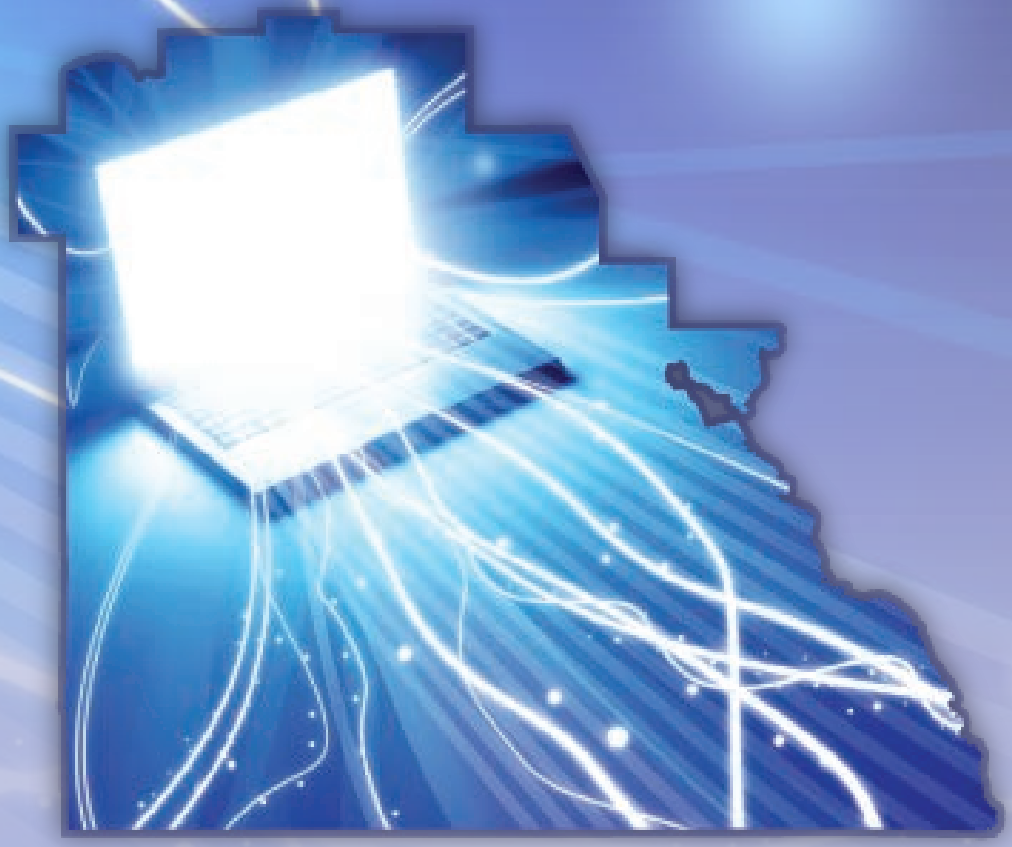
POLK COUNTY BROADBAND PLAN



BROADBAND Polk

Opportunity · Innovation · Efficiency

This page was intentionally left blank

GUIDED BY:

Polk Vision, Inc.

and

The citizens and businesses of Polk County

www.polkvision.com

PREPARED BY:

Central Florida Regional Planning Council

555 E Church Street, Bartow, FL 33830

www.cfrpc.org

June 2013

TABLE OF CONTENTS

EXECUTIVE SUMMARY 8
Vision Statement 8
What Is Broadband? 8
Why Do We Need It? 8
Broadband Polk 8
Broadband Needs in Polk County 9
Anchor Institutions and Businesses 9
Need Model 10
Future Demand 11
Anchor Institutions and Businesses 11
Demand Model 12
Goals, Strategies, and Action Items 12
The following strategies were identified for achieving the goals: 13
The following action items were identified: 14
Conclusion 16
INTRODUCTION AND BACKGROUND 17
Definition of Broadband 17
Why Broadband is Important 17
Why Broadband Planning is Important for Polk County 17
Project Background 19
Broadband Polk 19
Polk Vision 19
Broadband Planning Toolkit and Training Manual 19
Key Stakeholders 19
Broadband Polk Advisory Committee Members 20
The Planning Process 21
Public-Private Partnerships 25
Avoiding Conflict between Public - and Private -Sector Providers 25
VISION AND GOALS 26
Vision 26
Goals 26
EXISTING CONDITIONS 29
Socioeconomic Conditions 29
Demographics 29
Population Density and Projected Growth 34
Employment Growth and Industry Clusters 36
Broadband Assets 42

