650	-	-
OAK RIDGE PARK	13675 OAKS RD CHARLOTTE HALL MD 20662	-	-
PINEY POINT MUSEUM	44730 LIGHTHOUSE RD PINEY POINT MD 20674	3	3
PINEY POINT MUSEUM	44740 LIGHTHOUSE RD PINEY POINT	3	3

	MD 20674		
PINEY POINT MUSEUM	44720 LIGHTHOUSE RD PINEY POINT MD 20674	3	3
POINT LOOKOUT SP	11175 POINT LOOKOUT RD SCOTLAND MD 20687	3	3
PUBLICS WORKS	44825 SAINT ANDREWS CHURCH RD CALIFORNIA MD 20619	11	11
SHA LEONARDTOWN SHOP	26720 POINT LOOKOUT RD LEONARDTOWN MD 20650	-	-
ST CLEMENTS ISLAND MUSEUM	38360 BAYVIEW RD COLTONS POINT MD 20626	3	3
ST. MARY'S PROJECT FORRESTRY DIVISION – LEONARDTOWN	23110 LEONARD HALL DR LEONARDTOWN MD 20650	3	3
ST. MARY'S SOIL CONSERVATION DISTRICT	26737 RADIO STATION WAY, SUITE B, LEONARDTOWN, MD 20650	4	4
WICOMICO GOLF COURSE	35277 GOLF COURSE DR MECHANICSVILLE MD 20659	3	3
HOLLYWOOD REC CENTER	24400 MERVELL DEAN RD HOLLYWOOD MD 20636	3	3

Table 37: Planned Number of Anchor Institutions Calvert County

Name	Address	City	Type
Coster RD SAA Tower	Intersection Of Coster Rd & Mill Bridge Rd	Appeal	Other Gov. Facility
Highway Maintainance	325 Stafford Rd	Barstow	Other Gov. Facility
Beach Elementary School	7900 Old Bayside Rd	Chesapeake Beach	School (K-12)
NorthEast Comm. Center	4075 Gordon Stinnett Avenue	Chesapeake Beach	Other Comm. Support Org.
Twin Beaches Library	3819 Harbor Rd	Chesapeake Beach	Library
Calvert Co. Adult Education	4105 Old Town Rd	Huntingtown	School (K-12)
Company 6 Huntingtown VFDRS	4030 Old Town Rd	Huntingtown	Public Safety Entity

Huntingtown Elementary School	4345 Huntingtown Rd	Huntingtown	School (K-12)
Huntingtown High School	4125 Solomons Island Rd	Huntingtown	School (K-12)
Plum Point Elementary School	1245 Plum Point Rd	Huntingtown	School (K-12)
Plum Point Middle School	1475 Plum Point Rd	Huntingtown	School (K-12)
Sunderland SHA Tower	6250 North Solomon's Island Rd	Huntingtown	Other Gov. Facility
Appeal Elementary School	11655 H G Trueman Rd	Lusby	School (K-12)
Dowell Elementary School	12680 H G Trueman Rd	Lusby	School (K-12)
Mill Creek Middle School	601 Margaret Taylor Rd	Lusby	School (K-12)
Patuxent Elementary School	35 Appeal Ln	Lusby	School (K-12)
Patuxent High School	12485 Rousby Hall Rd	Lusby	School (K-12)
Southern Library	20 Appeal Ln	Lusby	Library
Southern Middle School	9615 H G Trueman Rd	Lusby	School (K-12)
Fairview Library	8120 Southern Maryland Blvd	Owings	Library
Mount Harmony Elementary School	900 W Mt Harmony Rd	Owings	School (K-12)
Nothern High School	2950 Chaneyville Rd	Owings	School (K-12)
Northern Middle School	2954 Chaneyville Rd	Owings	School (K-12)
Windy Hill Elementary School	9550 Boyds Turn Rd	Owings	School (K-12)
Windy Hill Middle School	9560 Boyds Turn Rd	Owings	School (K-12)
Mutual Elementary School	1455 Ball Rd	Port Republic	School (K-12)
Broomes Island Rd Tower	3205 Broomes Island Rd	Port Republic	Public Safety Entity
Barstow Elementary School	295 Williams Rd	Prince Frederick	School (K-12)
Calvert Career Center	330 Dorsey Rd	Prince Frederick	School (K-12)
Calvert Co. Backup 911	340 Stafford Rd	Prince Frederick	Public Safety Entity

Center			
Calvert Co. Public Schools	1305 Dares Beach Rd	Prince Frederick	School (K-12)
Calvert Country Schools	1350 Dares Beach Rd	Prince Frederick	School (K-12)
Calvert Elementary School	1450 Dares Beach Rd	Prince Frederick	School (K-12)
Calvert High School	600 Dares Beach Rd	Prince Frederick	School (K-12)
Calvert Middle School	435 Solomons Island Rd N	Prince Frederick	School (K-12)
Calvert Pines Senior Center	450 Dares Beach Rd	Prince Frederick	Other Comm. Support Org.
Co. Services Plaza	150 Main St	Prince Frederick	Other Gov. Facility
College of Southern MD Prince Frederick	115 Williams Rd	Prince Frederick	Comm. College
Community Resources Building	30 Duke St	Prince Frederick	Other Gov. Facility
Company 10 Calvert Advanced Life Support	60 Industry Ln	Prince Frederick	Public Safety Entity
Company 2 Prince Frederick VFD	450 Solomons Island Rd	Prince Frederick	Public Safety Entity
Company 4 Prince Frederick VRS	755 Solomons Island Rd	Prince Frederick	Public Safety Entity
Courthouse	175 Main St	Prince Frederick	Other Gov. Facility
District Court Building	200 Duke St	Prince Frederick	Other Gov. Facility
Maryland State Police Troop U	210 Main St	Prince Frederick	Public Safety Entity
Prince Frederick Library	850 Costley Way	Prince Frederick	Library
Prince Frederick SHA Tower	100 Hallowing Point Rd	Prince Frederick	Public Safety Entity
SHA	Rte 231 & 4	Prince Frederick	Other Gov. Facility
Calvert Marine Museum	14150 Solomons Island	Solomons	Other Comm. Support Org.
Chesapeake Biological	1 Williams St	Solomons	Other Institutes of

Laboratory			Higher Ed.
Company 3 Solomons VFDRS	200 Calvert Beach Rd	Solomons	Public Safety Entity
Solomons Island PD Substation	14484 Solomons Island Rd	Solomons	Public Safety Entity
Company 7 St. Leonards VFDRS	200 Calvert Beach Rd	St. Leonard	Public Safety Entity
Saint Leonard Elementary School	5370 St. Leonard Rd	St. Leonard	School (K-12)
Mt Hope Comm. Center	100 Pushaw Station Rd	Sunderland	Other Comm. Support Org.
Sunderland Elementary School	150 Clyde Jones Rd	Sunderland	School (K-12)

Table 38: Planned Number of Anchor Institutions Charles County

Name	Address	City	Type
Hughesville SHA Tower	None	Hughesville	Public Safety Entity
Charles County 911 Center	10425 Audie Lane	La Plata	Public Safety Entity
Charles County Backup Center	6855 Crain Hwy	La Plata	Public Safety Entity
MD State Police Troop H	9500 Mitchell Road	La Plata	Public Safety Entity
MVA	11 Industrial Drive	Waldorf	Other Gov. Facility
Charles County Government Building	200 Baltimore Street	La Plata	Government Facility
Hughesville Volunteer Fire Department	15245 Prince Frederick Road	Hughesville	Public Safety Entity
Nanjemoy Volunteer Fire Department	4260 Port Tobacco Road	Nanjemoy	Public Safety Entity
Mount Hope Elementary School	9275 Ironsides Road	Nanjemoy	School (K-12)

Table 39: Planned Number of Anchor Institutions St Marys County

Name	Address	City	Type
Evergreen Elementary	43765 Evergreen Way	California	School (K-12)
Southern MD Higher Ed. Center	44219 Airport Road	California	Other Institutions of Higher Learning
Dynard Elementary	23510 Bushwood Road	Chaptico	School (K-12)
Fairland Academy	20833 Great Mills Road	Great Mills	School (K-12)
Greenville Knolls Elementary	45711 Military Lane	Great Mills	School (K-12)
Hollywood Elementary	44395 Joy Chapel Road	Hollywood	School (K-12)
Circuit Court	41605 Courthouse Dr	Leonardtown	Other Gov. Facility
College of Southern MD Leonardtown	22950 Hollywood Road	Leonardtown	Comm. College
DHMH	21580 Peabody St.	Leonardtown	Other Gov. Facility
DPSCS	23150 Leonard Hall Dr	Leonardtown	Public Safety Entity
Leonardtown Elementary	22885 Duke St.	Leonardtown	School (K-12)
Leonardtown MSC	23110 Leonard Hall Dr	Leonardtown	Public Safety Entity
Leonardtown SHA Tower	26720 Point Lookout Road	Leonardtown	Public Safety Entity
Maryland State Police Troop T	23200 Leonard Hall Dr	Leonardtown	Public Safety Entity
MSDE	41670 Courthouse Dr	Leonardtown	Other Gov. Facility
MVA	27351 Point Lookout Dr	Leonardtown	Other Gov. Facility
St. Mary's County Backup 911 Center	41655 Courthouse Dr	Leonardtown	Public Safety Entity

Charter School	20945 Great Mills Rd, Suite 501	Lexington Park	School (K-12)
Green Holly Elementary	46060 Millstone Landing Road	Lexington Park	School (K-12)
Lexington Park Elementary	46753 Shangri La	Lexington Park	School (K-12)
Town Creek Elementary	45805 Dent Dr	Lexington Park	School (K-12)
Lettie Marshall Dent Elementary	37840 New Market Turner Rd	Mechanicsville	School (K-12)
Mechanicsville Elementary	28585 Three Notch Rd	Mechanicsville	School (K-12)
Oakville Elementary	26410 Three Notch Rd	Mechanicsville	School (K-12)
White Marsh Elementary	29090 Thompson Corner Rd	Mechanicsville	School (K-12)
Park Hall Elementary	20343 Hermanville Rd	Park Hall	School (K-12)
Ridge Elementary	49430 Airedele Road	Ridge	School (K-12)
Three Notch Rd SHA Tower	19644 Three Notch Rd St. James	St. James	Other Gov. Facility
St. Mary's College of Maryland	18952 E. Fisher Road	St. Mary's City	Other Institutions of Higher Learning
Piney Point Elementary	44550 Tall Timbers	Tall Timbers	School (K-12)

Note: Above planned anchor institutions for Calvert, Charles and St. Mary's Counties will be connected in 2013 by the One Maryland Broadband Network Grant.

Table 40: Spectrum Licenses

Call Sign	Licensee/ Lessee Name	Common Name	Radio Service Code	Radio Service Desc	Market Code	Market Name	County	State	FIPS Code	Population	Full/ Partial Indicator	Lower Band	Upper Band	Total Spectrum	Active Lease
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Calvert County	MD	24009	88737	Full	2496	2502	6	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Calvert County	MD	24009	61946	Partial	2602	2608	6	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Calvert County	MD	24009	88737	Full	2608	2614	6	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Calvert County	MD	24009	88737	Full	2618	2624	6	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Calvert County	MD	24009	88737	Full	2624	2629.5	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Calvert County	MD	24009	88737	Full	2629.5	2635	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Calvert County	MD	24009	88737	Full	2635	2640.5	5.5	N

B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Calvert County	MD	24009	61946	Partial	2640.5	2646	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Calvert County	MD	24009	61946	Partial	2646	2651.5	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Calvert County	MD	24009	61946	Partial	2651.5	2657	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Calvert County	MD	24009	88737	Full	2657	2662.5	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Calvert County	MD	24009	88737	Full	2662.5	2668	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Calvert County	MD	24009	88737	Full	2668	2673.5	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Charles County	MD	24017	146551	Full	2496	2502	6	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Charles County	MD	24017	32737	Partial	2602	2608	6	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Charles County	MD	24017	146551	Full	2608	2614	6	N

B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Charles County	MD	24017	146551	Full	2618	2624	6	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Charles County	MD	24017	146551	Full	2624	2629.5	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Charles County	MD	24017	146551	Full	2629.5	2635	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Charles County	MD	24017	146551	Full	2635	2640.5	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Charles County	MD	24017	32737	Partial	2640.5	2646	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Charles County	MD	24017	32737	Partial	2646	2651.5	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Charles County	MD	24017	32737	Partial	2651.5	2657	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Charles County	MD	24017	146551	Full	2657	2662.5	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Charles County	MD	24017	146551	Full	2662.5	2668	5.5	N

B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	Charles County	MD	24017	146551	Full	2668	2673.5	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	St. Mary's County	MD	24037	105151	Full	2496	2502	6	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	St. Mary's County	MD	24037	102571	Partial	2602	2608	6	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	St. Mary's County	MD	24037	105151	Full	2608	2614	6	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	St. Mary's County	MD	24037	105151	Full	2618	2624	6	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	St. Mary's County	MD	24037	105151	Full	2624	2629.5	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	St. Mary's County	MD	24037	105151	Full	2629.5	2635	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	St. Mary's County	MD	24037	105151	Full	2635	2640.5	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	St. Mary's County	MD	24037	102571	Partial	2640.5	2646	5.5	N

B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	St. Mary's County	MD	24037	102571	Partial	2646	2651.5	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	St. Mary's County	MD	24037	102571	Partial	2651.5	2657	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	St. Mary's County	MD	24037	105151	Full	2657	2662.5	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	St. Mary's County	MD	24037	105151	Full	2662.5	2668	5.5	N
B461	NSAC, LLC	Clearwire	BR	Broadband Radio Service	BTA461	Washington, DC	St. Mary's County	MD	24037	105151	Full	2668	2673.5	5.5	N

Table 41: Provider Transmission and Speed Capability for Charles, Calvert and St Mary's Counties

Provider Name	DBA_Name	Technology_of_ Transmission	Max_Download_ Speed	Max_Upload_ Speed	County Served
Allied Telecom Group, LLC	Allied Telecom Group, LLC	Asymmetric xDSL	Greater than or equal to 6 mbps and less than 10 mbps	Greater than or equal to 3 mbps and less than 6 mbps	Charles, St. Mary's
Allied Telecom Group, LLC	Allied Telecom Group, LLC	Other Copper Wireline	Greater than or equal to 25 mbps and less than 50 mbps	Greater than or equal to 25 mbps and less than 50 mbps	Charles, St. Mary's
Atlantech Online, Inc.	Atlantech Online, Inc.	Other Copper Wireline	Greater than or equal to 1.5 mbps and less than 3 mbps	Greater than or equal to 1.5 mbps and less than 3 mbps	Calvert, Charles, St. Mary's

Atlantic Broadband (Penn), LLC	Atlantic Broadband	Cable Modem - Other	Greater than or equal to 10 mbps and less than 25 mbps	Greater than or equal to 768 kbps and less than 1.5 mbps	Calvert, Charles
Broadview Networks Holdings, Inc.	Broadview Networks Holdings, Inc.	Other Copper Wireline	Greater than or equal to 1.5 mbps and less than 3 mbps	Greater than or equal to 1.5 mbps and less than 3 mbps	Calvert, St. Mary's
Broadview Networks Holdings, Inc.	Broadview Networks Holdings, Inc.	Other Copper Wireline	Greater than or equal to 3 mbps and less than 6 mbps	Greater than or equal to 3 mbps and less than 6 mbps	Charles
Comcast Cable Communications, LLC	Comcast	Cable Modem - DOCSIS 3.0	Greater than or equal to 50 mbps and less than 100 mbps	Greater than or equal to 10 mbps and less than 25 mbps	Calvert, Charles, St. Mary's
Comcast Cable Communications, LLC	Comcast	Cable Modem - Other	Greater than or equal to 50 mbps and less than 100 mbps	Greater than or equal to 10 mbps and less than 25 mbps	Charles, St. Mary's
DIECA Communications, Inc.	Covad Communications Company	Other Copper Wireline	Greater than or equal to 3 mbps and less than 6 mbps	Greater than or equal to 3 mbps and less than 6 mbps	Calvert, Charles
DIECA Communications, Inc.	Covad Communications Company	Asymmetric xDSL	Greater than or equal to 6 mbps and less than 10 mbps	Greater than or equal to 768 kbps and less than 1.5 mbps	Charles
DSL.net, Inc.	DSL.net, Inc.	Symmetric xDSL	Greater than or equal to 768 kbps and less than 1.5 mbps	Greater than or equal to 768 kbps and less than 1.5 mbps	Charles
DSL.net, Inc.	DSL.net, Inc.	Other Copper Wireline	Greater than or equal to 1.5 mbps and less than 3 mbps	Greater than or equal to 1.5 mbps and less than 3 mbps	Charles
Gans Communications, LP	MetroCast	Cable Modem - Other	Greater than or equal to 10	Greater than or equal to 1.5	St. Mary's

	Communications		mbps and less than 25 mbps	mbps and less than 3 mbps	
Level 3 Communications, LLC	Level 3 Communications, LLC	Optical Carrier/Fiber to the End User	Greater than or equal to 1 gbps	Greater than or equal to 1 gbps	Charles
Megapath, Inc.	Megapath	Asymmetric xDSL	Greater than or equal to 768 kbps and less than 1.5 mbps	Greater than 200 kbps and less than 768 kbps	Charles
New Edge Holding Company	New Edge Network, Inc	Asymmetric xDSL	Greater than or equal to 1.5 mbps and less than 3 mbps	Greater than 200 kbps and less than 768 kbps	Calvert, Charles
New Edge Holding Company	New Edge Network, Inc	Asymmetric xDSL	Greater than or equal to 768 kbps and less than 1.5 mbps	Greater than 200 kbps and less than 768 kbps	St. Mary's
PAETEC Communications, Inc.	PAETEC Communications, Inc.	Other Copper Wireline	Greater than or equal to 50 mbps and less than 100 mbps	Greater than or equal to 50 mbps and less than 100 mbps	Charles, St. Mary's
Verizon Communications Inc.	Verizon Maryland Inc.	Asymmetric xDSL	Greater than or equal to 50 mbps and less than 100 mbps	Greater than or equal to 10 mbps and less than 25 mbps	Calvert, Charles
Verizon Communications Inc.	Verizon Maryland Inc.	Asymmetric xDSL	Greater than or equal to 6 mbps and less than 10 mbps	Greater than or equal to 768 kbps and less than 1.5 mbps	St. Mary's
Verizon Communications Inc.	Verizon Maryland Inc.	Optical Carrier/Fiber to the End User	Greater than or equal to 50 mbps and less than 100 mbps	Greater than or equal to 10 mbps and less than 25 mbps	Calvert, Charles
XO Holdings, Inc.	XO Communications, LLC	Other Copper Wireline	Greater than or equal to 6 mbps and less than 10 mbps	Greater than or equal to 6 mbps and less than 10 mbps	Charles

			mbps		
XO Holdings, Inc.	XO Communications, LLC	Other Copper Wireline	Greater than or equal to 1.5 mbps and less than 3 mbps	Greater than or equal to 1.5 mbps and less than 3 mbps	St. Mary's

Table 42: Service Providers for Calvert, Charles and St. Mary’s

	Calvert	Charles	St. Mary’s
Providers	AT&T	AT&T	AT&T
	Comcast	Covad	Hughesnet
	HughesNet	Cricket	MetroCast Communications
	Sprint	HughesNet	Sprint
	Starband	Sprint	Starband
	Verizon	Starband	Verizon Wireless
	Verizon Wireless	T-Mobile	Wild Blue
	Wild Blue	Verizon	Comcast
		Verizon Wireless	
		Wild Blue	
		Comcast	

Table 43: Broadband Technologies for the Future

	Fibre (FTTH)	Copper (VDSL)	Cable (DOCSIS 3.0)	Mobile (4G)	Satellite
Speed and latency	Virtually unlimited speed (currently up to 1Gbps), very low latency.	Limited speed (VDSL 2 can achieve its maximum theoretical speed of 100 Mbps only within a range of 300 m). Practical speeds are much lower than the advertised speeds.	Bandwidth in 160 Mbps in downstream and 120 Mbps in upstream (reallocation of analogue TV channels into compressed digital space can leverage the capability of DOCSIS 3.0 to allow for 1Gbps	Theoretical bandwidth of up to 100 Mbps for mobile access and 1 Gbps for nomadic access (LTE Advanced). The speed depends on the distance user/BTS and on the number of users	Currently commercially available 4 Mbps (theoretically up to 1 Gbps in the future). High latency (500-900 ms) makes it not suitable for real-time services (e.g. VoIP, real-time games). Fair Access Policies in

			speeds in the future).	connected to one base station.	use (setting download quotas)
Symmetry	Yes	Asymmetric	Asymmetric	Asymmetric	Asymmetric
Deployment	Future proof technology though requires substantial civil engineering works (new-build of last-mile infrastructure). Current technology can serve users to up to 30km from the exchange.	Use of old legacy network. Deployment limited to a short distance from the exchange (only at 1.6km VDSL2 speeds are comparable to ADSL2).	Retooling the existing infrastructure, however no drastic upgrades necessary.	High suitability to cover remote areas where it would be economically inefficient to lay fibre. Larger blocks of spectrum will be necessary.	Suitable to cover remote areas where it would be economically inefficient to lay fibre. Expensive equipment for end-users.
Energy efficiency	High efficiency (PONs have only passive components in the neighbourhood infrastructure which minimizes the network maintenance cost and requirements).	Lower efficiency (active networks like DSL, VDSL and cable have active components in the network backbone equipment, in the central office, in the neighbourhood network infrastructure, and in the customer premises equipment; need to use amplifiers).			Good energy efficiency (satellites are solar-powered).

Table 44: Population Change in past 10 years

Date	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Calvert County	75,163	77,342	80,396	83,369	85,341	86,778	87,608	88,119	88,560	89,212	88,737	89,389
Charles County	121,203	124,699	127,796	131,475	134,561	137,180	139,383	140,672	141,444	142,226	146,551	148,269
St. Mary's County	86,521	87,468	89,897	92,664	94,959	96,982	98,653	100,401	101,664	102,999	105,151	106,479
Southern Maryland Region	282,887	289,509	298,089	307,508	314,861	320,940	325,644	329,192	331,668	334,437	340,439	344,137

Source: Population Division, US Census Bureau

Table 45: Total Business Establishments in Calvert per Industry Per 2009

NAICS code description	Total establishments
Total for all sectors	1741
Forestry, fishing, hunting, and Agriculture Support	2

Utilities	7
Construction	354
Manufacturing	41
Wholesale trade	34
Retail trade	199
Transportation and warehousing	49
Information	20
Finance and insurance	87
Real estate and rental and leasing	94
Professional, scientific, and technical services	200
Management of companies and enterprises	9
Administrative and Support and Waste Management and Remediation Services	84
Educational services	19
Health care and social assistance	180
Arts, entertainment, and recreation	41
Accommodation and food services	144
Other services (except public administration)	176
Industries not classified	1

Sources: US Census Bureau

Table 46: Total Business Establishments in Charles per Industry Per 2009

NAICS code description	Total establishments
Total for all sectors	2701
Forestry, fishing, hunting, and Agriculture Support	8
Mining, quarrying, and oil and gas extraction	3
Utilities	5
Construction	398

Manufacturing	51
Wholesale trade	69
Retail trade	518
Transportation and warehousing	71
Information	34
Finance and insurance	158
Real estate and rental and leasing	105
Professional, scientific, and technical services	262
Management of companies and enterprises	14
Administrative and Support and Waste Mang and Remediation Srvs	117
Educational services	37
Health care and social assistance	307
Arts, entertainment, and recreation	29
Accommodation and food services	229

Source: US Census Bureau

Table 47: Total Business Establishments in St. Mary's per Industry Per 2009

NAICS code description	Total establishments
Total for all sectors	1911
Forestry, fishing, hunting, and Agriculture Support	8
Mining, quarrying, and oil and gas extraction	3
Utilities	1
Construction	282
Manufacturing	26
Wholesale trade	38
Retail trade	295
Transportation and warehousing	94

Information	30
Finance and insurance	73
Real estate and rental and leasing	83
Professional, scientific, and technical services	298
Management of companies and enterprises	7
Administrative and Support and Waste Mang and Remediation Srvs	87
Educational services	25
Health care and social assistance	158
Arts, entertainment, and recreation	29
Accommodation and food services	177
Other services (except public administration)	194
Industries not classified	3

Table 48: Total Employment in Calvert, Charles and St. Mary's per Industry

Area	LineCode	Description	2009
Calvert		Employment by place of work (number of jobs)	
Calvert	10	Total employment	33562
Calvert		By type	
Calvert	20	Wage and salary employment	22955
Calvert	40	Proprietors employment	10607
Calvert	50	Farm proprietors employment	249
Calvert	60	Nonfarm proprietors employment 2/	10358
Calvert		By industry	
Calvert	70	Farm employment	280
Calvert	80	Nonfarm employment	33282
Calvert	90	Private employment	28808

Calvert	100	Forestry, fishing, and related activities	(D)
Calvert	200	Mining	22
Calvert	300	Utilities	1071
Calvert	400	Construction	3344
Calvert	500	Manufacturing	(D)
Calvert	600	Wholesale trade	459
Calvert	700	Retail trade	4054
Calvert	800	Transportation and warehousing	649
Calvert	900	Information	261
Calvert	1000	Finance and insurance	842
Calvert	1100	Real estate and rental and leasing	2253
Calvert	1200	Professional, scientific, and technical services	2171
Calvert	1300	Management of companies and enterprises	(D)
Calvert	1400	Administrative and waste management services	1776
Calvert	1500	Educational services	344
Calvert	1600	Health care and social assistance	4327
Calvert	1700	Arts, entertainment, and recreation	873
Calvert	1800	Accommodation and food services	2834
Calvert	1900	Other services, except public administration	2600
Calvert	2000	Government and government enterprises	4474
Calvert	2001	Federal, civilian	150
Calvert	2002	Military	302
Calvert	2010	State and local	4022
Calvert	2011	State government	251
Calvert	2012	Local government	3771
Charles		Employment by place of work (number of jobs)	

Charles	10	Total employment	59184
Charles		By type	
Charles	20	Wage and salary employment	44109
Charles	40	Proprietors employment	15075
Charles	50	Farm proprietors employment	370
Charles	60	Nonfarm proprietors employment 2/	14705
Charles		By industry	
Charles	70	Farm employment	416
Charles	80	Nonfarm employment	58768
Charles	90	Private employment	48459
Charles	100	Forestry, fishing, and related activities	(D)
Charles	200	Mining	(D)
Charles	300	Utilities	(D)
Charles	400	Construction	5443
Charles	500	Manufacturing	994
Charles	600	Wholesale trade	(D)
Charles	700	Retail trade	9716
Charles	800	Transportation and warehousing	1682
Charles	900	Information	678
Charles	1000	Finance and insurance	1929
Charles	1100	Real estate and rental and leasing	3247
Charles	1200	Professional, scientific, and technical services	3707
Charles	1300	Management of companies and enterprises	128
Charles	1400	Administrative and waste management services	2830
Charles	1500	Educational services	647
Charles	1600	Health care and social assistance	5739

Charles	1700	Arts, entertainment, and recreation	1096
Charles	1800	Accommodation and food services	5220
Charles	1900	Other services, except public administration	3759
Charles	2000	Government and government enterprises	10309
Charles	2001	Federal, civilian	2232
Charles	2002	Military	1052
Charles	2010	State and local	7025
Charles	2011	State government	394
Charles	2012	Local government	6631
St. Mary's		Employment by place of work (number of jobs)	
St. Mary's	10	Total employment	61870
St. Mary's		By type	
St. Mary's	20	Wage and salary employment	45492
St. Mary's	40	Proprietors employment	16378
St. Mary's	50	Farm proprietors employment	565
St. Mary's	60	Nonfarm proprietors employment 2/	15813
St. Mary's		By industry	
St. Mary's	70	Farm employment	614
St. Mary's	80	Nonfarm employment	61256
St. Mary's	90	Private employment	46323
St. Mary's	100	Forestry, fishing, and related activities	303
St. Mary's	200	Mining	85
St. Mary's	300	Utilities	(D)
St. Mary's	400	Construction	3274
St. Mary's	500	Manufacturing	702
St. Mary's	600	Wholesale trade	(D)

St. Mary's	700	Retail trade	5652
St. Mary's	800	Transportation and warehousing	2475
St. Mary's	900	Information	560
St. Mary's	1000	Finance and insurance	1425
St. Mary's	1100	Real estate and rental and leasing	3508
St. Mary's	1200	Professional, scientific, and technical services	10671
St. Mary's	1300	Management of companies and enterprises	(D)
St. Mary's	1400	Administrative and waste management services	(D)
St. Mary's	1500	Educational services	1200
St. Mary's	1600	Health care and social assistance	5168
St. Mary's	1700	Arts, entertainment, and recreation	1196
St. Mary's	1800	Accommodation and food services	3436
St. Mary's	1900	Other services, except public administration	3233
St. Mary's	2000	Government and government enterprises	14933
St. Mary's	2001	Federal, civilian	7692
St. Mary's	2002	Military	2612
St. Mary's	2010	State and local	4629
St. Mary's	2011	State government	788
St. Mary's	2012	Local government	3841

Source: Bureau of Economic Analysis - (D)* means "Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals."

Table 49: Number of Paid Employees in Charles County

2009 County Business Patterns					
Charles		MD			
Major Industry					
NAICS code	NAICS code description	Paid employees for paid period including March 12 (number)	First-quarter payroll	Annual payroll (\$1,000)	Total establishments

			(\$1,000)		
-----	Total for all sectors	32497	252823	1063237	2701
11----	Forestry, fishing, hunting, and Agriculture Support	27	172	784	8
23----	Mining, quarrying, and oil and gas extraction	A	108	701	3
22----	Utilities	F	D	D	5
23----	Construction	3199	34020	146971	398
31----	Manufacturing	670	6348	24876	51
42----	Wholesale trade	702	7138	28913	69
44----	Retail trade	8761	52287	234775	518
48----	Transportation and warehousing	1261	9530	37698	71
51----	Information	391	5343	22584	34
52----	Finance and insurance	993	13061	50017	158
53----	Real estate and rental and leasing	555	5020	27550	105
54----	Professional, scientific, and technical services	1934	25687	110759	262
55----	Management of companies and enterprises	C	D	D	14
56----	Administrative and Support and Waste Management and Remediation Services	1065	7837	31899	117
61----	Educational services	555	2603	10155	37
62----	Health care and social assistance	4351	39343	174330	307
71----	Arts, entertainment, and recreation	263	900	4385	29

72----	Accommodation and food services	5146	16260	68586	229
81----	Other services (except public administration)	1758	10798	45706	283
99----	Industries not classified	5	22	102	3

Table 50: Number of Paid Employees in Calvert County

2009 County Business Patterns					
Calvert		MD			
Major Industry					
NAICS code	NAICS code description	Paid employees for paid period including March 12 (number)	First-quarter payroll (\$1,000)	Annual payroll (\$1,000)	Total establishments
-----	Total for all sectors	17919	163050	663334	1741
11----	Forestry, fishing, hunting, and Agriculture Support	A	D	D	2
22----	Utilities	F	D	D	7
23----	Construction	1971	20239	94713	354
31----	Manufacturing	678	7753	32776	41
42----	Wholesale trade	C	S	4651	34
44----	Retail trade	2978	17023	73393	199
48----	Transportation and warehousing	294	2638	9122	49
51----	Information	197	2985	12029	20
52----	Finance and insurance	403	5306	19725	87
53----	Real estate and rental and leasing	405	3972	17358	94
54----	Professional, scientific, and technical services	1469	14554	60155	200

55----	Management of companies and enterprises	C	D	D	9
56----	Administrative and Support and Waste Mang and Remediation Srvs	886	6704	27479	84
61----	Educational services	195	1283	5314	19
62----	Health care and social assistance	3071	30250	127728	180
71----	Arts, entertainment, and recreation	322	2674	9747	41
72----	Accommodation and food services	2667	7820	35406	144
81----	Other services (except public administration)	1060	5803	25180	176
99----	Industries not classified	A	D	D	1

Table 51: Number of Paid Employees in St. Mary's County

2009 County Business Patterns					
St. Mary's		MD			
Major Industry					
NAICS code	NAICS code description	Paid employees for paid period including March 12 (number)	First-quarter payroll (\$1,000)	Annual payroll (\$1,000)	Total establishments
-----	Total for all sectors	28070	288410	1230110	1911
11----	Forestry, fishing, hunting, and Agriculture Support	B	186	683	8
23----	Mining, quarrying, and oil and gas extraction	A	D	D	3
22----	Utilities	B	D	D	1
23----	Construction	1644	14327	64583	282

31----	Manufacturing	E	D	D	26
42----	Wholesale trade	284	2954	13122	38
44----	Retail trade	4684	24507	105013	295
48----	Transportation and warehousing	520	4305	18835	94
51----	Information	297	3244	13086	30
52----	Finance and insurance	466	4111	16585	73
53----	Real estate and rental and leasing	448	2929	12925	83
54----	Professional, scientific, and technical services	7353	130442	548666	298
55----	Management of companies and enterprises	E	D	D	7
56----	Administrative and Support and Waste Mang and Remediation Srvs	G	D	D	87
61----	Educational services	591	5518	23567	25
62----	Health care and social assistance	4256	35749	144284	158
71----	Arts, entertainment, and recreation	307	799	3543	29
72----	Accommodation and food services	3037	8477	38553	177
81----	Other services (except public administration)	1153	8480	36639	194
99----	Industries not classified	A	D	D	3

Source: Maryland Department of Labor, Licensing and Regulation

D designates “Withheld to avoid disclosing data for individual companies; data are included in higher level totals”

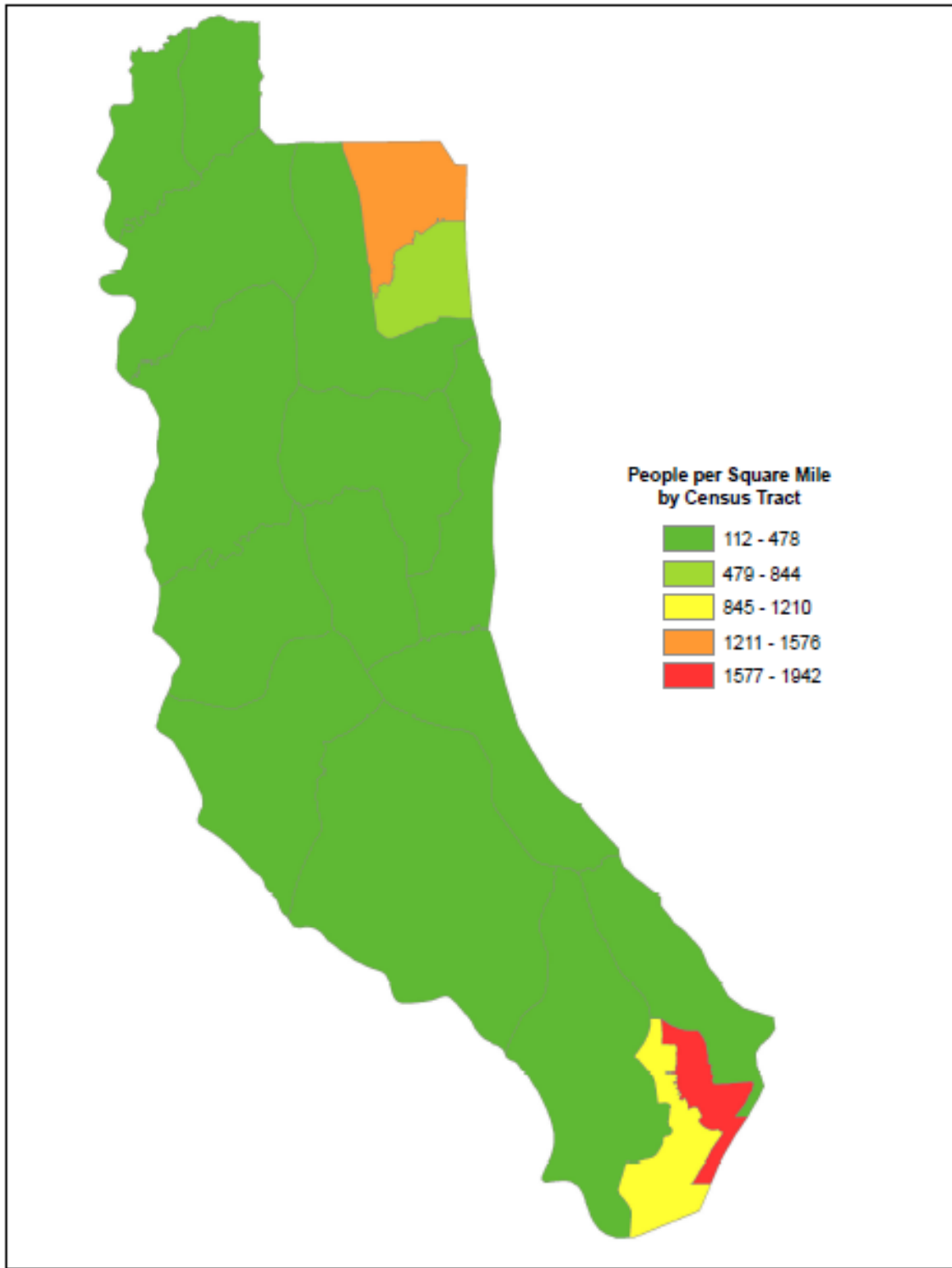
F means “500-999 employees” A means “0-19 employees”

Appendix B: Maps

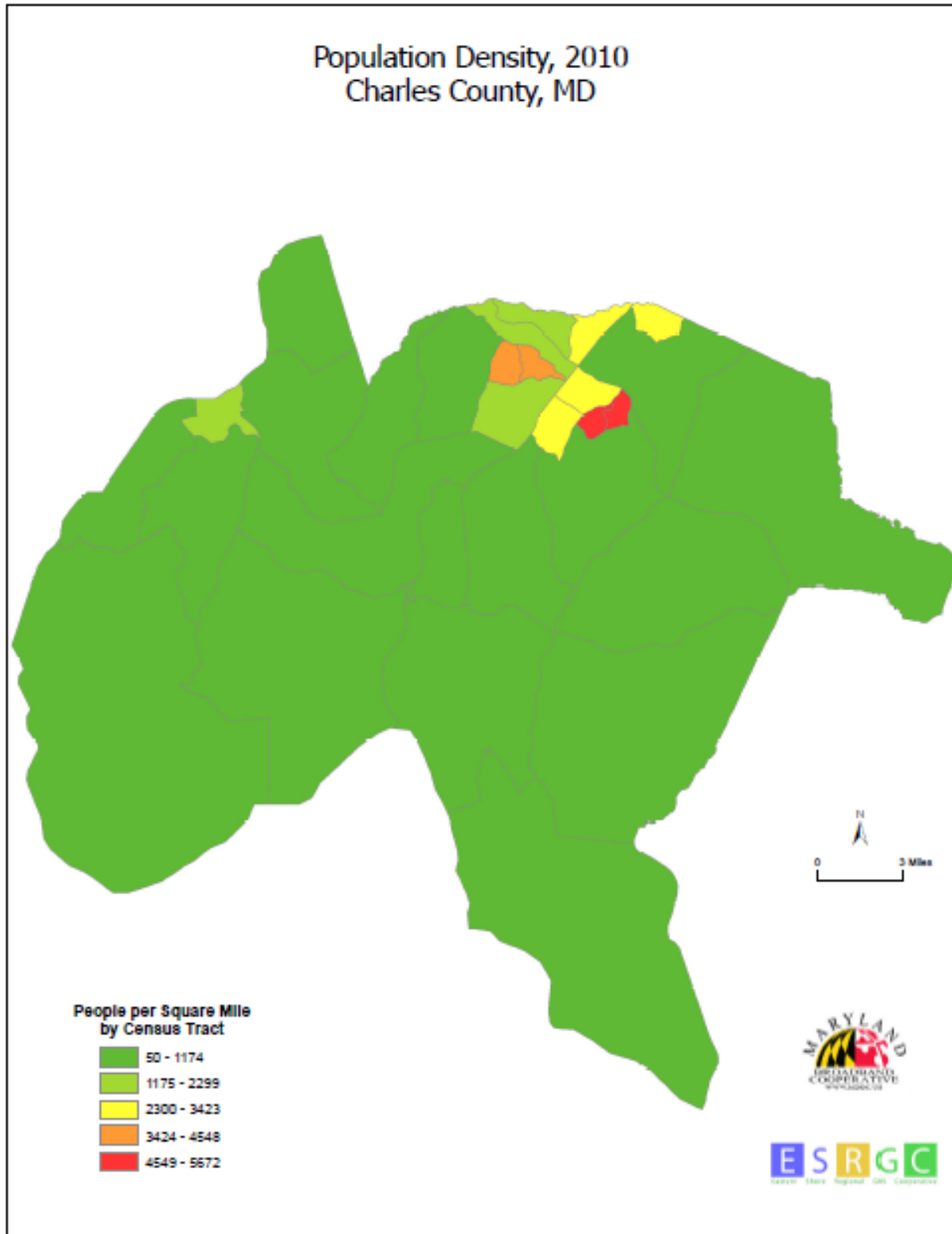
Disclaimer

“The maps are based on provider submitted data under a federal grant program. Please note that in most cases provider submitted data is only verifiable at the census block level. In other words, while your census block may have been verified and reported as being served by broadband, it is understood that not every address within that census block has access to broadband.”

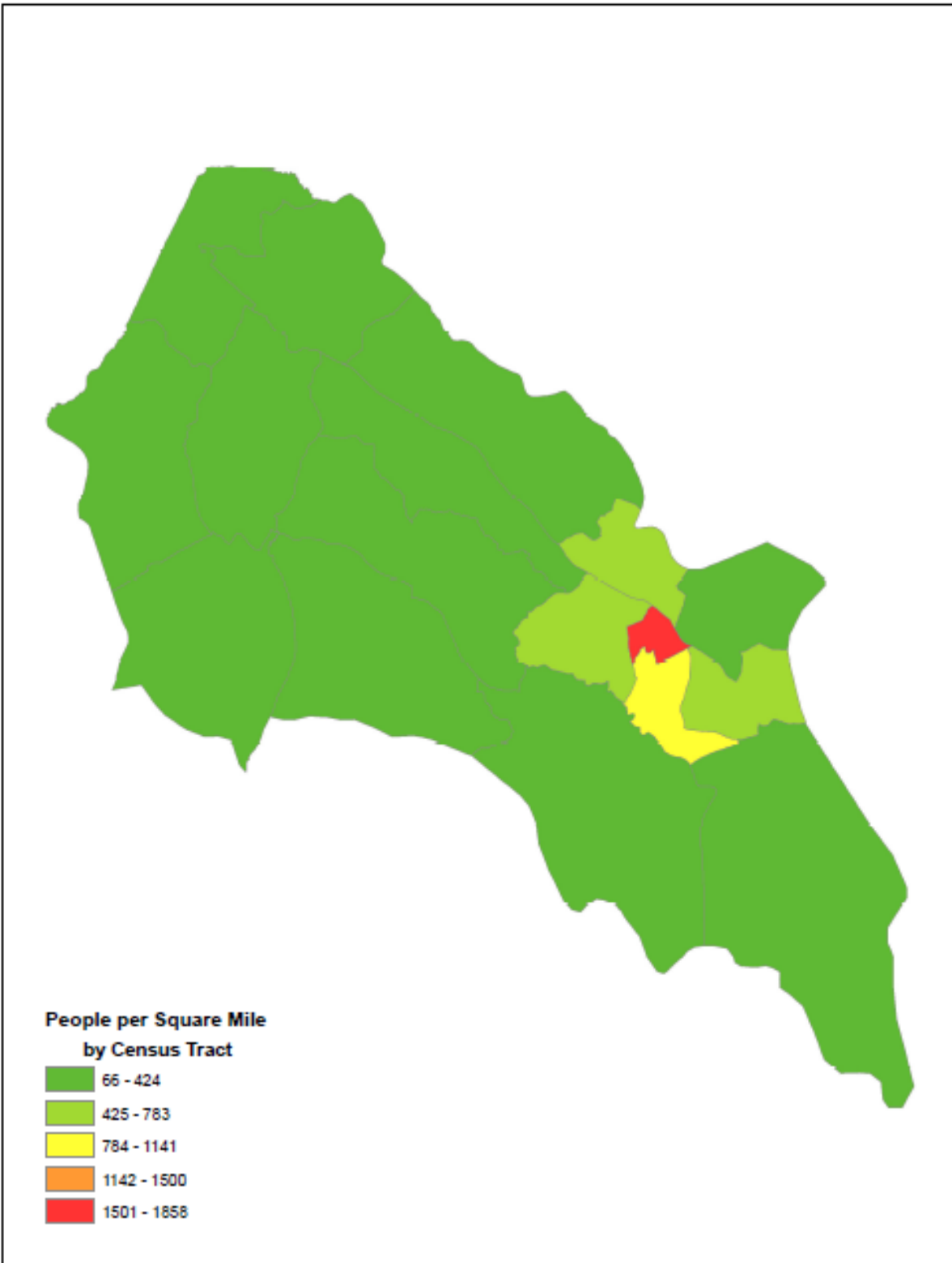
Map 1 – Calvert County Population Density Map



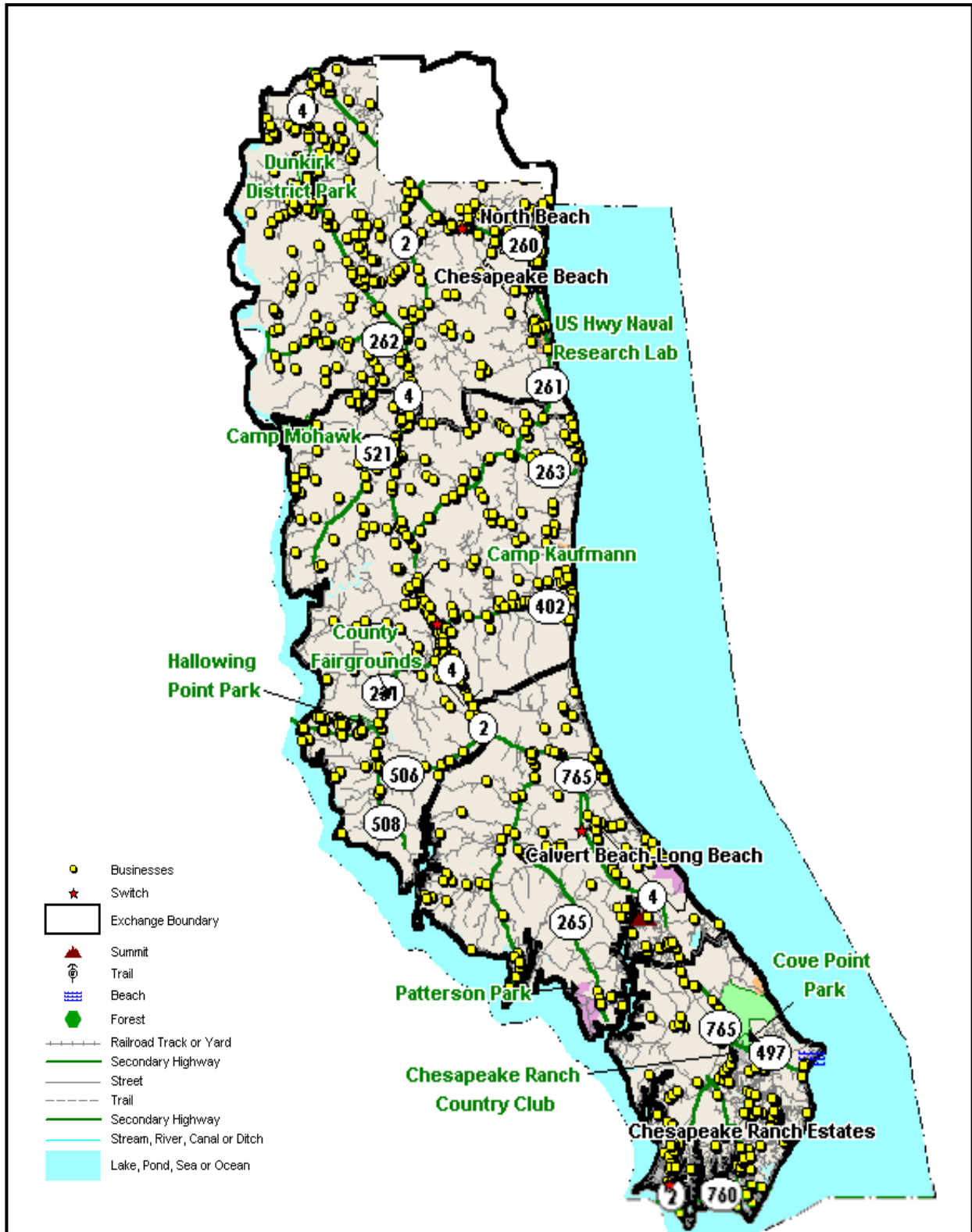
Map 2 – Charles County Population Density Map



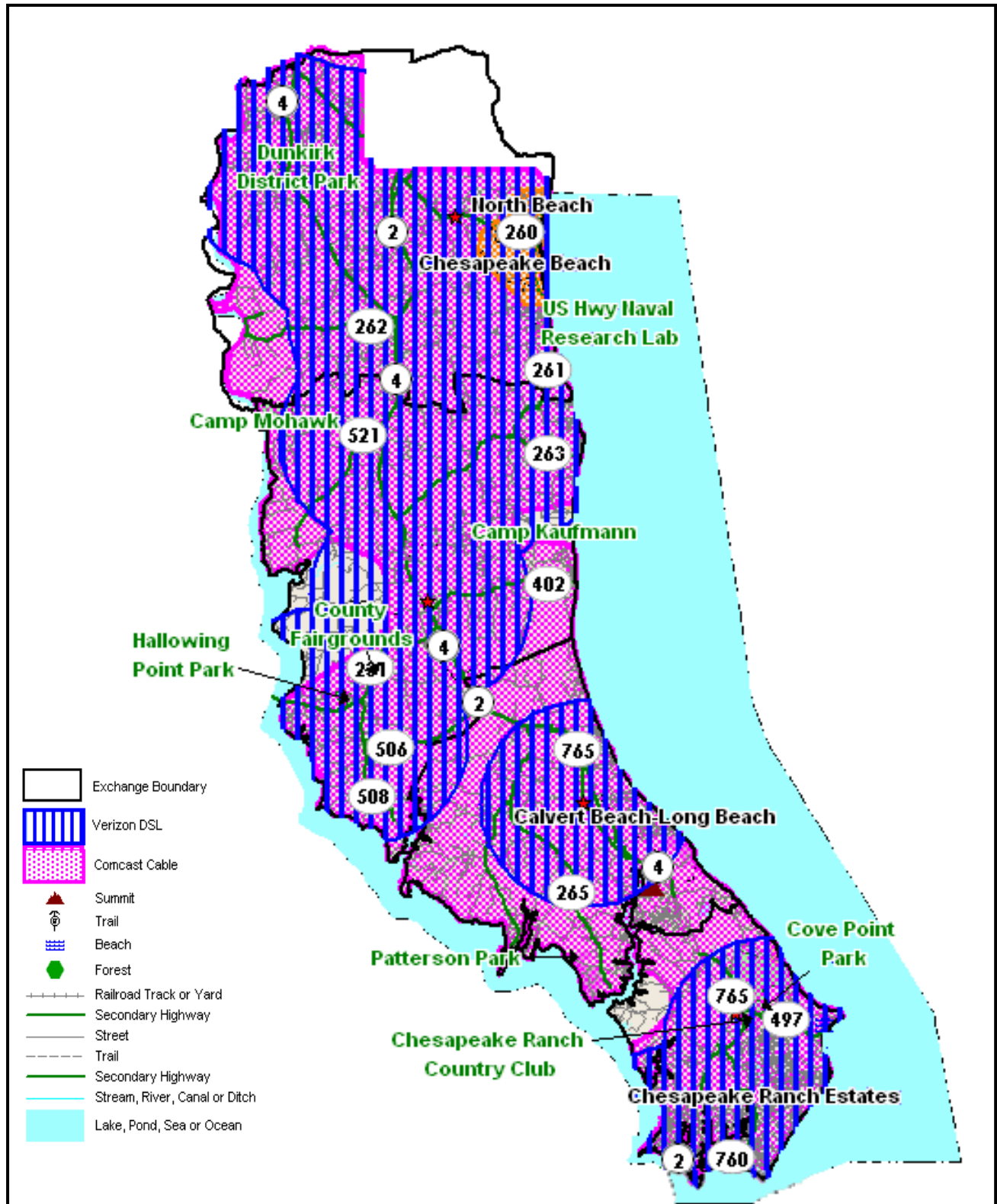
Map 3 – St. Mary’s County Population Density Map