Wireline 42
Wireless Broadband and Vertical Assets 48
Spectrum Availability for Mobile Broadband 49
Policies and Regulations 49
Funding Opportunities 49
Libraries 50
Schools 51
Colleges and Universities 51
Government 52
Healthcare 53
Broadband Utilization Survey Results 53
Businesses 53
Households 61
Areas of Greatest Broadband Need (Current) 71
PROJECTION OF FUTURE DEMAND 73
Weighted Broadband Demand Score 77
GIS Analysis Procedure 77
Generalized Future Land Use Methodology 80
CONCLUSION AND RECOMMENDATIONS 83
Strategies 83
Action Items 84
GLOSSARY OF TERMS 87
BIBLIOGRAPHY 89
APPENDIX A: GOAL AND STRATEGY WORKSHEET 91
APPENDIX B: BUSINESS AND RESIDENTIAL SURVEYS 92

LIST OF FIGURES

Figure 1. Anchor Institutions, Employment Density, and Fiber Coverage 9
Figure 2. Population Density and Existing Commercial Broadband Coverage 10
Figure 3. Areas of Greatest Broadband Need 11
Figure 4. Broadband Demand Model 12
Figure 5. Planning Process Design 24
Figure 6. Population Growth Rates, 1980-2010 29
Figure 7. Municipalities in Polk County 31
Figure 8. Age Groups, 2010 32
Figure 9. Educational Attainment for Persons Aged 25 and Older, 2011 32
Figure 10. Annual Unemployment Rates, Not Seasonally Adjusted, 2000-2011 33
Figure 11. Median Household Income, 2011 33
Figure 12. Percent of the Population Living Below the Poverty Threshold, 2011 34
Figure 13. Population Density, 2010 34
Figure 14. Polk County's Actual and Projected Population, 1980-2040 35
Figure 15. Projected Percent Change in Population Per Square Mile, 2010-2020 35
Figure 16. Employment Per Square Mile, 2010 41
Figure 17. Employment Per Square Mile, Projected, 2020 41
Figure 18. Projected Percent Change in Employment Per Square Mile, 2010-2020 42
Figure 19. Commercial Wireline Broadband Coverage By Service Type 43
Figure 20. Commercial Wireline Broadband: Maximum Advertised Download Speeds 43
Figure 21. Typical Wireline Download Speeds, Fort Meade Area 45
Figure 22. Wireline Broadband Mapped By Provider 45
Figure 23. Municipal Fiber Networks 46
Figure 24. Bartow Fiber Network: Central Detail 46
Figure 25. Lakeland Fiber Network: Central Detail 47
Figure 26. Winter Haven Fiber Network 47
Figure 27. Typical Commercial Download Speeds & Tower Locations 48
Figure 28. Wireless Broadband Providers 48
Figure 29. United States Frequency Allocations from 300 MHz to 512 MHz, 2011 49
Figure 30. Connection Speeds & Computers Available at Polk County Libraries, 2012 50
Figure 31. Connection Speeds and Providers for Polk County Schools 51
Figure 32. Colleges and Universities 52
Figure 33. County Government Facilities and Connection Speeds 52
Figure 34. Healthcare Facilities 53
Figure 35. Rating of Businesses Internet Connection - Question 6 54
Figure 36. Internet Connection Speed Rating - Question 9 56
Figure 37. Likelihood of Needing Faster Internet in the Next Year - Question 10, Part 1 56