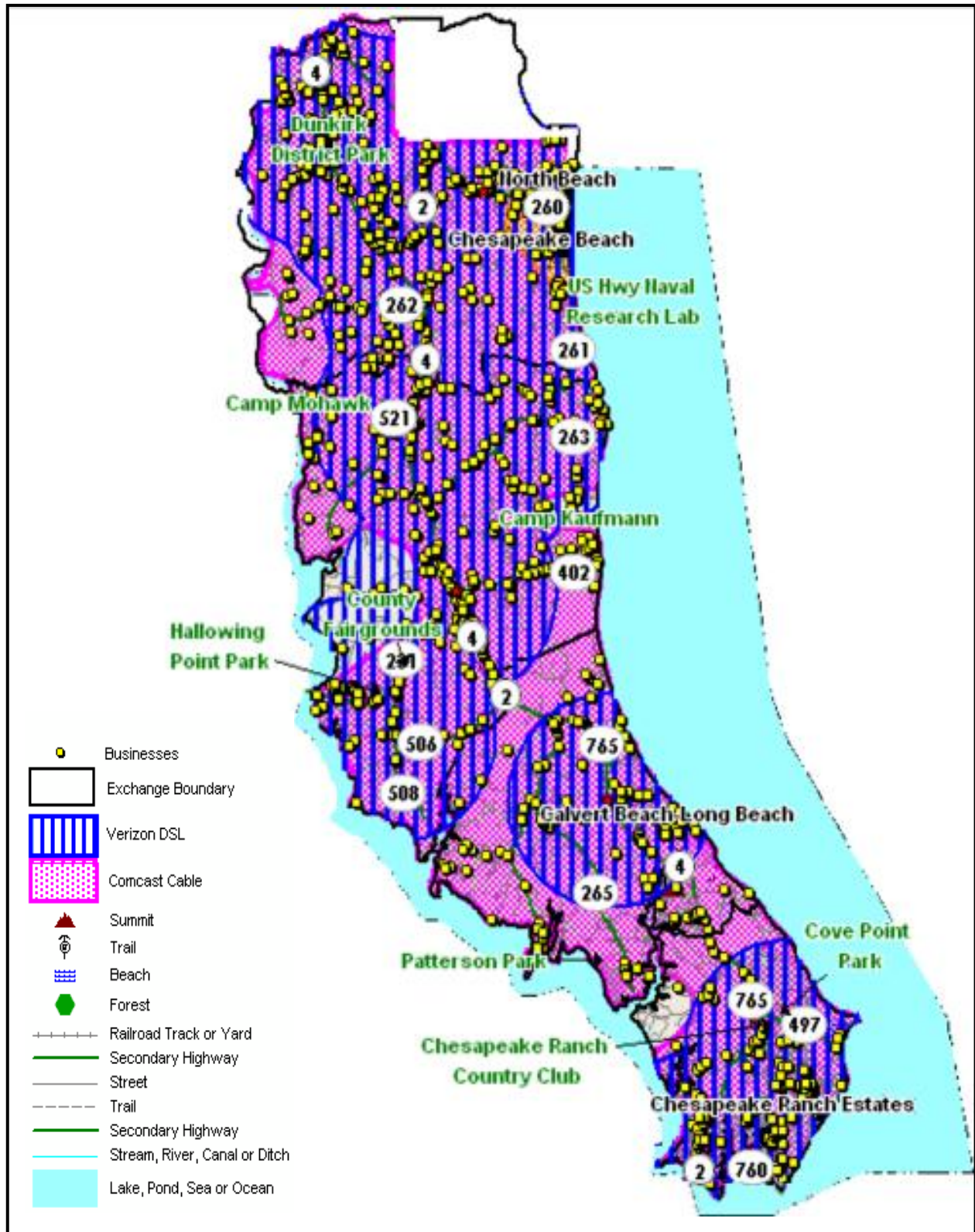
Map 4 – Calvert County Businesses – 2005



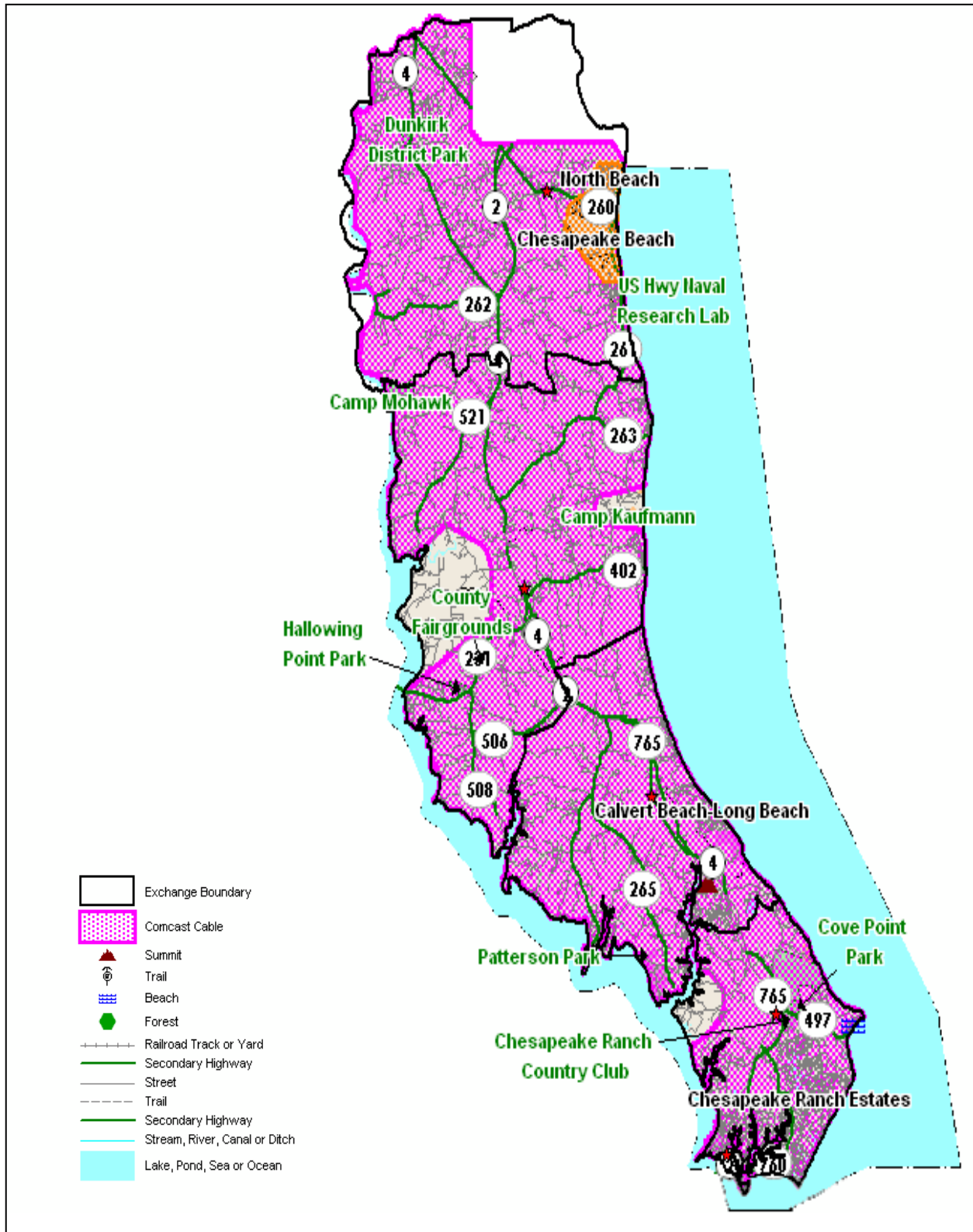
Map 5 – Calvert County Cable Modem & DSL Coverage – 2005



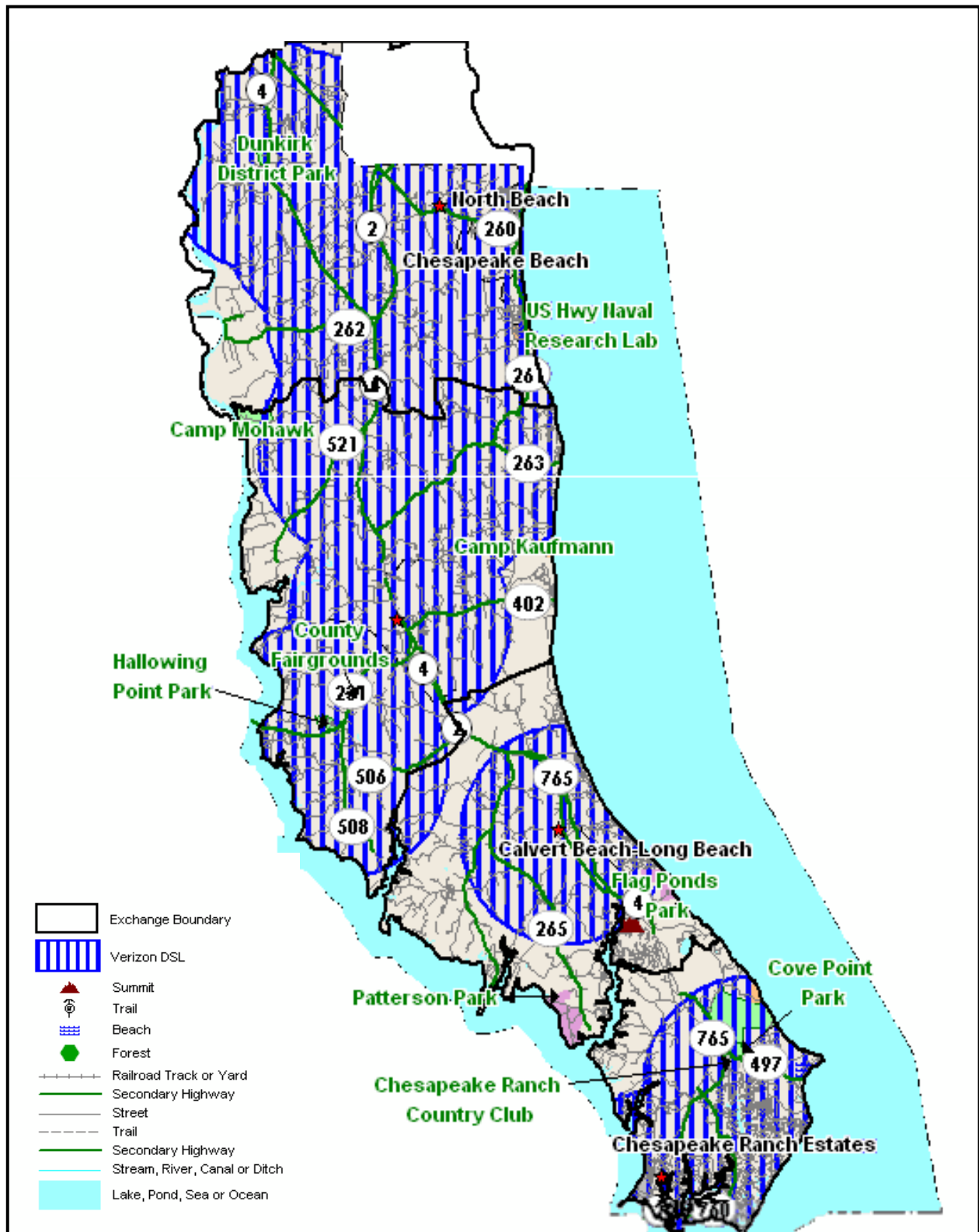
Map 6 – Calvert County Businesses and Broadband Coverage – 2005



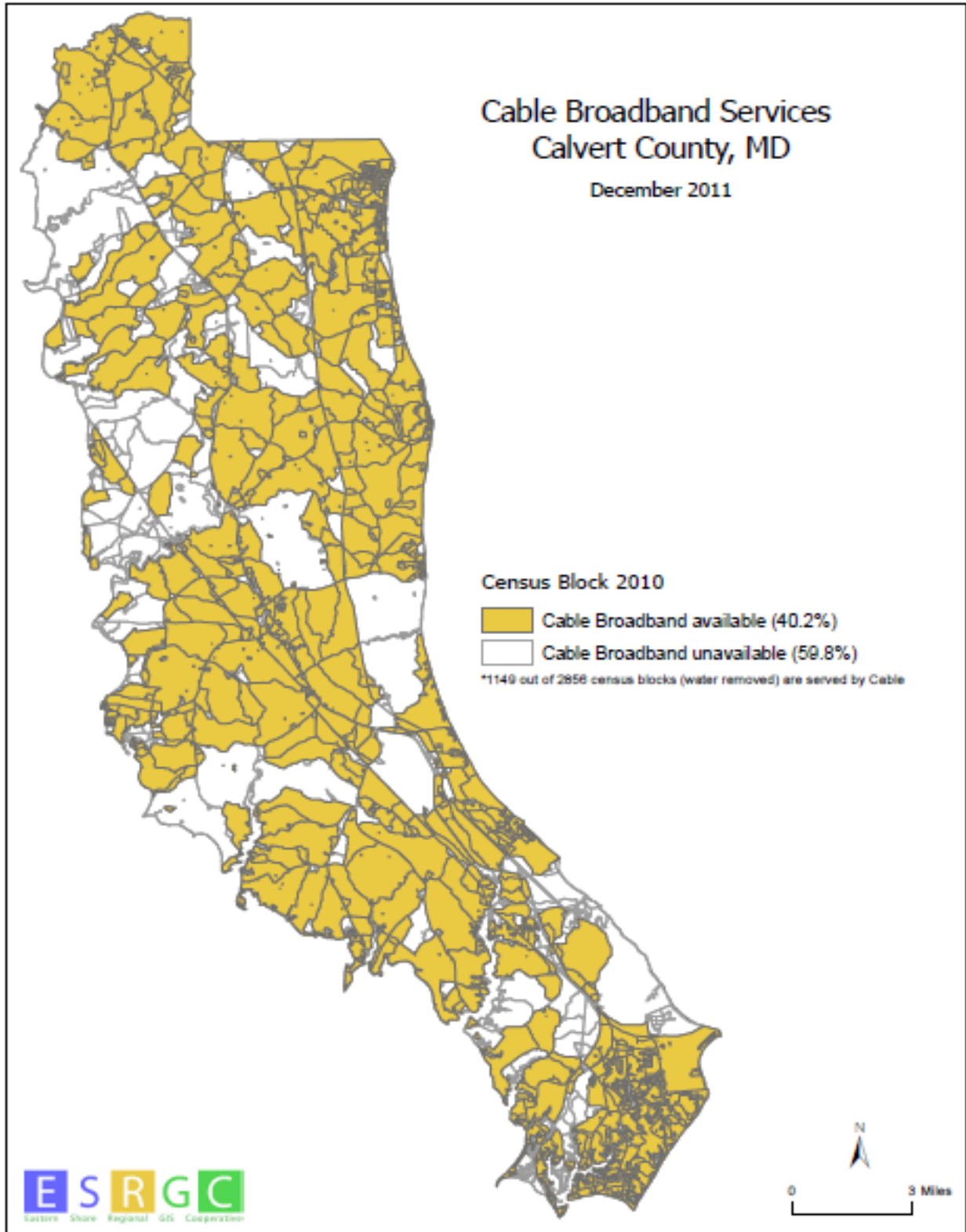
Map 7 – Calvert County Cable Modem Coverage - 2005



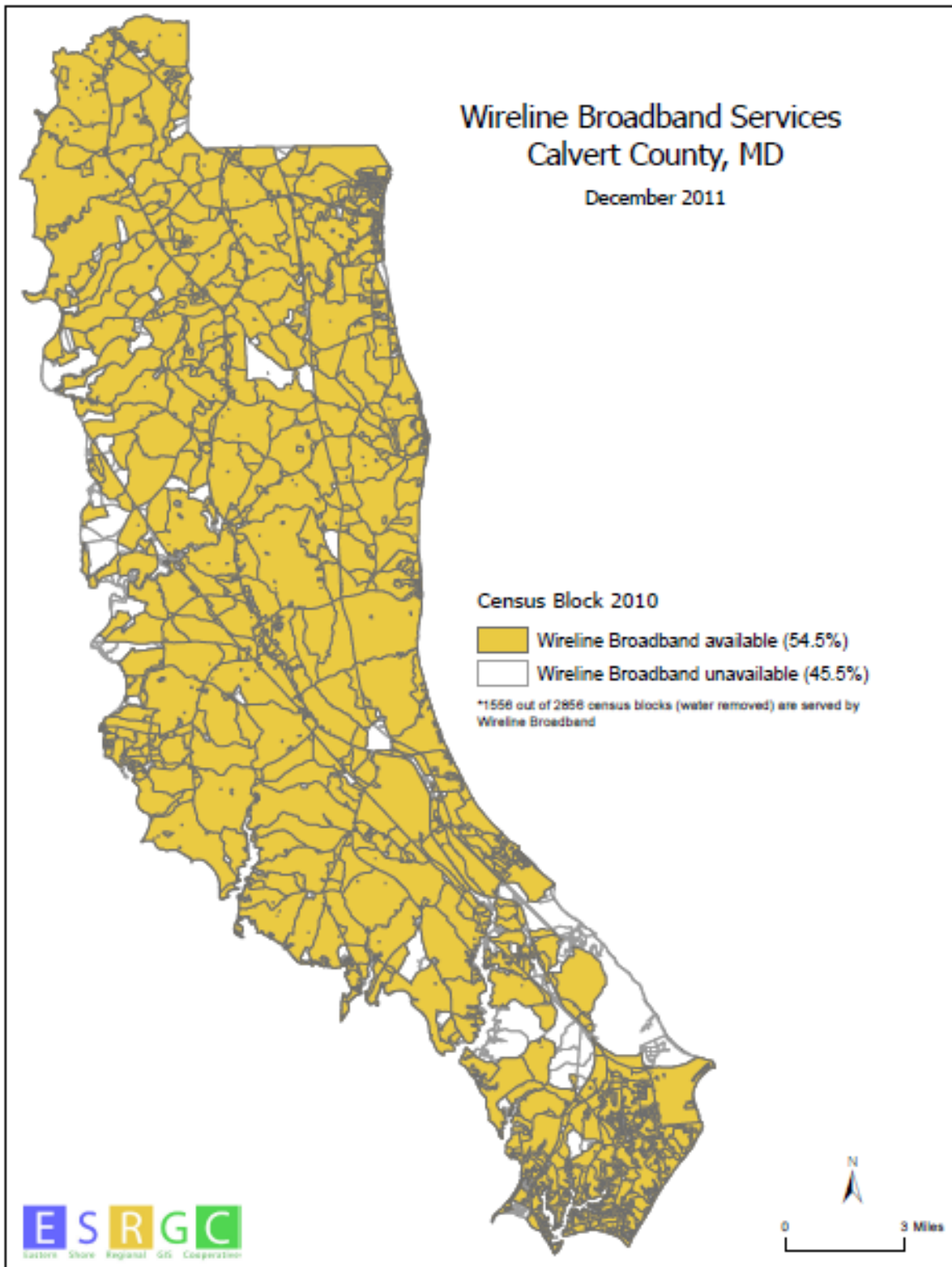
Map 8 – Calvert County DSL Coverage – 2005



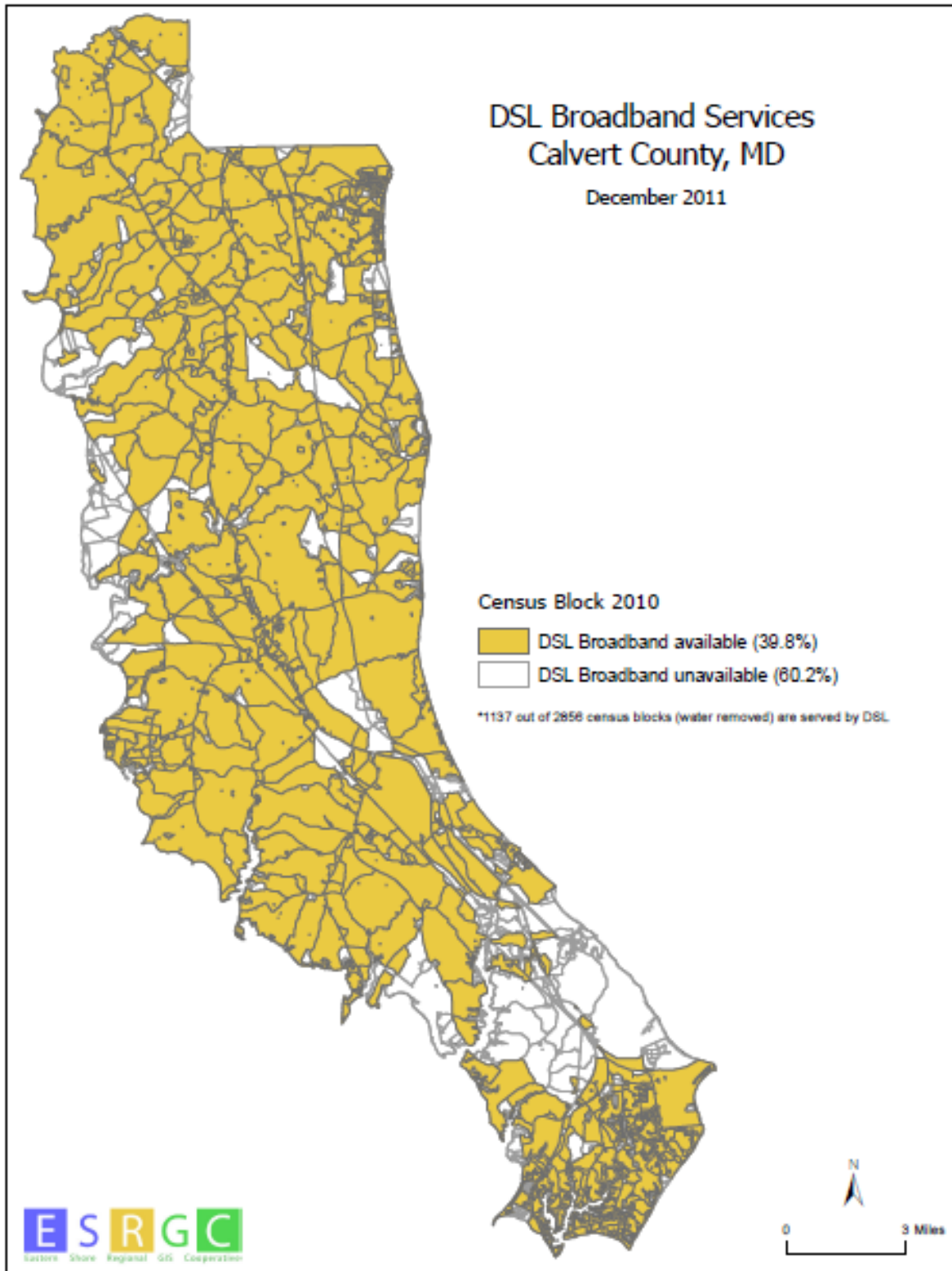
Map 9 – Calvert County Cable Broadband Services – 2011



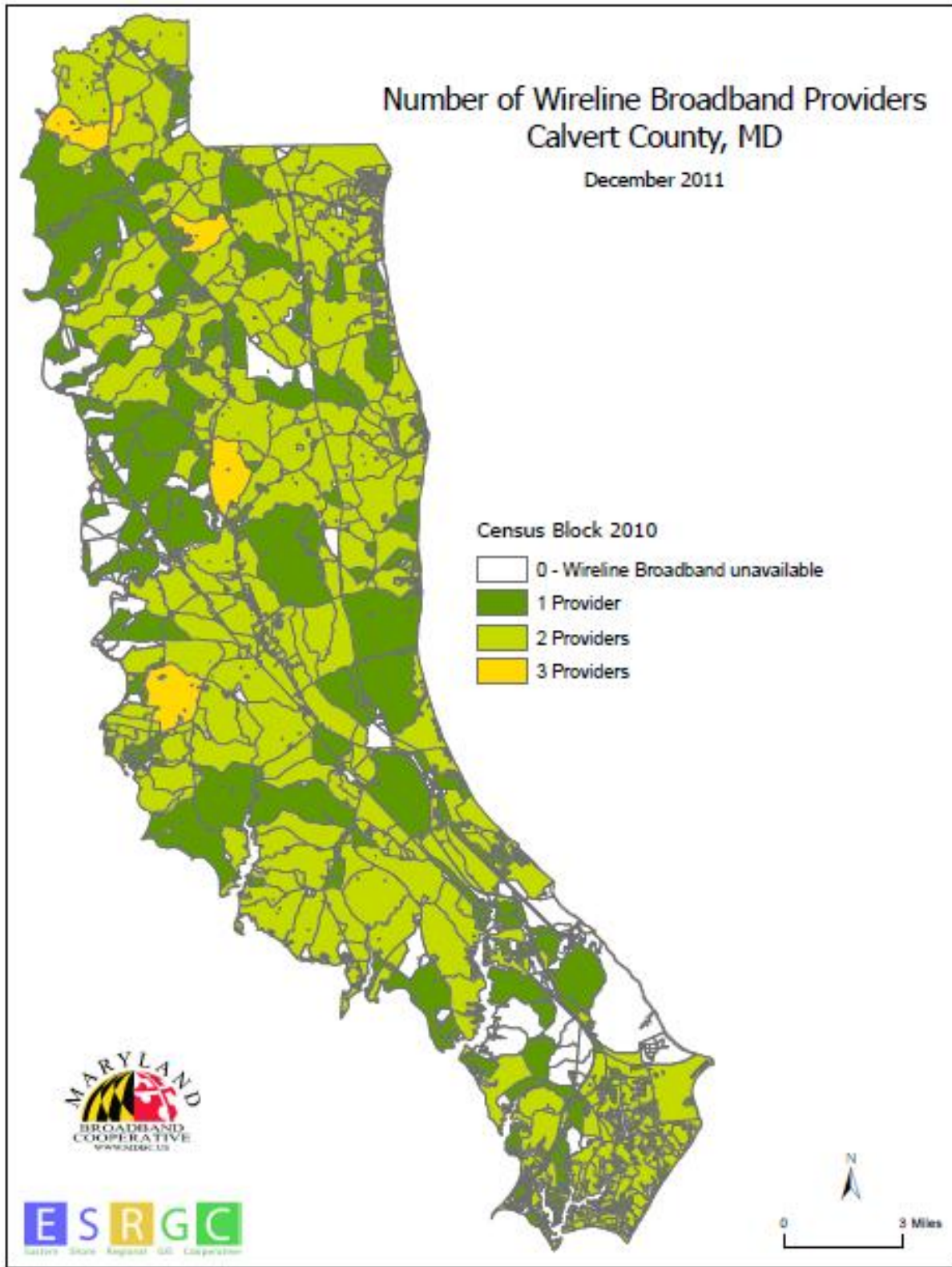
Map 10 – Calvert County Wireline Broadband Services – 2011



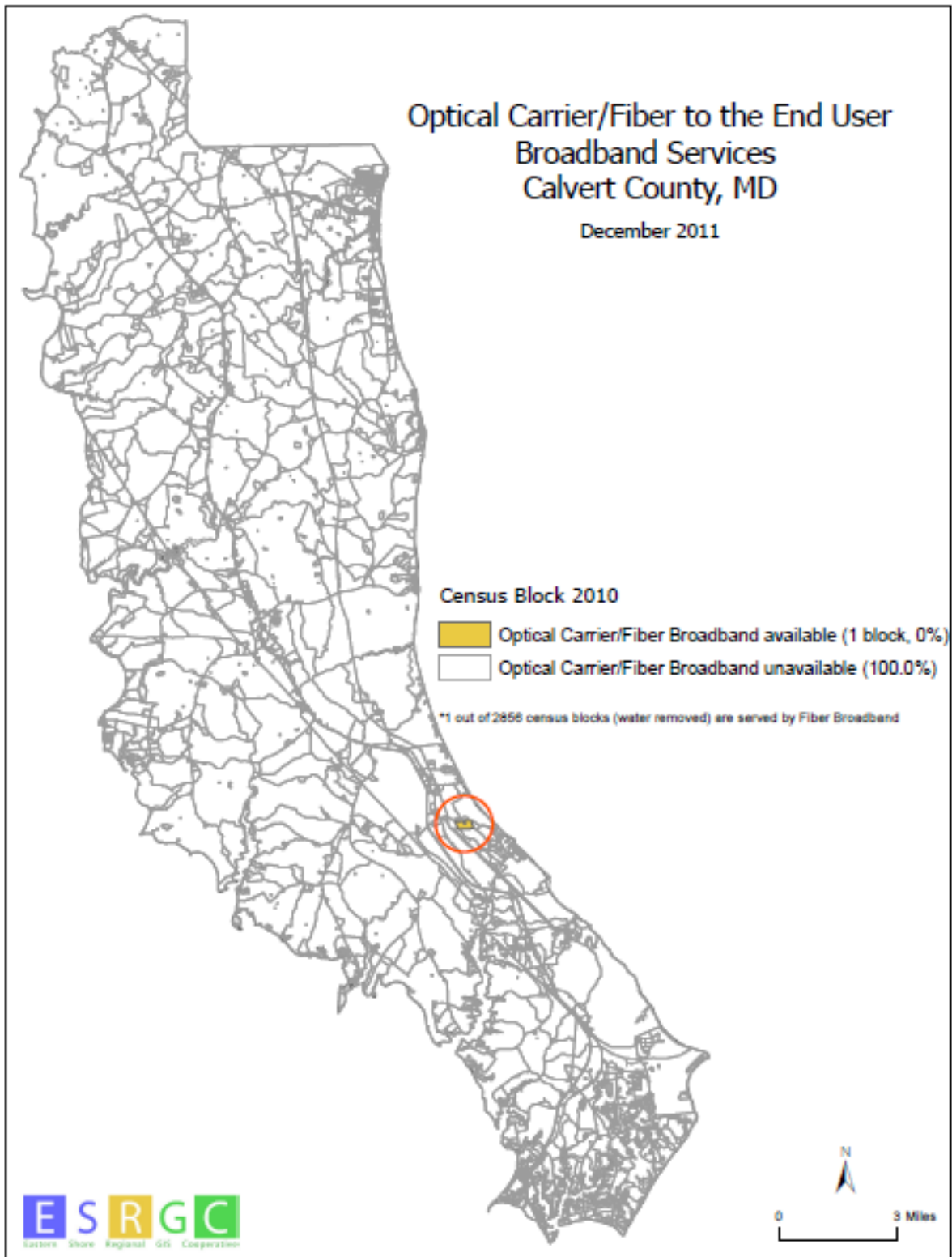
Map 11 – Calvert County DSL Broadband Services - 2011



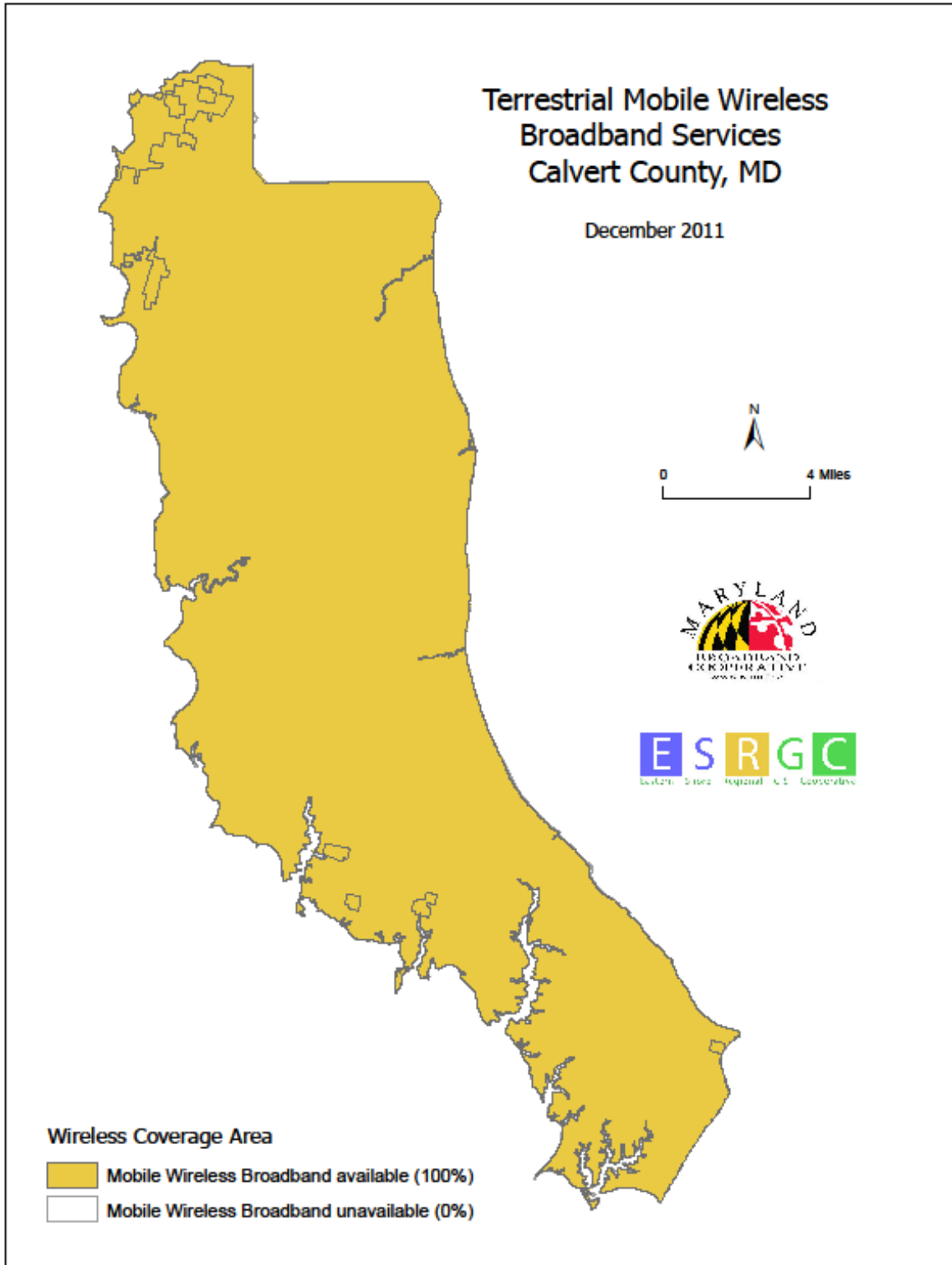
Map 12 - Calvert County Number of Wireline Providers - 2011



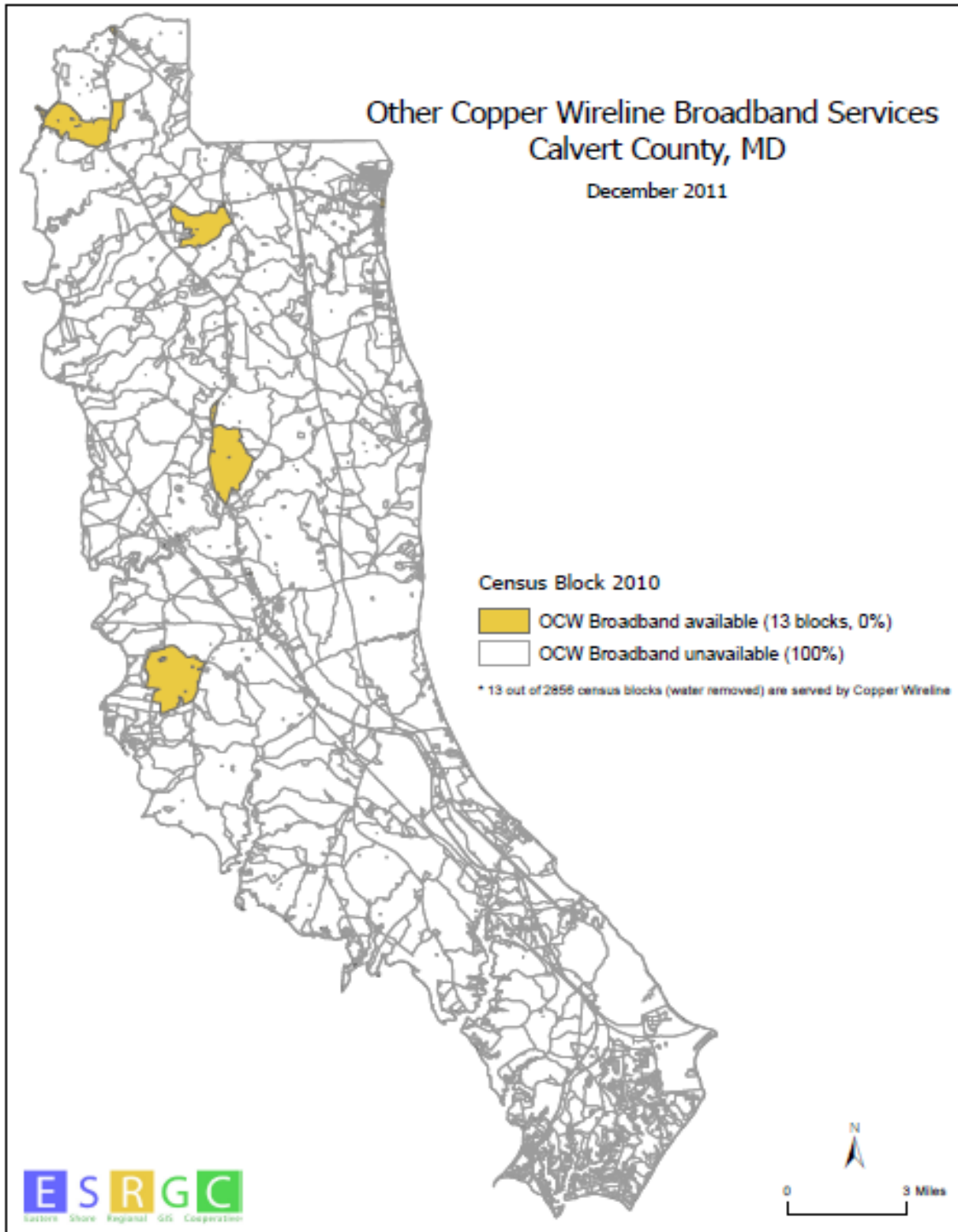
Map 13 – Calvert County Fiber Optic Coverage – 2011



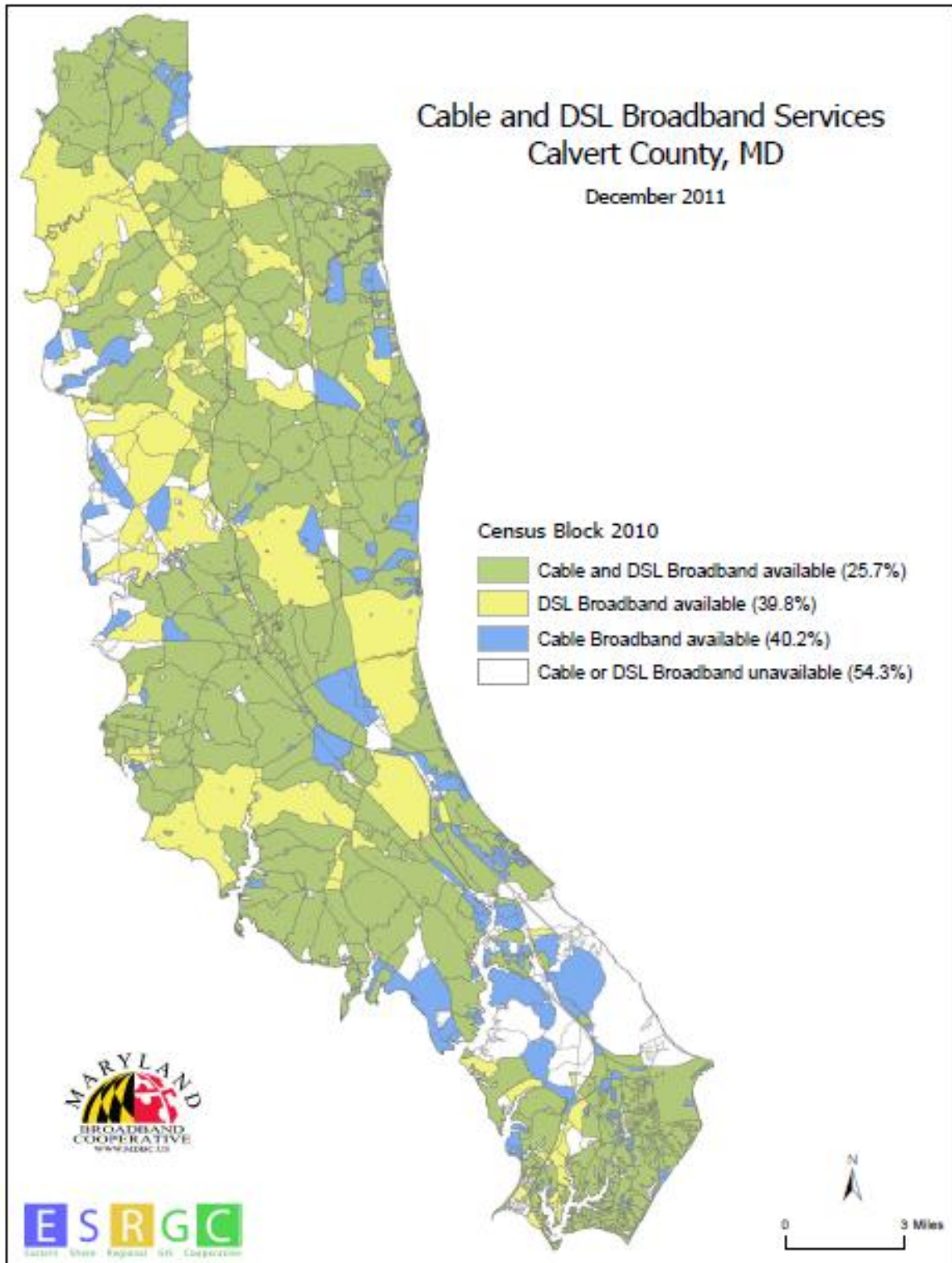
Map 14 - Calvert County Mobile Wireless Coverage - 2011



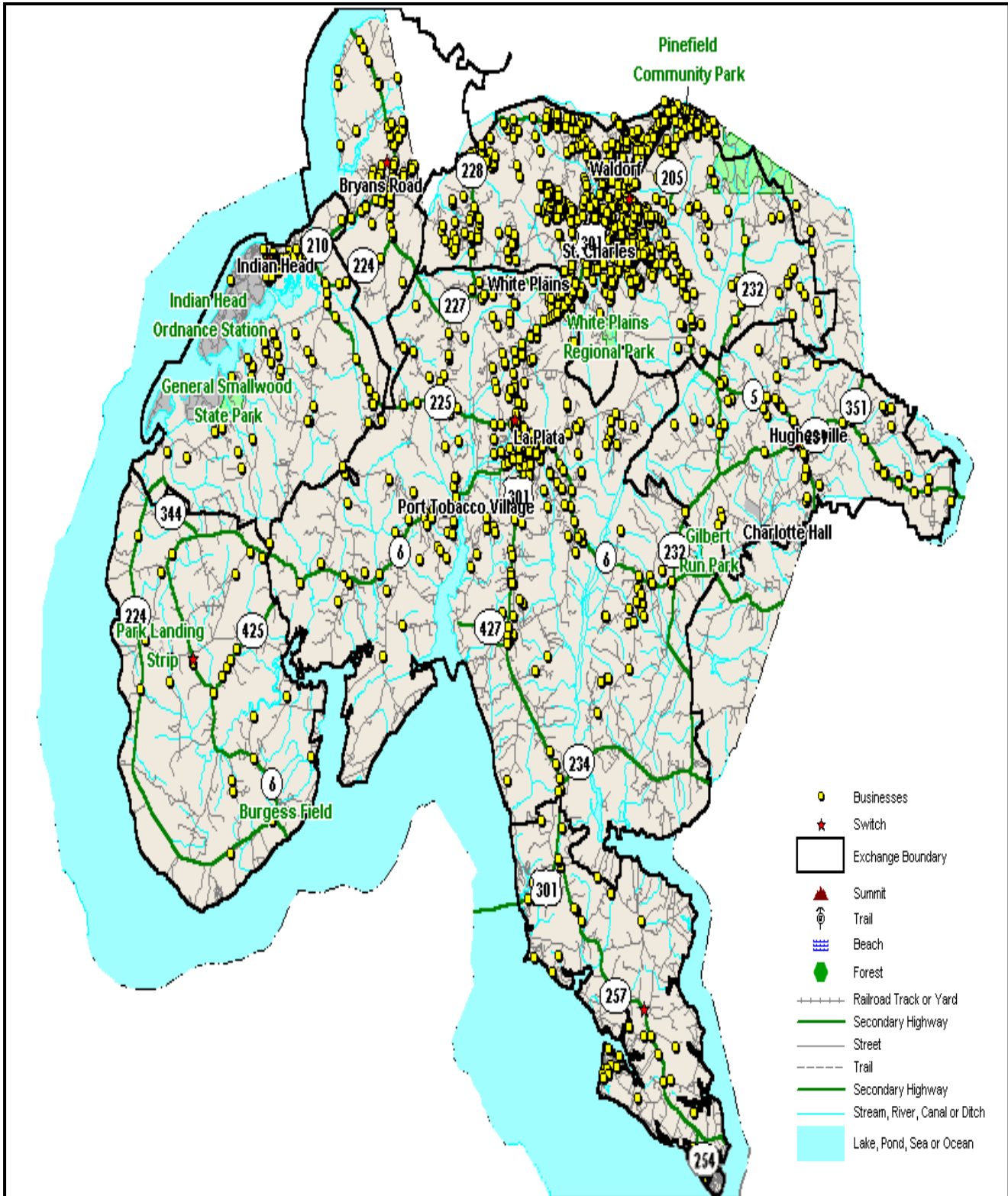
Map 15 – Calvert County Other Copper Wireline Coverage -2011



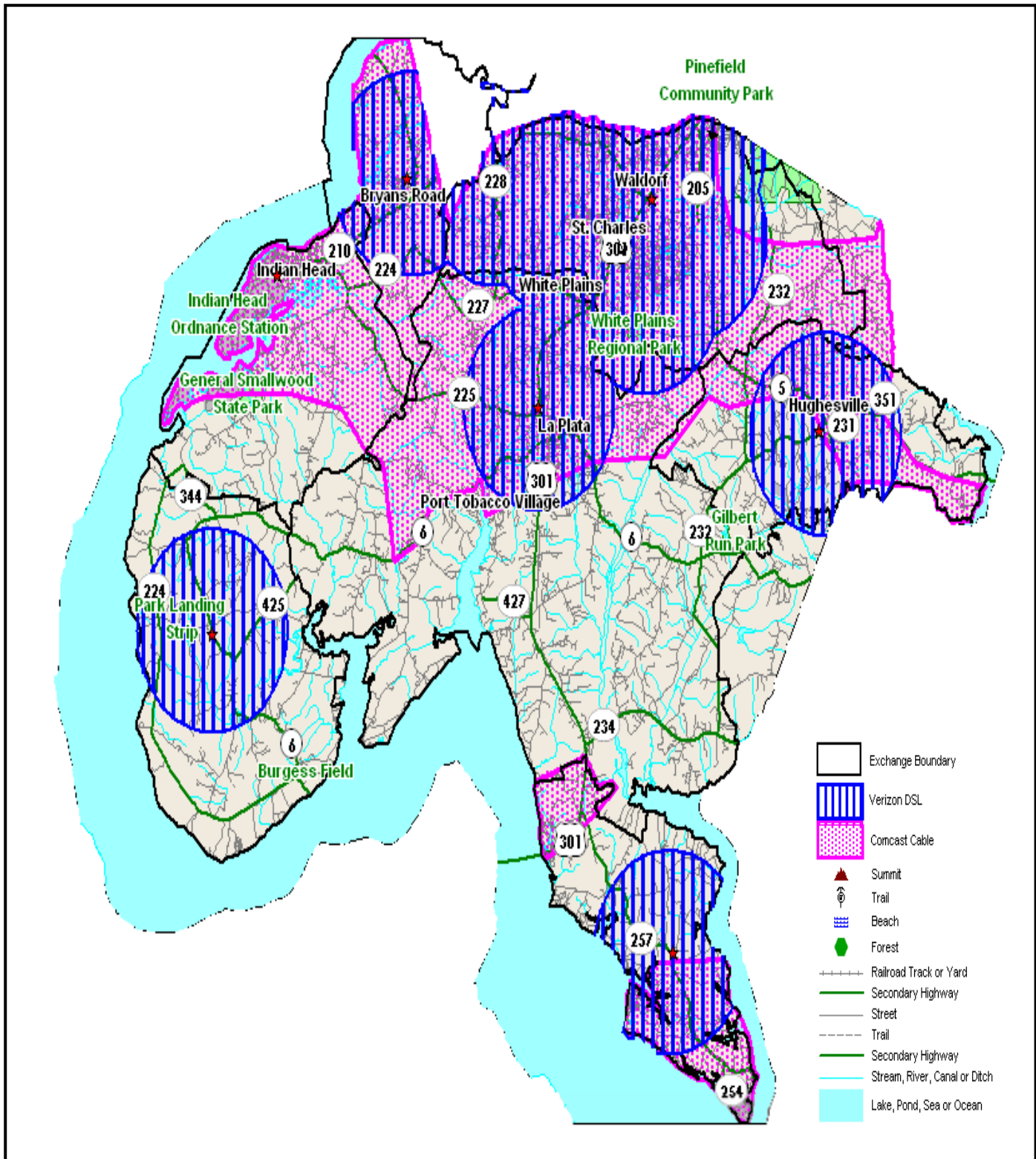
Map 16- Calvert County Cable and DSL Broadband Services – 2011



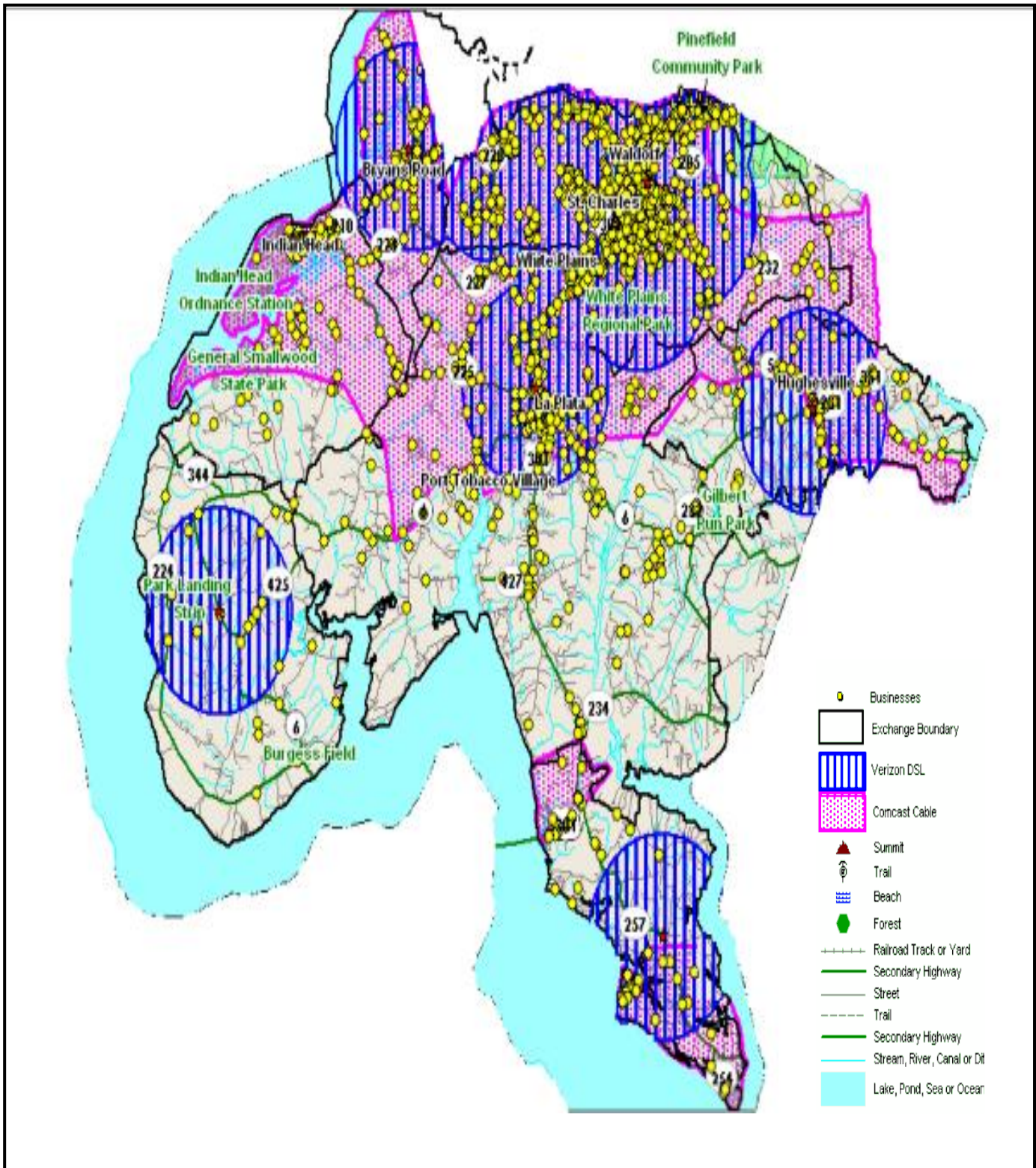
Map 17 – Charles County Businesses – 2005