Figure 38. Likelihood of Needing Faster Internet in the Next 3 Yrs - Question 10, Part 2 56
Figure 39. Fast Internet is Critical for Competitiveness - Question 17 59
Figure 40. Fast Internet is Critical to Produce & Deliver Services - Question 18 59
Figure 41. Fast Internet is Critical for Survival of Your Company - Question 19 59
Figure 42. Download & Upload Speeds - Questions 23-26..... 60
Figure 43. Top Reason for Not Having Internet - Question 28..... 60
Figure 44. Faster Internet Could Increase Usage - Question 19 64
Figure 45. Likelihood of Internet Used for Shopping - Question 23 65
Figure 46. Likelihood of Internet Used for Educational Purposes - Question 24..... 65
Figure 47. Likelihood of Internet Used for Entertainment - Question 25 66
Figure 48. Likelihood of Internet Used for Business - Question 26 66
Figure 49. Likelihood of Internet Used for Banking & Bill Paying - Question 27..... 66
Figure 50. Age Distribution - Question 34 67
Figure 51. Race & Ethnicity Distribution - Question 36 68
Figure 52. Household Income - Question 38 69
Figure 53. Educational Attainment - Question 39..... 69
Figure 54. Areas of Greatest Broadband Need..... 72
Figure 55. Percentile Rank of Projected 2020 Employment Per Square Mile (E)..... 73
Figure 56. Percentile Rank of Projected 2020 Population Per Square Mile (P)..... 74
Figure 57. Future Land Use Score (F)..... 74
Figure 58. Estimated Broadband Connections Per 1,000 Households (C) 76
Figure 59. Data Layer Assembly to Produce the Final Model 77
Figure 60. ESRI ArcGIS ModelBuilder Data Model..... 78
Figure 61. Weighted Broadband Demand, Projected for 2020 79
Figure 62. 2020 Broadband Demand Heat Map..... 79

LIST OF TABLES

Table 1. Goals, Strategies, and Action Items 16
Table 2. I-4 Corridor Population Growth, 2000-2010 18
Table 3. Broadband Polk Advisory Committee Members 20
Table 4. Data for Broadband Planning 23
Table 5. Prioritization from Forms Submitted 28
Table 6. Populations of Municipalities in Polk County, 2010 30
Table 7. Race and Ethnicity, 2011 31
Table 8. Occupations with the Greatest Projected Absolute Growth 36
Table 9. Occupations with the Greatest Projected Relative Growth 37
Table 10. Industries with the Greatest Projected Absolute Growth 38
Table 11. Industries with the Greatest Projected Relative Growth 38
Table 12. Broadband Applications with Typical Speed Ranges Required 44
Table 13. Organizations' Monthly Internet Costs - Question 4 54
Table 14. Applications of Internet Use - Question 7 55
Table 15. Factors that Prevent Obtaining a Faster Internet Connection - Question 12 57
Table 16. Reasons High-speed Internet is Important - Question 14 58
Table 17. Internet Usage for Entertainment Purposes - Questions 9-10 62
Table 18. Internet Usage for Online Shopping - Questions 11-12 62
Table 19. Internet Usage for Banking & Paying Bills - Questions 13-14 63
Table 20. Internet Usage for Educational Purposes - Questions 15-16 63
Table 21. Internet Usage for Business Purposes - Questions 17-18 64
Table 22. Internet Costs - Question 21 65
Table 23. Top Reason for No Internet - Question 28 67
Table 24. Age Group Distribution - Question 35 68
Table 25. Relationship between Broadband Access and Household Income Level 70
Table 26. Relationship between Broadband Access and Education Attainment Level 70
Table 27. Relationship between Broadband Access and Race/Ethnicity 71
Table 28. Generalized Future Land Use Scores 75
Table 29. FCC Data Values for Variable "C" 76
Table 30. CFRPC Generalized Future Land Use Category Descriptions 81
Table 31. Relationships between Goals, Strategies, and Action Items 86

This page was intentionally left blank

EXECUTIVE SUMMARY

Vision Statement

Broadband Polk's vision is to facilitate increased opportunity, innovation, and efficiency by ensuring that every individual, corporation, non-profit, visitor, government entity, and community partner in Polk County has access to affordable high-speed internet service.

What Is Broadband?

Broadband is high-speed internet access that is always on and faster than the traditional dial-up access. Broadband access is provided by a variety of technologies, including:

- Optical fiber cables;
- Cable access, sharing infrastructure with cable television services;
- DSL (digital subscriber lines), sharing infrastructure with land telephone services;
- Satellite transmission, used primarily in remote areas;
- Mobile broadband networks (for example, 3G and 4G), most commonly accessed by smartphones and tablet computers.

Of the above technologies, fiber tends to provide the fastest service and DSL the slowest. Any of the above technologies can be connected to a wireless router, providing wireless internet access ("Wi-Fi") to devices within range of the router.