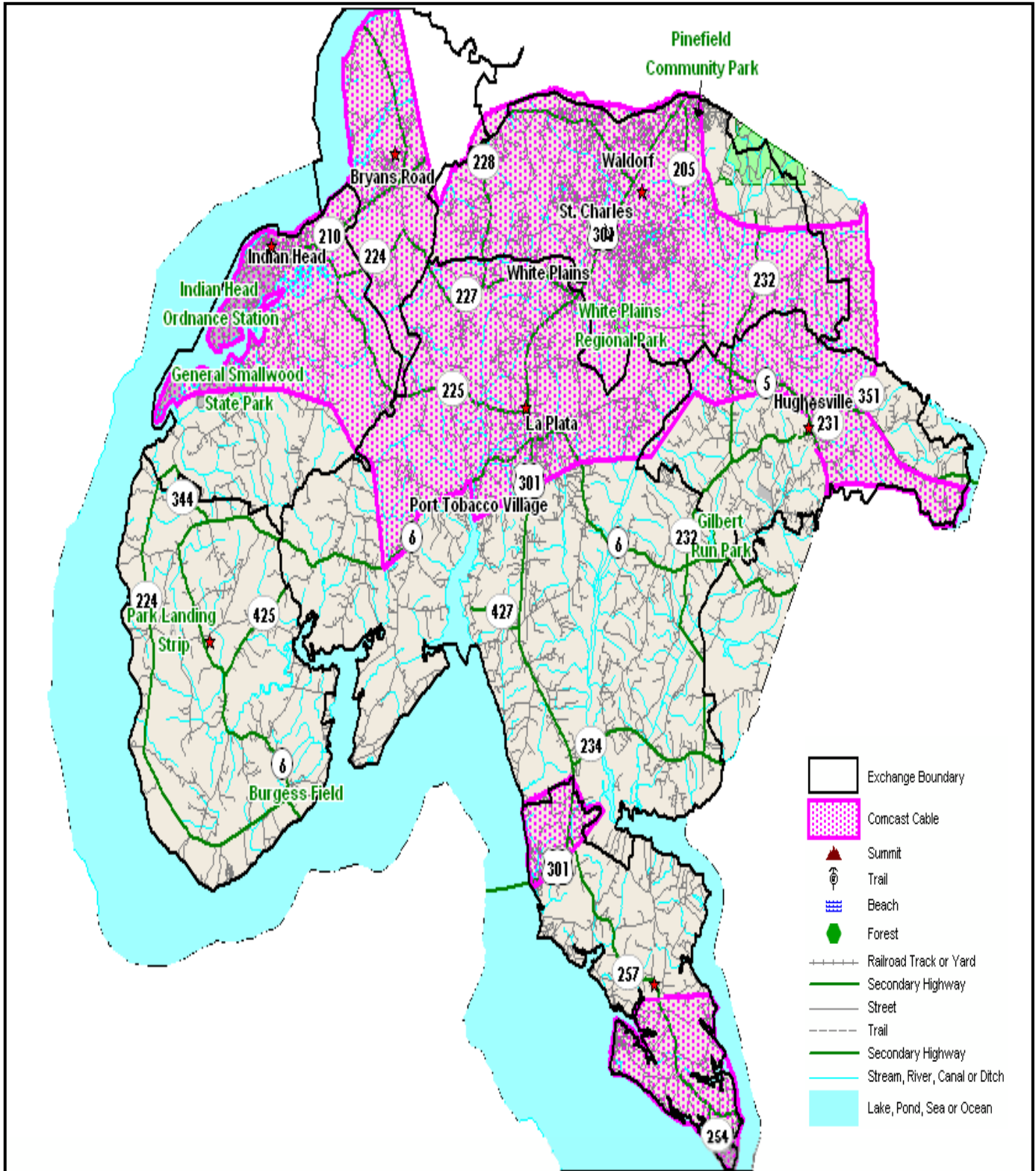
Map 18 – Charles County Cable Modem & DSL Coverage - 2005



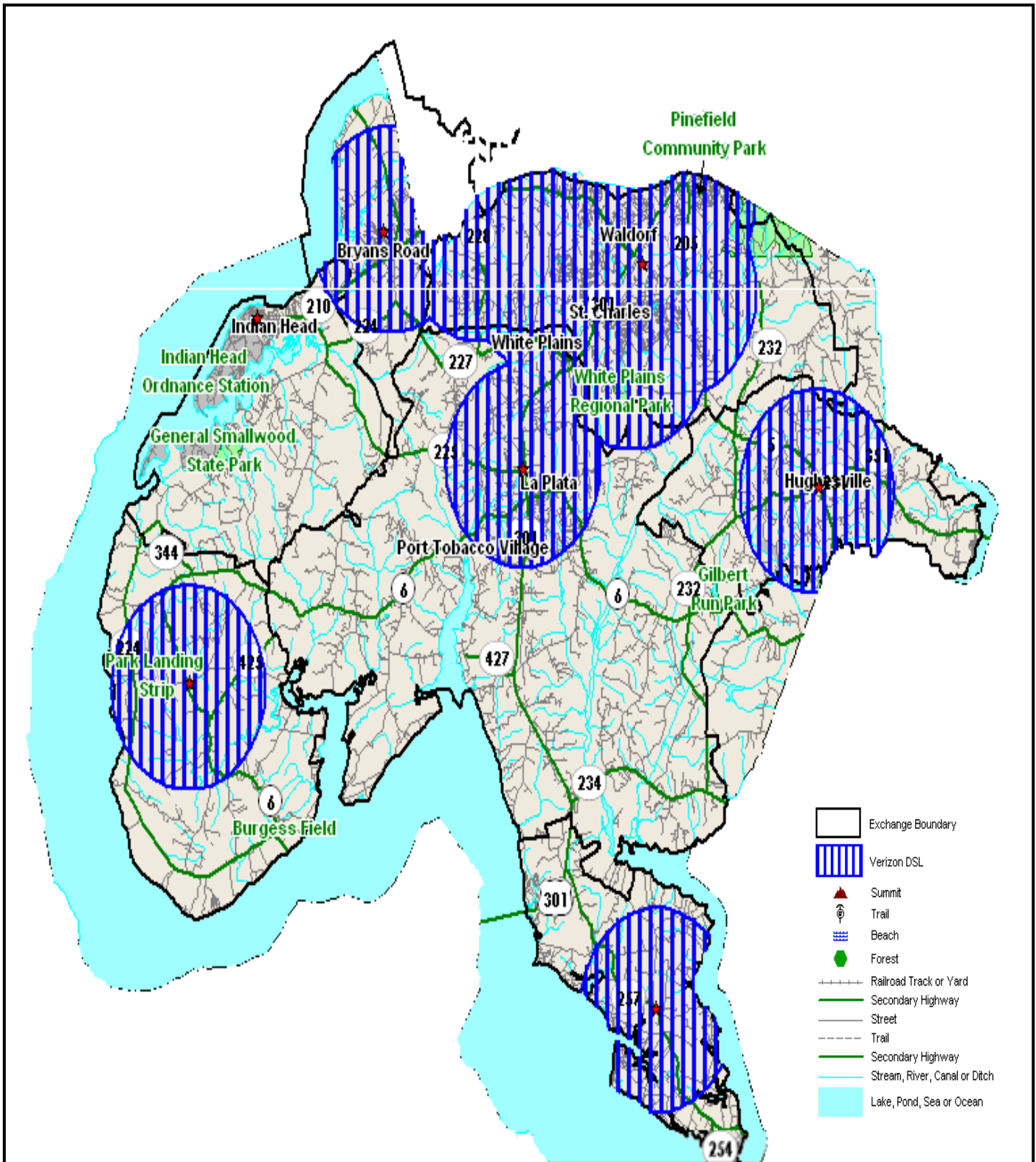
Map 19 – Charles County Businesses and Broadband Coverage – 2005



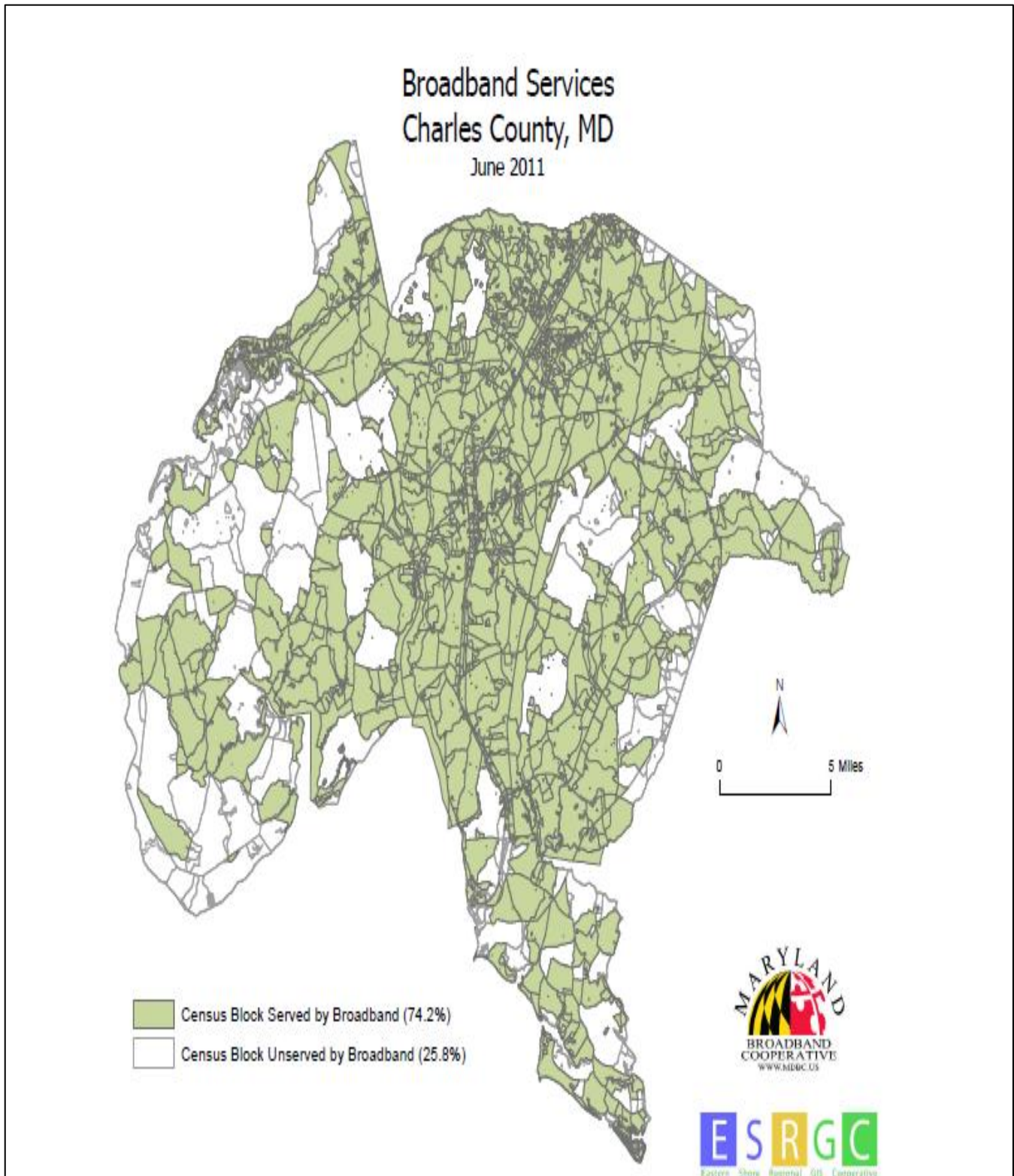
Map 20- Charles County Cable Modem Coverage - 2005



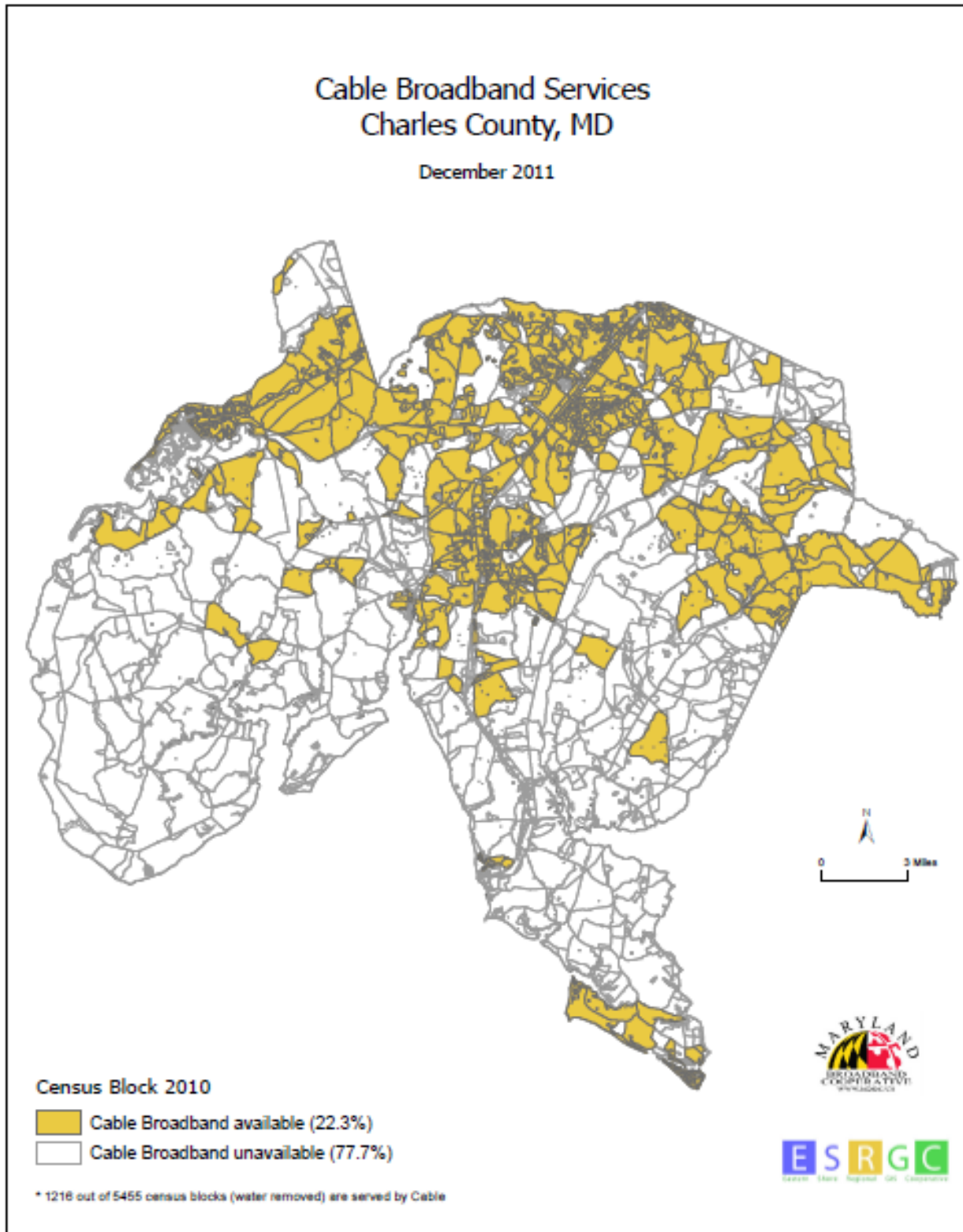
Map 21 – Charles County DSL Coverage – 2005



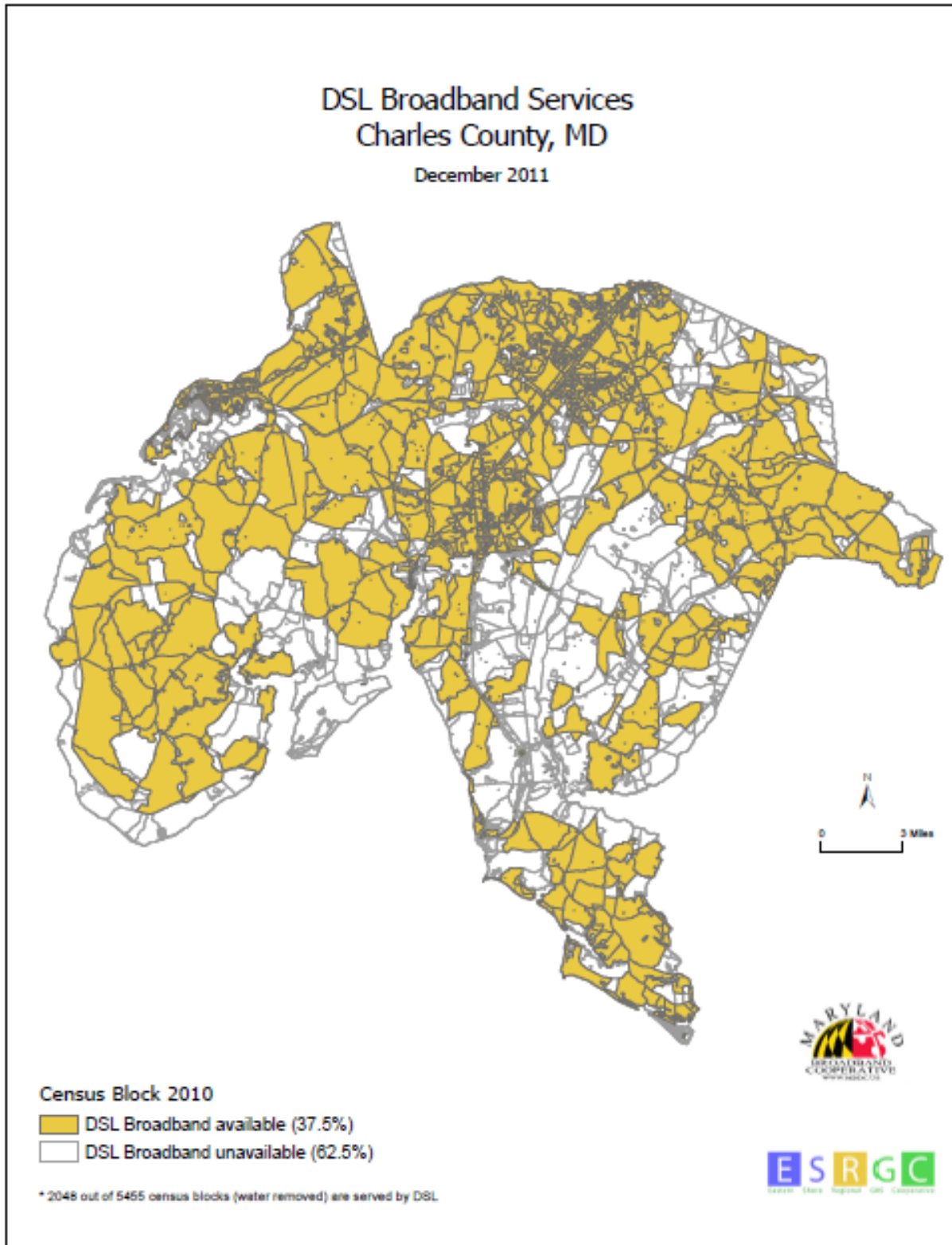
Map 22 -Charles County Broadband Services- 2011



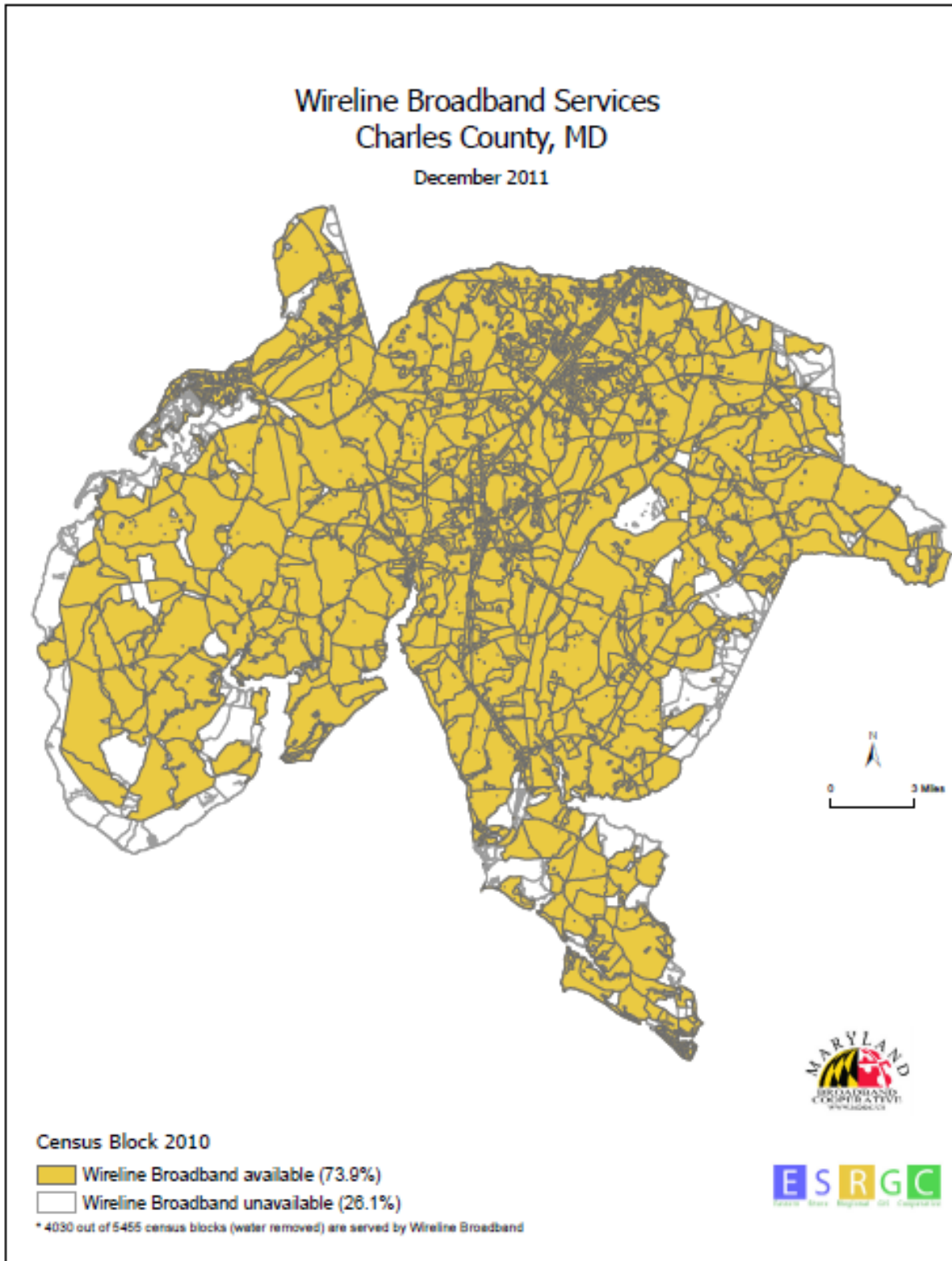
Map 23 – Charles County Cable Broadband Services - 2011



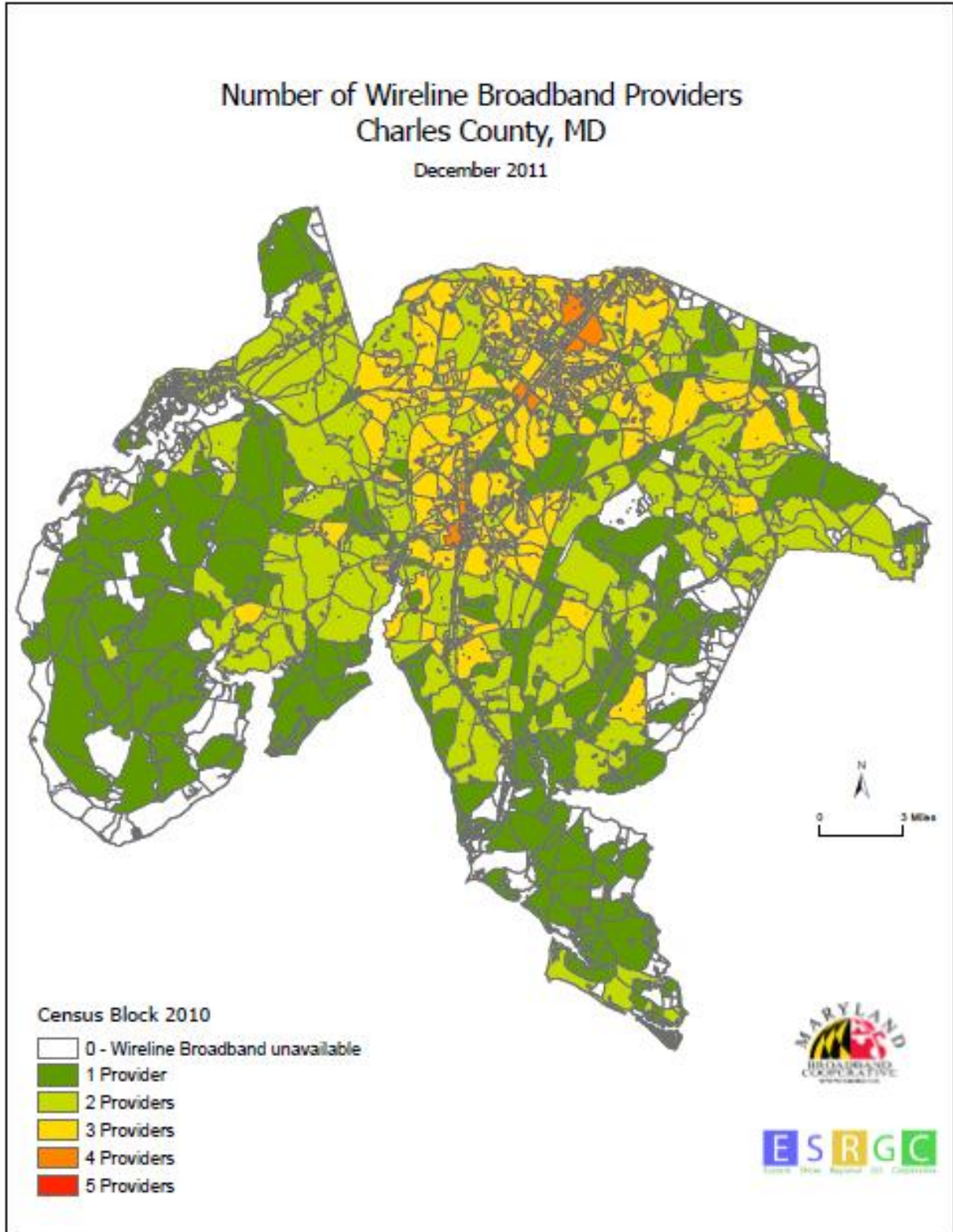
Map 24 – Charles County DSL Coverage – 2011



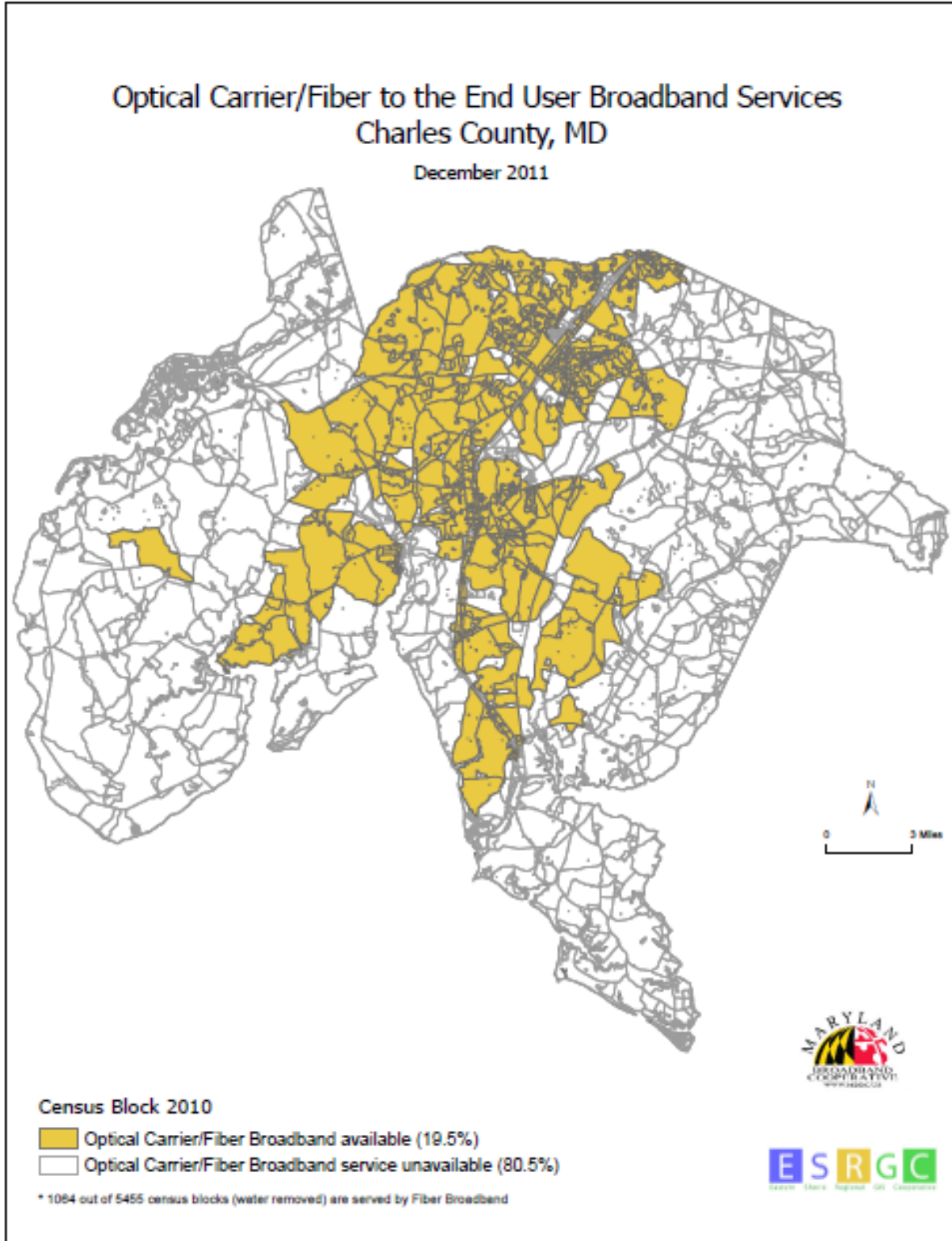
Map 25– Charles County Wireline Coverage – 2011



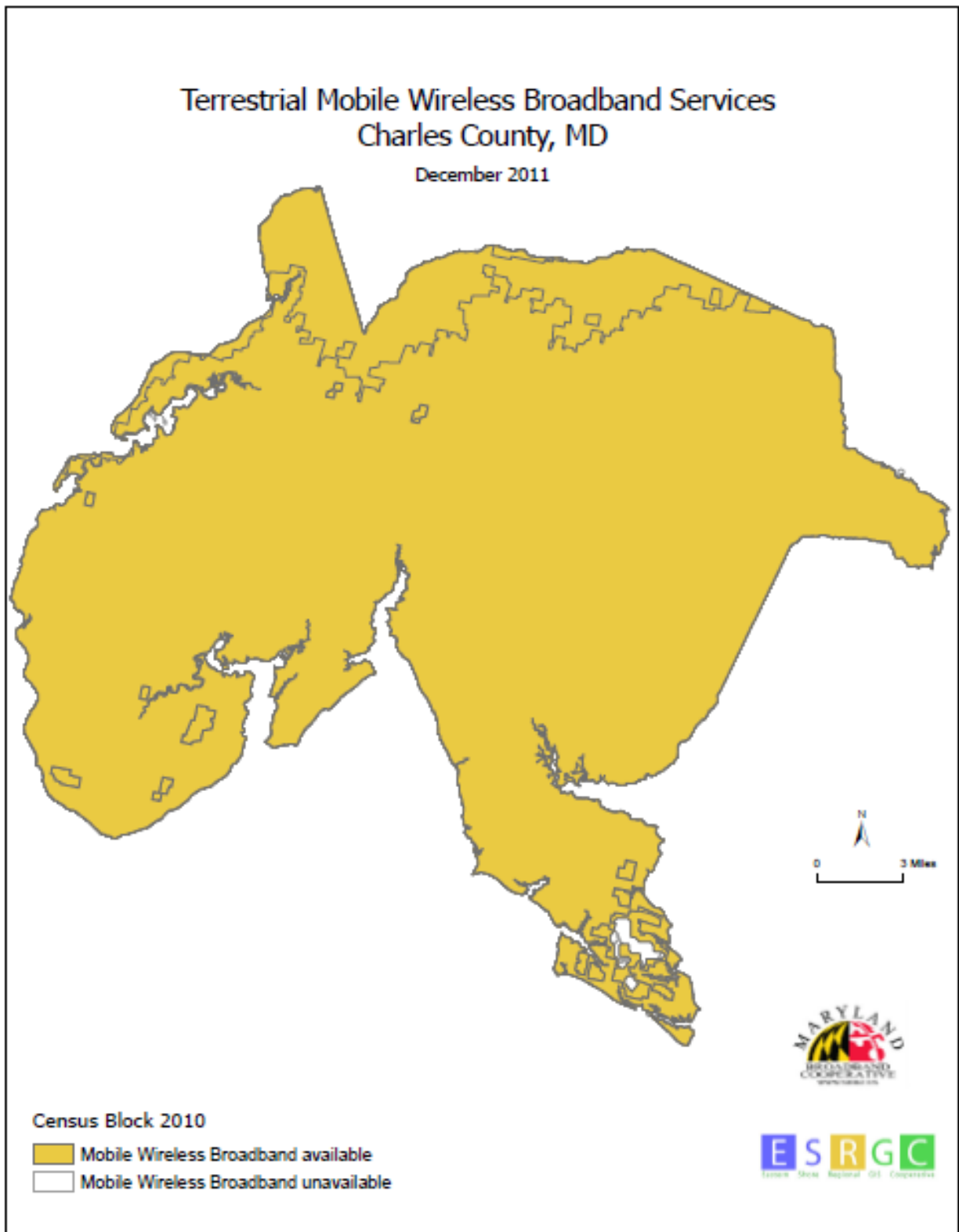
Map 26 – Charles County Number of Wireline Providers – 2011



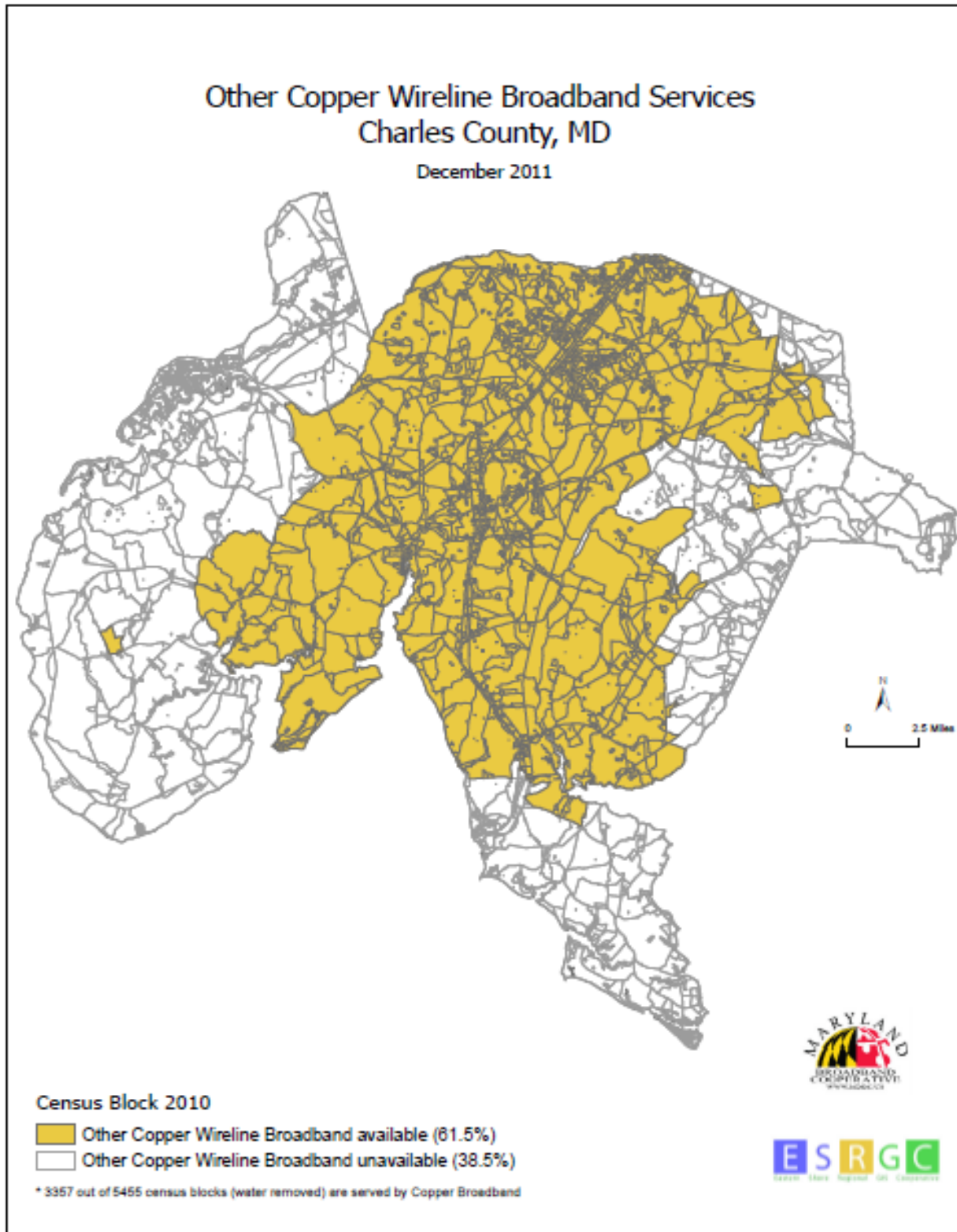
Map 27 – Charles County Fiber Optic Coverage – 2011



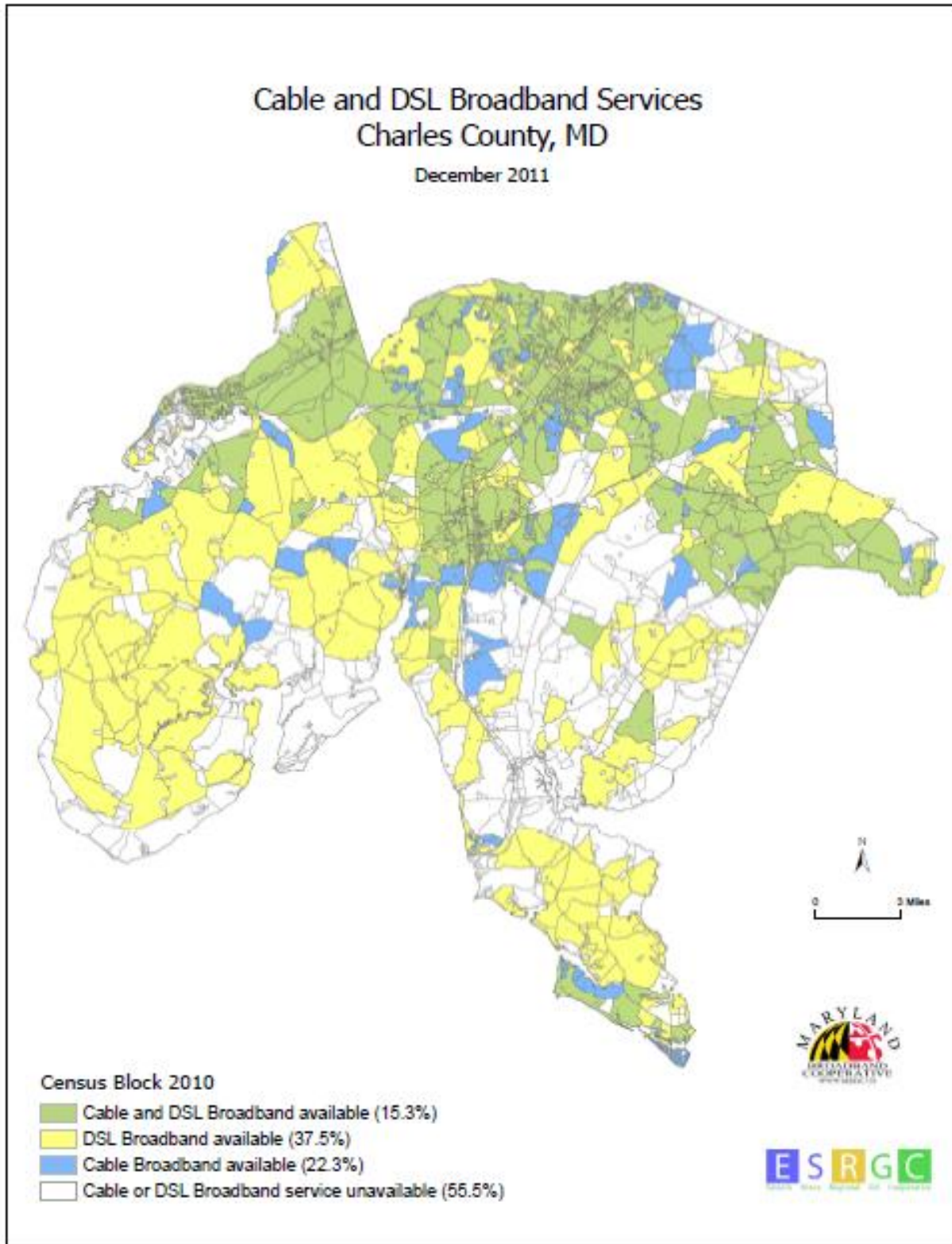
Map 28 – Charles County Mobile Wireless Coverage – 2011



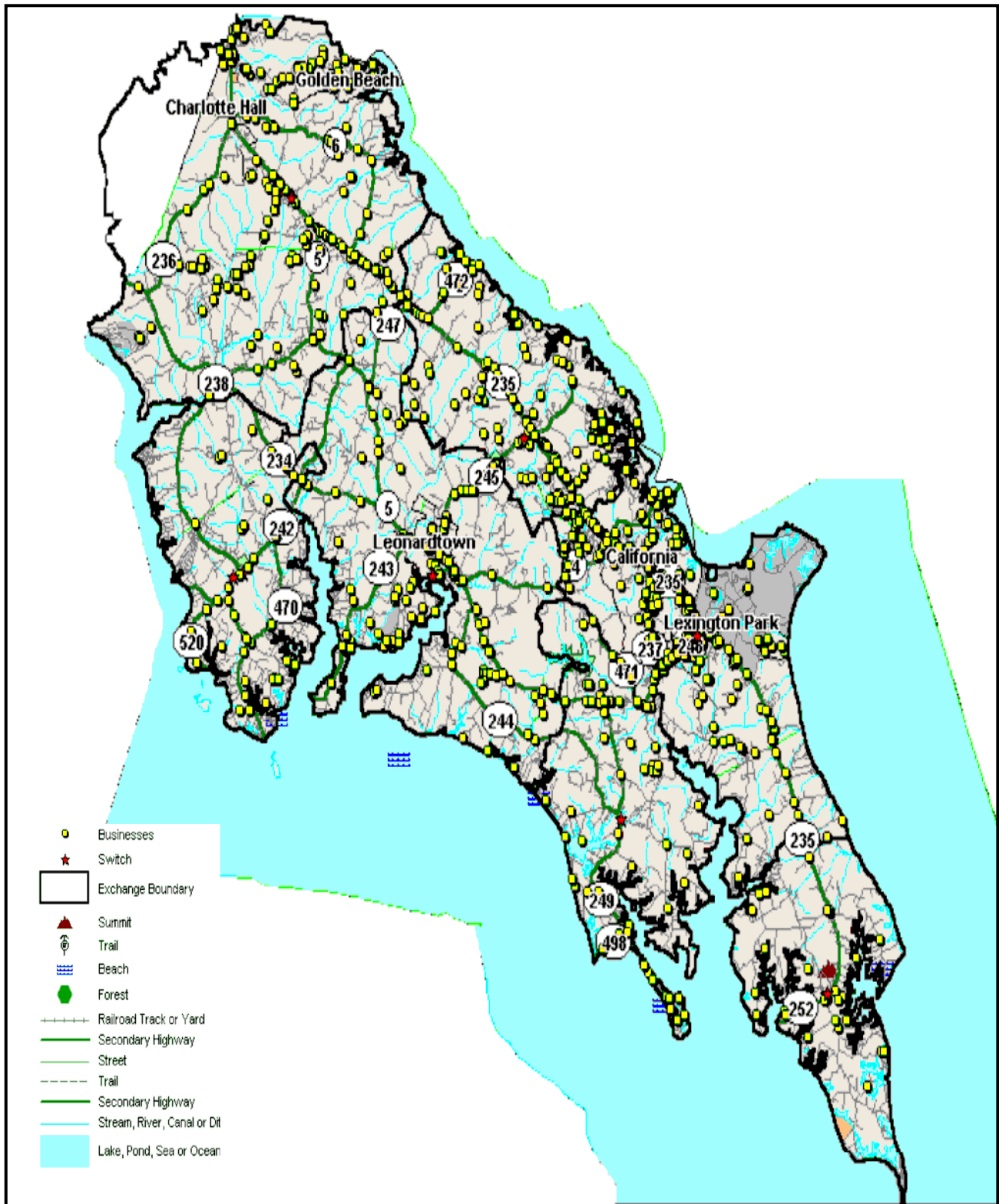
Map 29 – Charles County Other Copper Wireline Coverage -2011



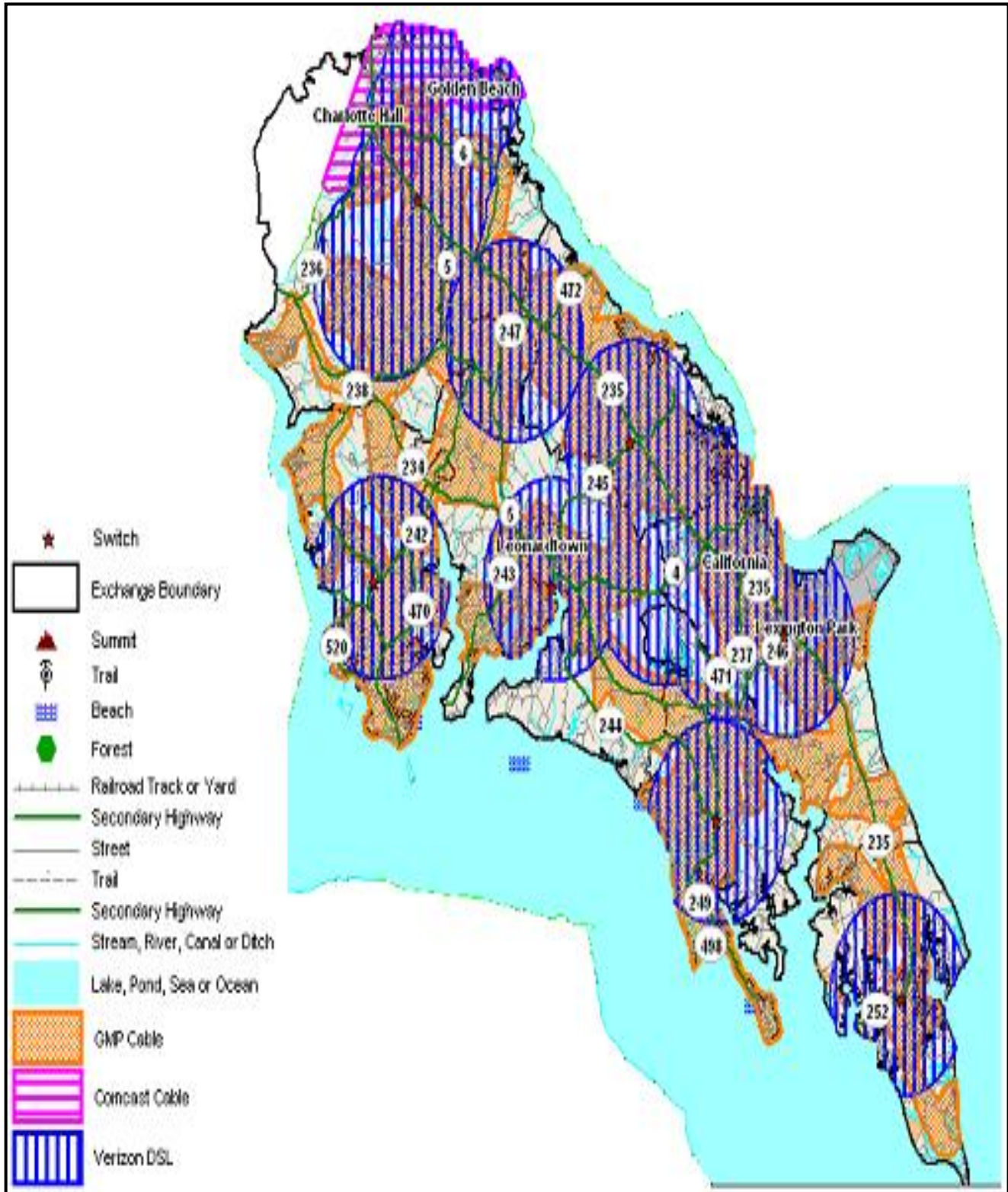
Map 30 - Charles County Cable and DSL Broadband Services-2011