Broadband is used not only for e-mailing and accessing web pages, but for an enormous variety of applications—from database management to remote medical diagnosis, controlling building access to operating public transit systems, conducting financial transactions to earning degrees via online classes.

Why Do We Need It?

Throughout history, infrastructure networks have served to connect people, places, ideas and products. The great infrastructures of the 19th century were railroads and canals; the great infrastructures of the 20th century were highway systems and communications systems such as radio, telephony, and television; and the great infrastructure of the 21st century is broadband. Communities and regions that develop their broadband infrastructure will have better, faster access to new ideas, innovations, and technologies. Being connected means having more and better jobs, a stronger educational system, a more efficient government, more effective public safety and health care providers, and a better quality of life. Planning now to ensure that Polk County's future broadband infrastructure needs will be met is essential for sustainable economic development and prosperity within the county.

Broadband Polk

The Broadband Polk planning process and its vision, goals, strategies and action items were guided and developed collaboratively by Polk County citizens, business leaders, civic organizations, non-profits, educational institutions, economic development professionals and technology experts.

Broadband Needs in Polk County

Anchor Institutions and Businesses

Figure 1 shows Anchor Institutions and employment density in Polk County along with municipal and commercial fiber optic broadband coverage. There are several areas with Anchor Institutions and concentrated employment outside the current range of fiber coverage, notably in the areas of Lake Wales and Frostproof. Two universities, Warner University and Webber International University, are in areas not served by fiber. Fiber service is planned for the Florida Polytechnic University campus that is under construction in northeast Lakeland.

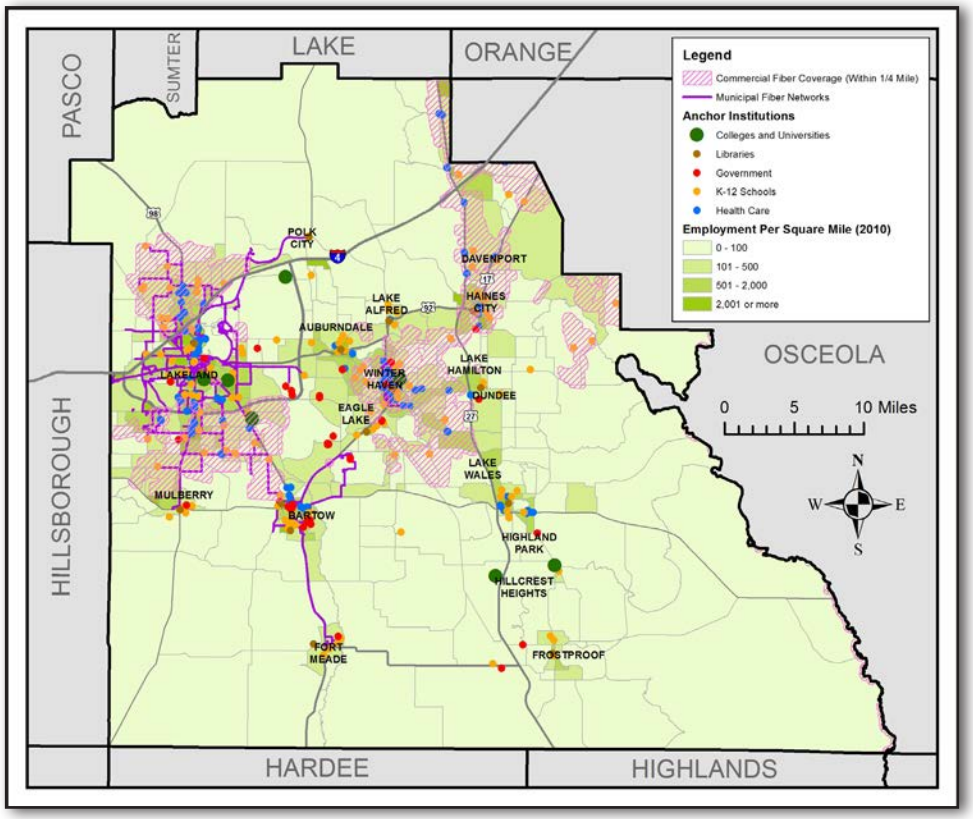


Figure 1. Anchor Institutions, Employment Density, and Fiber Coverage

Residents

Compared to Florida and the United States, Polk County's residents have lower wages, higher unemployment, higher poverty rates, and lower educational attainment. Like many areas of transitioning economy and culture, Polk County has experienced a decline in industries that previously provided generous employment. Improved broadband access opens up a wide range of new possibilities to residents. Just a few examples are online education and training, online banking and other financial tools, research opportunities for students, and networking for business and employment.