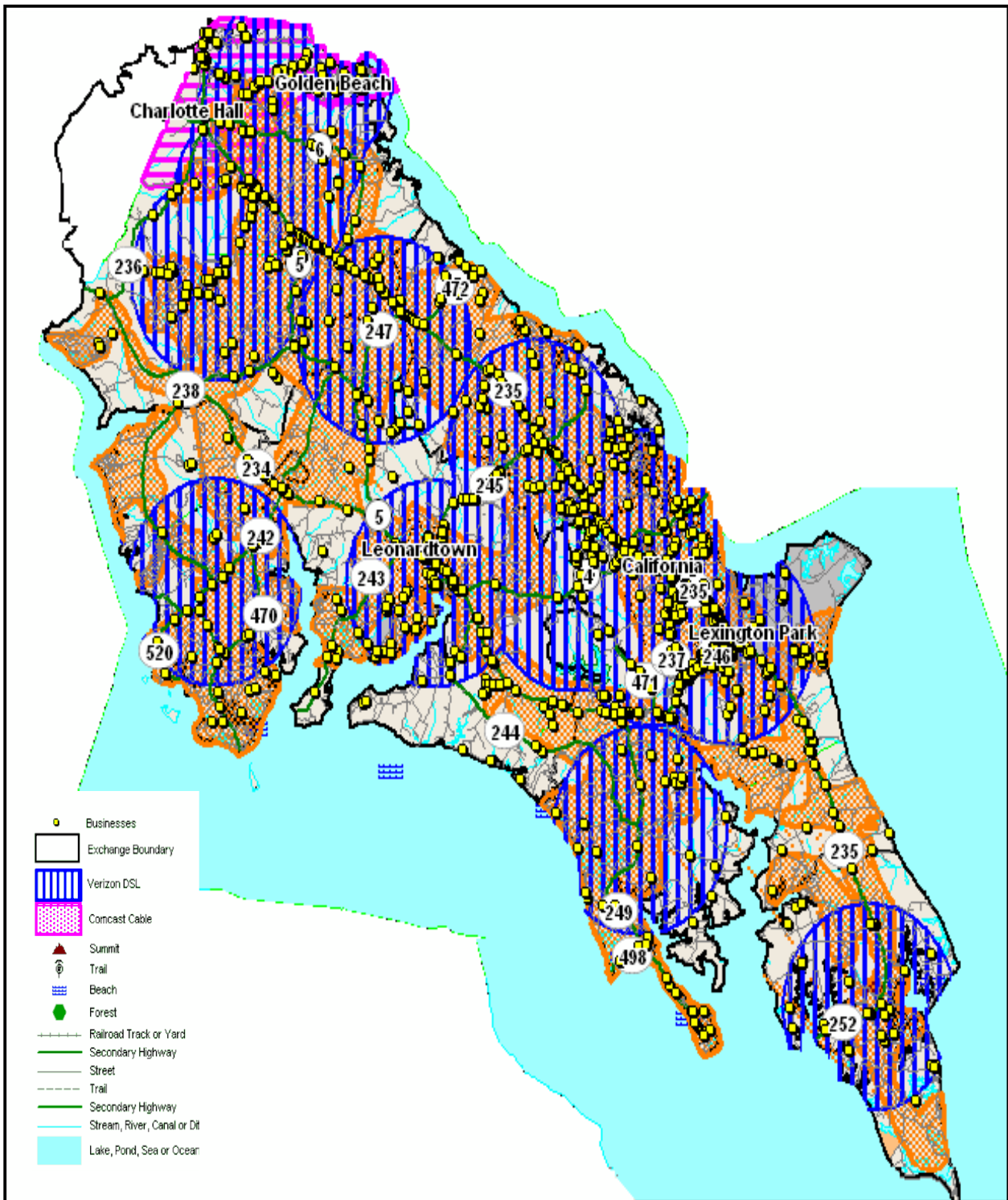
Map 31 – St. Mary’s County Businesses – 2005



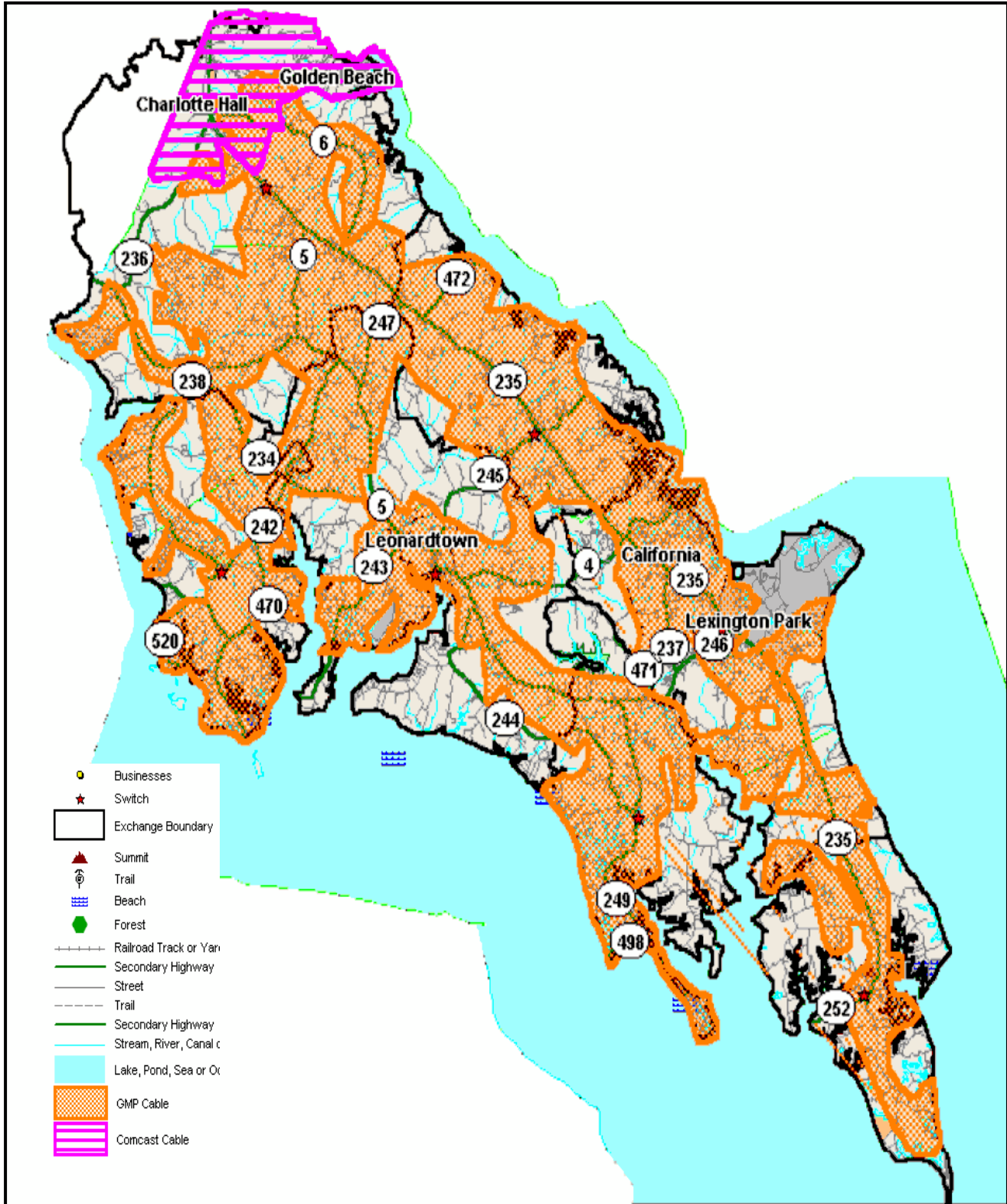
Map 32 – St. Mary’s County Cable Modem & DSL Coverage - 2005



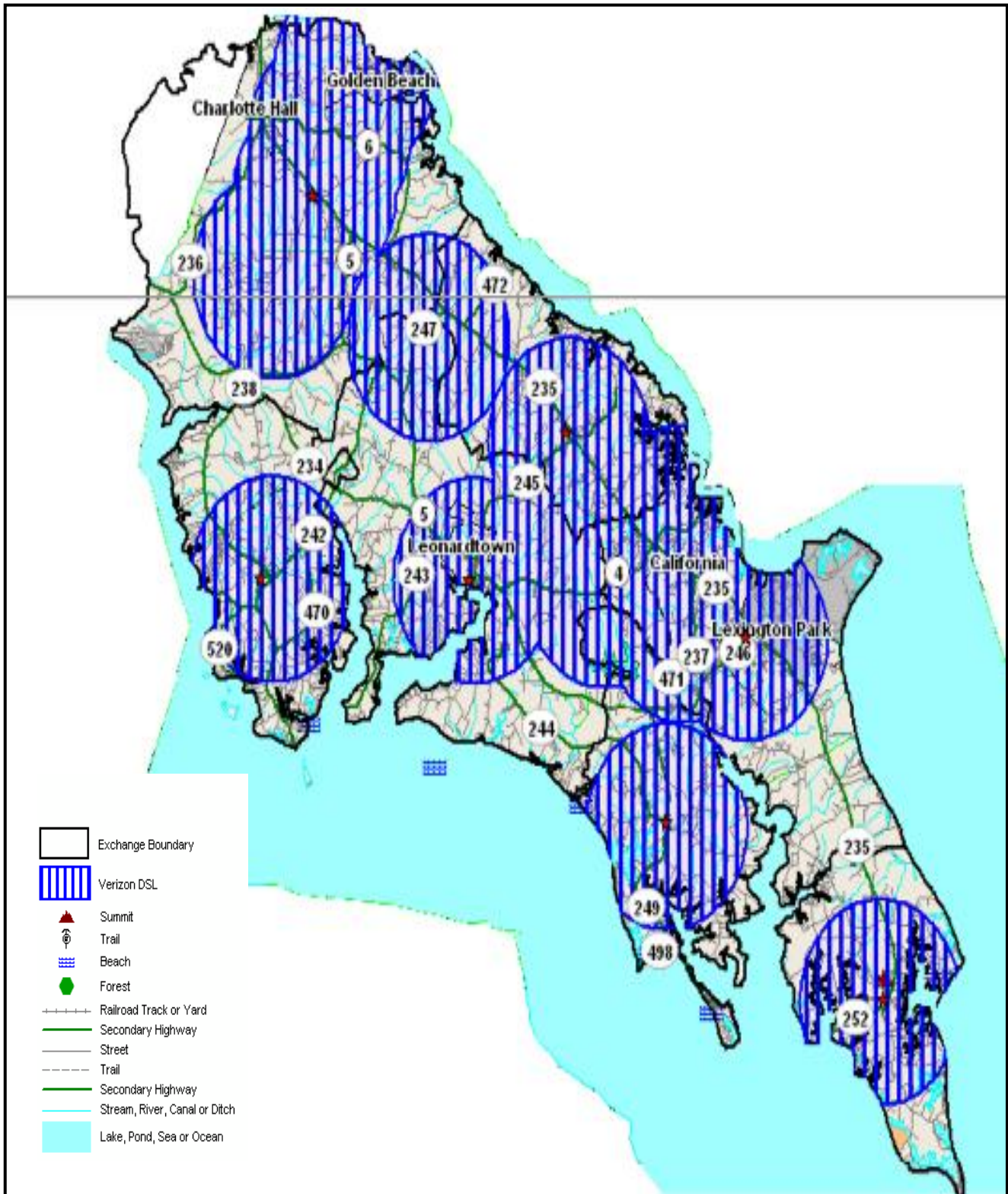
Map 33 – St. Mary’s County Businesses and Broadband Coverage - 2005



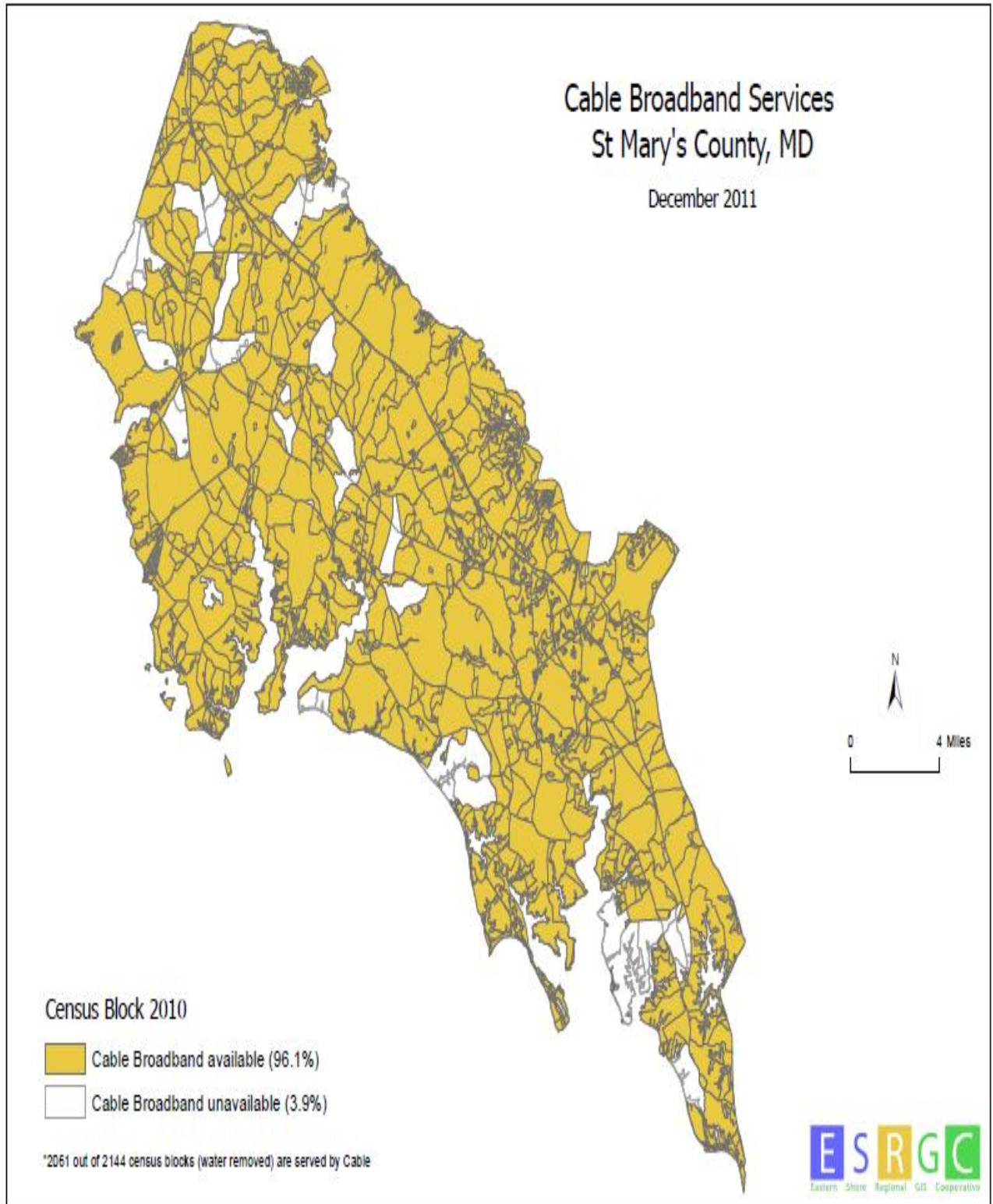
Map 34 – St. Mary’s County Cable Modem Coverage – 2005



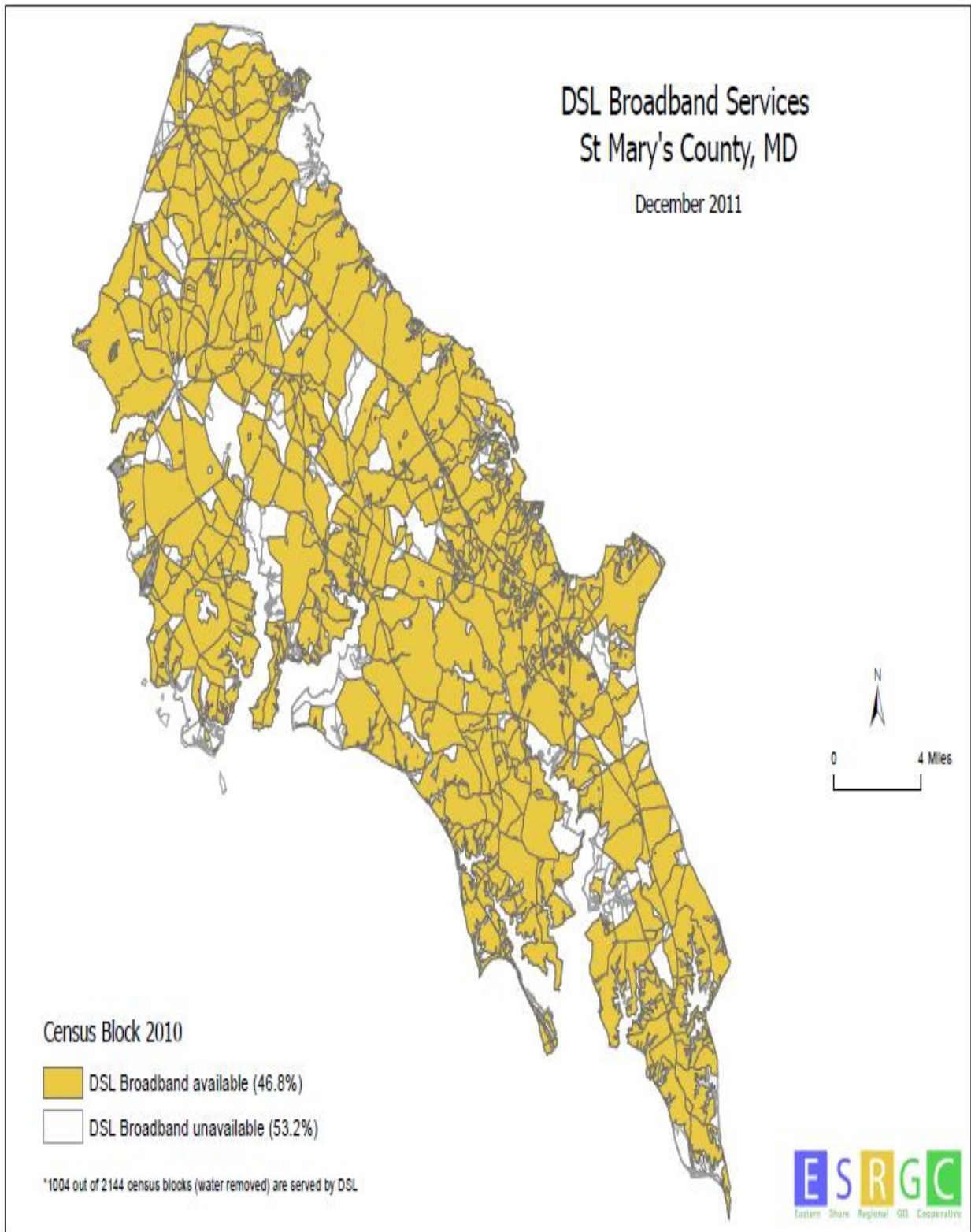
Map 35 – St. Mary’s County DSL Coverage – 2005



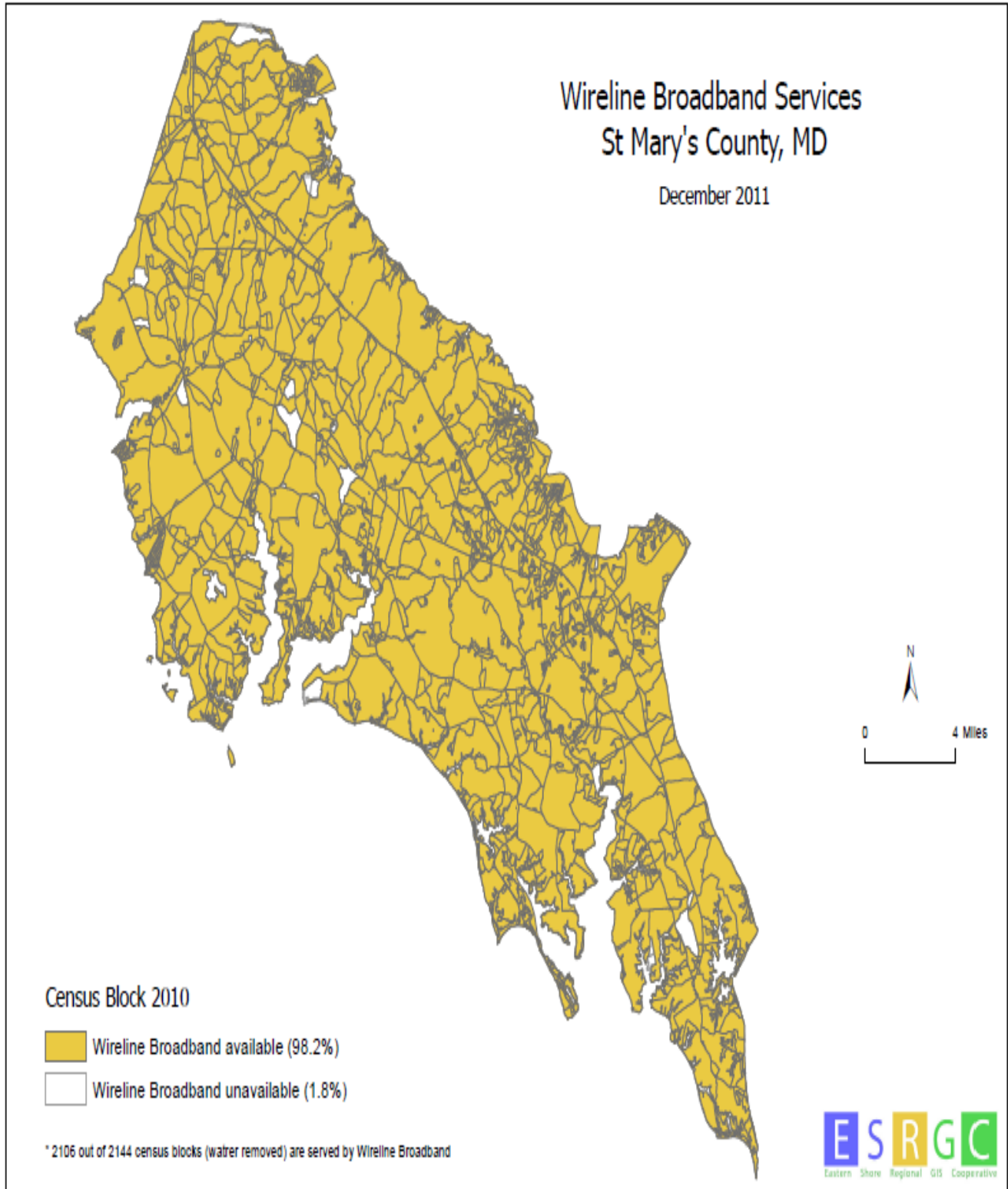
Map 36 – St. Mary's County Cable Modem Coverage – 2011



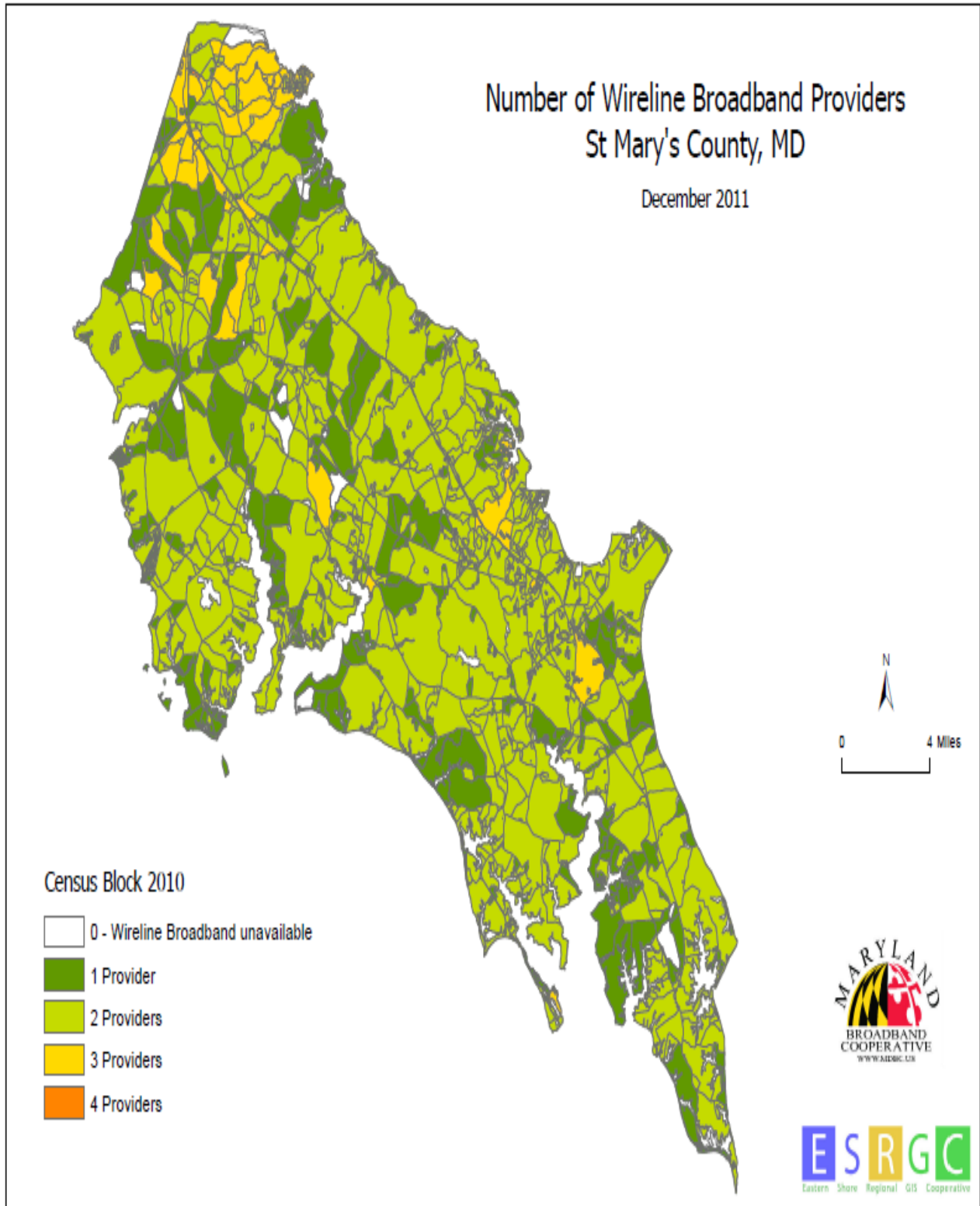
Map 37 – St. Mary’s County DSL Coverage – 2011



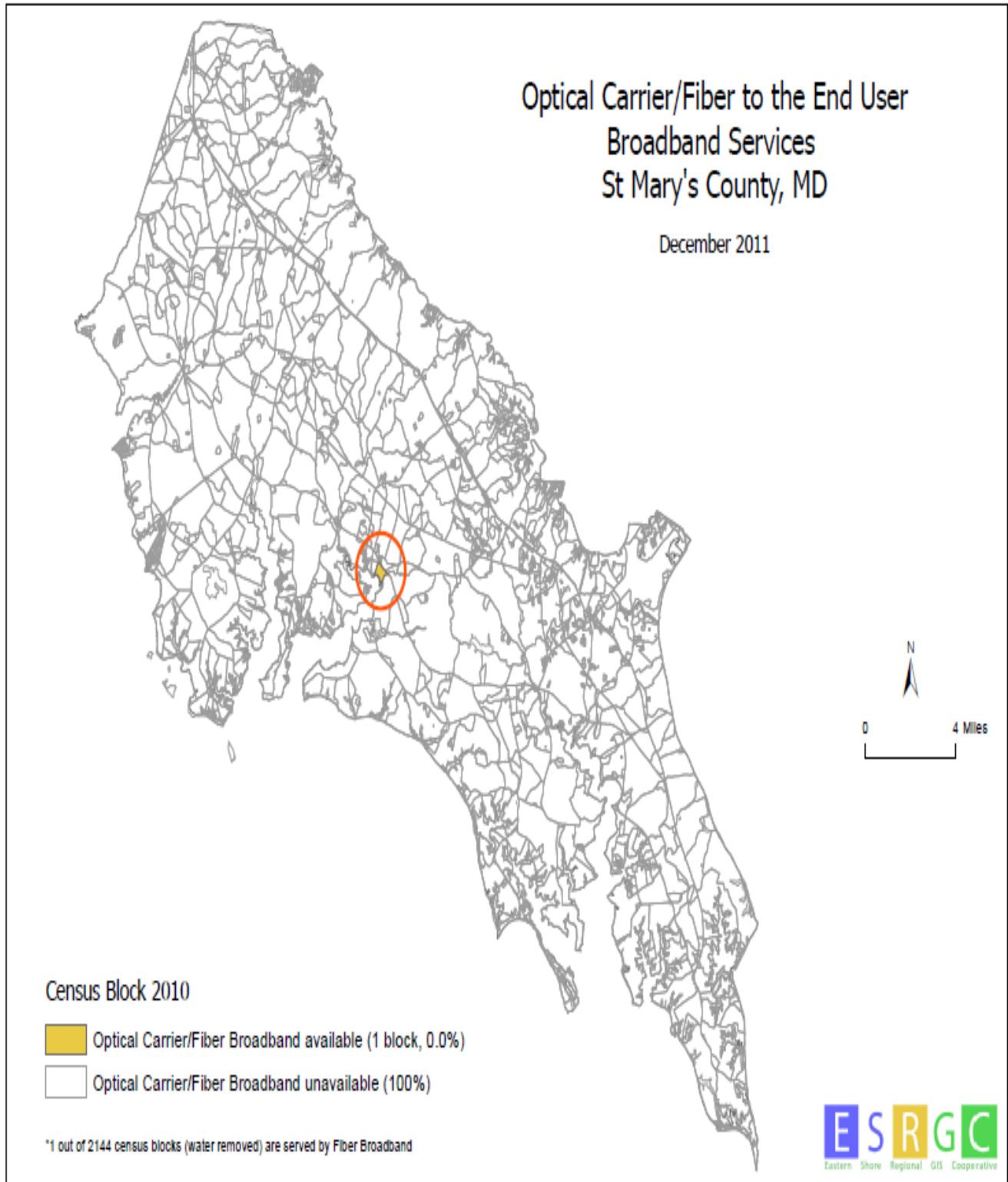
Map 38 – St. Mary’s County Wireline Coverage – 2011



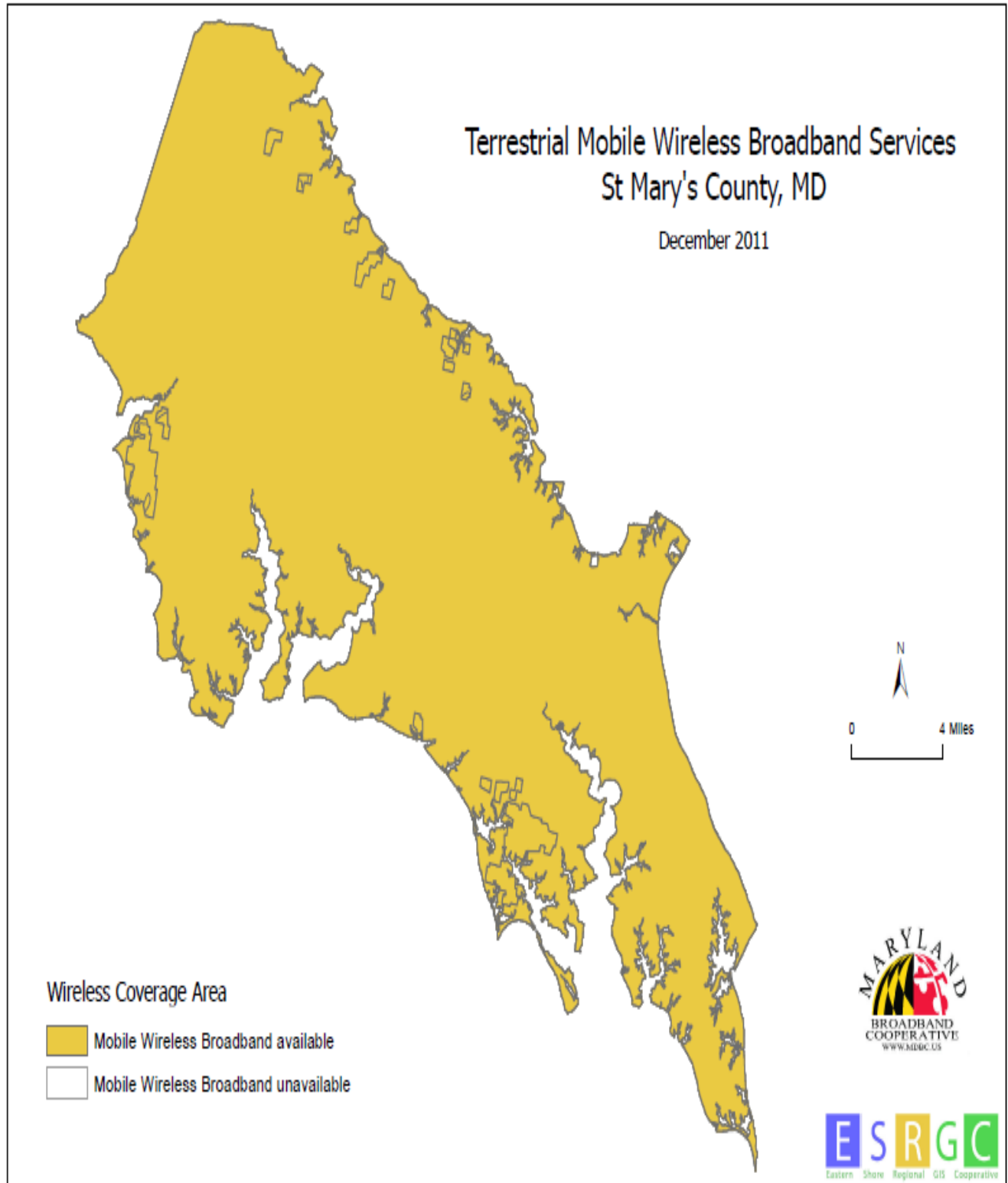
Map 39 – St. Mary’s County Number of Wireline Providers - 2011



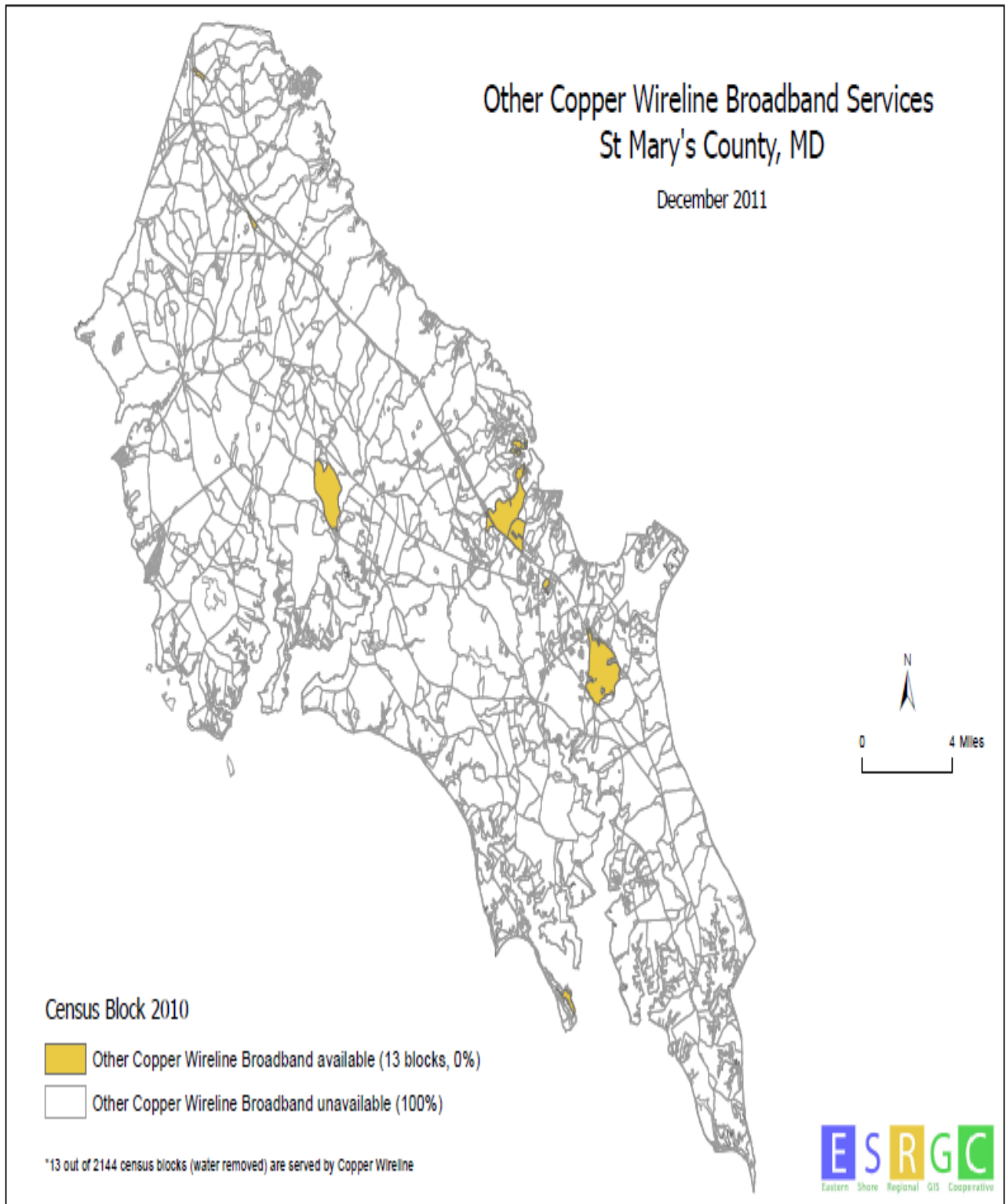
Map 40 – St. Mary's County Fiber Optic Coverage - 2011



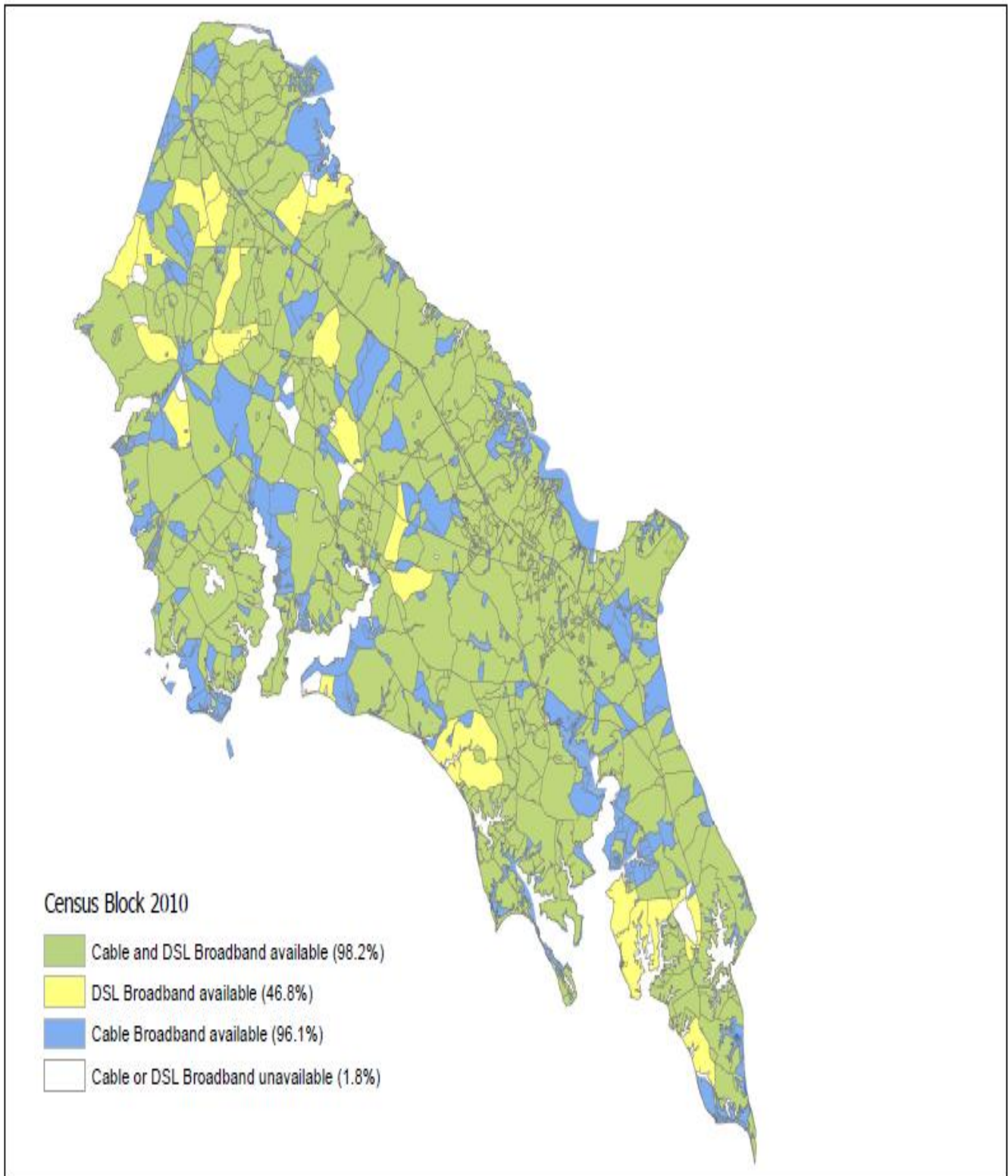
Map 41 – St. Mary's County Mobile Wireless Coverage - 2011



Map 42 - St. Mary's County Other Copper Wireline Coverage -2011



Map 43 - St. Mary's County Cable and DSL Broadband Services-2011



Appendix C: Charts

Chart 1 – Calvert County Technology – December 31, 2010

Technology	Percent Population	Nationwide
DSL	85.1%	88.0%
Fiber	0.9%	15.0%
Cable	94.8%	85.2%
Wireless	99.3%	97.6%
Other	0.0%	0.3%

Source API Call

Chart 2 – Calvert County Speed – December 31, 2010

Speed	Percent Population	Nationwide
Unreported	0.0%	0.0%
Download > 0.768 Mbps, Upload > 0.2 Mbps	100.0%	98.9%
Download > 3 Mbps, Upload > 0.768 Mbps	100.0%	97.1%

Source API Call

Chart 3 – Calvert County Broadband Speed Test – December 31, 2010

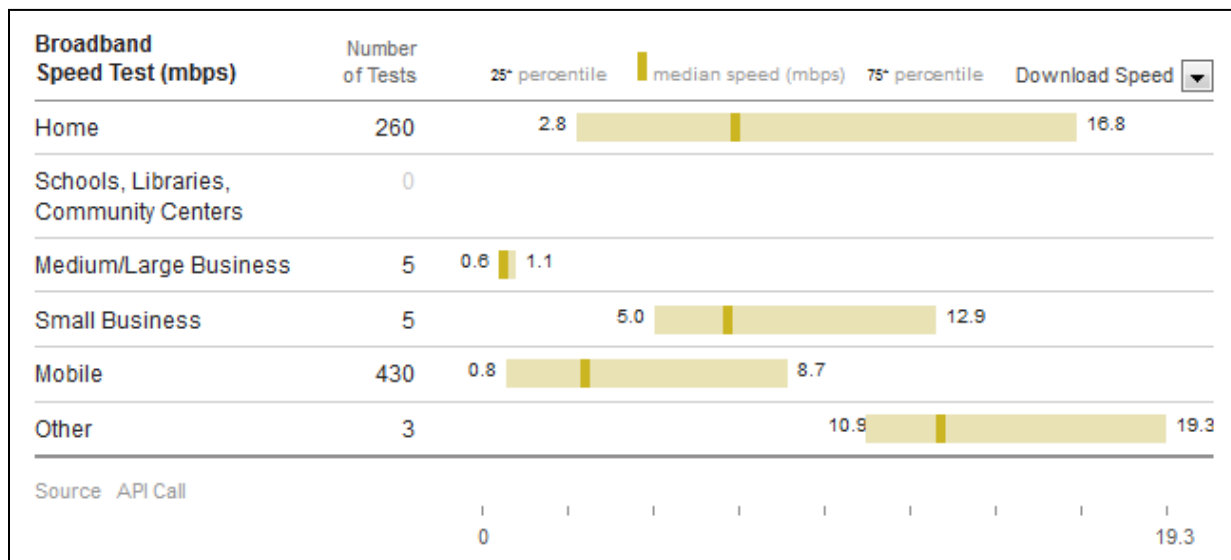


Chart 4 – St. Mary’s Technology – December 31, 2010

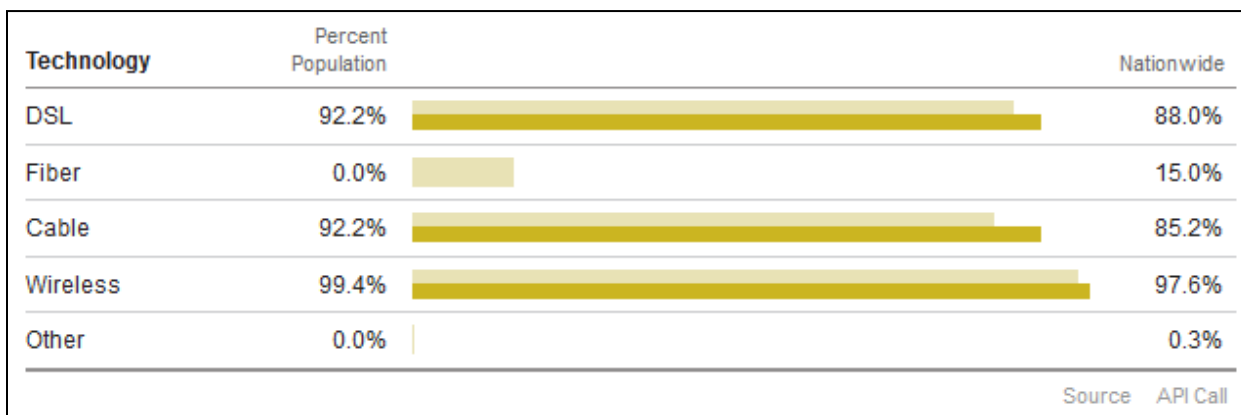


Chart 5 – St. Mary’s County Speed – December31, 2010

Speed	Percent Population	Nationwide
Unreported	0.0%	0.0%
Download > 0.768 Mbps, Upload > 0.2 Mbps	100.0%	98.9%
Download > 3 Mbps, Upload > 0.768 Mbps	99.3%	97.1%

Source API Call

Chart 6 – St. Mary’s County Broadband Speed Test – December 31, 2010

Broadband Speed Test (mbps)	Number of Tests	25 th percentile	median speed (mbps)	75 th percentile	Download Speed <input type="button" value="v"/>
Home	194	2.0		6.7	
Schools, Libraries, Community Centers	9	0.3		4.8	
Medium/Large Business	10	1.3		14.0	
Small Business	11		3.1	9.5	
Mobile	501	0.8		2.6	
Other	4	1.0		5.1	

Source API Call

0 | | | | | | | | 14.0

Chart 7 – Charles County Technology – December 31, 2010

Technology	Percent Population	Nationwide
DSL	90.8%	88.0%
Fiber	66.7%	15.0%
Cable	83.8%	85.2%
Wireless	99.7%	97.6%
Other	0.0%	0.3%

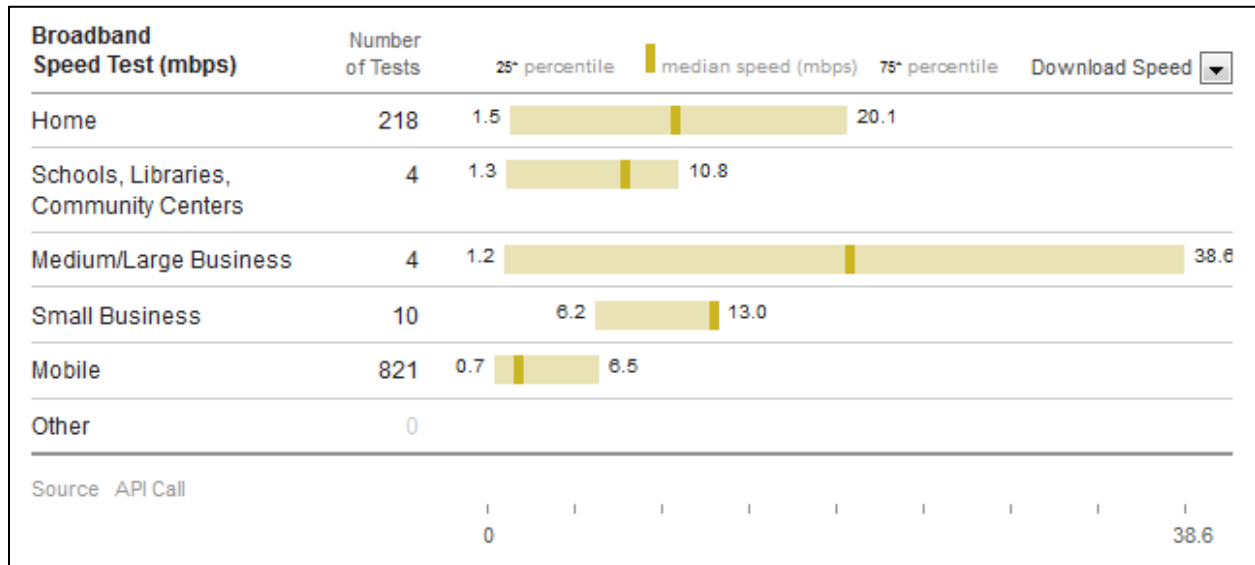
Source API Call

Chart 8 – Charles County Speed – December 31, 2010

Speed	Percent Population	Nationwide
Unreported	0.0%	0.0%
Download > 0.768 Mbps, Upload > 0.2 Mbps	100.0%	98.9%
Download > 3 Mbps, Upload > 0.768 Mbps	99.6%	97.1%

Source API Call

Chart 9 – Charles County Broadband Speed Test – December 31, 2010



Appendix D: Best Practices

The project in Singapore enlists intensive government interaction to support in their broadband goals and objectives. However, ONE broadband initiative in Singapore is very similar to One Maryland Broadband Network (OMBN) and they began issuing Facilities-Based Operation (FBO) and Service-Based Operation (SBO) licenses⁴⁵.

- FBO licenses could be applied to the Maryland initiative by allowing anchor institutions to be responsible for issuing licenses to other institutions or third parties looking to connect to their fiber and would be paid a fee to use the connection.
- The SBO licenses would be applicable only to other users trying to connect to broadband service on the property of an anchor institution or a separate entity with access.

A perfect example of Service-Based operations would be a land owner extending service to another portion of the land to a third party. From a cost structure perspective, this would be feasible for anchor institutions because the fee paid by other users could be used to maintain the connection and pay for the anchor institutions' service bill. The margins of the license fee would have to be supported by a cost benefit analysis to ensure maintenance and equipment costs are of little to no expense to the anchor institution. The motive in Singapore for utilizing the license agreements is to promote pure competition among service providers in the region. Under the license system potential users would need to apply for the license and be approved by the providing firm or in this case anchor institution. The intricacies of a licensed user system used by Singapore would need to be tested based on potential acceptance, and anchor institutions' capability of employing a person to manage the license agreements. Similarly, the Canadian broadband initiative suggests, "The Government will continue to consult extensively with Canadians and Canadian businesses to ensure the success of the Economic Action Plan. The federal government provides up to 50 percent of eligible project costs for Internet Service Providers that have been selected to deploy broadband infrastructure and services to unserved/underserved areas. The other 50 percent of

⁴⁵ IDA Singapore - Technology – Overview; IDA Singapore; Web. 13 Feb. 2012.

<http://www.ida.gov.sg/Technology/20060417141828.aspx>

costs, or more, is borne by the applicants. First Nations projects are eligible for up to 100% federal funding.”⁴⁶

⁴⁶ Chapter 5: Conclusion and next Steps." *Canada's Economic Action Plan*. Web. 14 Feb. 2012.

<http://www.actionplan.gc.ca/eng/feature.asp?pageId=100>

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Glossary

3 GPP	Third Generation Partnership Program
4G	Fourth Generations
4G LTE	Fourth Generation Long Term Evolution
ARRA	American Recovery Reinvestment Act
BTOP	Broadband Technology Opportunities Program
CAI	Community Anchor Institutions
DBED	Department of Business and Economic Development
DoIT	Department of Information Technology
DSL	Digital Subscriber Line
DWDM ring	Dense wavelength division multiplexing ring
EDA	Economic Development Administration
FTTC	Fiber to the Curb
FTTH	Fiber to the Home
Gbps	Giga Bit Per Second
ISP	Internet Service Provider
Kbps	Kilo Bit Per Sec
LTE	Long Term Evolution
Mbps	Mega Bit Per Second
Mb/s	Mega Bit Per Second
MdBC	Maryland Broadband Cooperative
MDOT	Maryland Department of Transportation
MSEC	Mega Second
NTIA	National Telecommunication and Information Administration
OMBN	One Maryland Broadband Network
POPS	Points of Presence

ROADM	Reconfigurable Optical Add-Drop Multiplexer
SBA	Small Business Administration
SMECO	Southern Maryland Electric Cooperative
SCORE	Skilled Counselors and Other Resources
Tier 1	Level 1
USM	University System of Maryland
Voip	Voice over Internet Protocol
Wi-Max	Worldwide Interoperability for Microwave Access