Survey data collected in 2012 indicated that approximately 80 percent of Polk County residents have home internet service. Residents without home internet service most often cited cost as their reason for not having it. Making broadband more accessible, reliable, and affordable in under-served areas can dramatically improve the quality of life for residents.

Figure 2 shows existing commercial fiber and cable coverage overlaid upon population density at the census-block level. Although cable coverage is extensive throughout the county, fiber coverage is not available in several areas, especially in the southern half of the county.

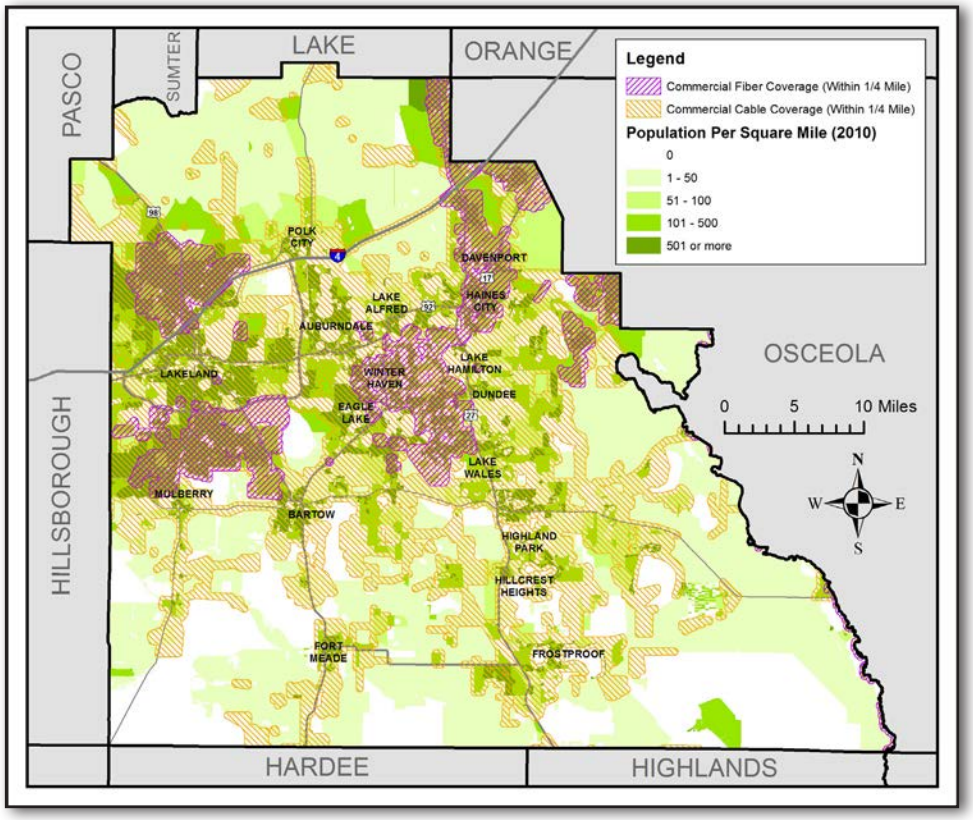


Figure 2. Population Density and Existing Commercial Broadband Coverage

Need Model

To identify underserved areas in which improved broadband access may have a particularly strong impact and may offer much-needed new opportunities to residents, a geographic model identifying areas of need was developed. This model identifies areas where lack of service, lack of broadband adoption by households, and low income combine to create a demand gap. The following were the specific factors used in the calculation:

- Current lack of coverage;
- Current low rates of broadband penetration;
- Generalized existing land use (priority is given to agricultural and low-density residential areas because these are where isolated, underserved populations are most likely to reside).

The results of this model are shown in Figure 3. Areas of need are particularly evident in the southern part of the county, but also in and around the urban areas of Lakeland and Winter Haven and in the far northern part of the county.

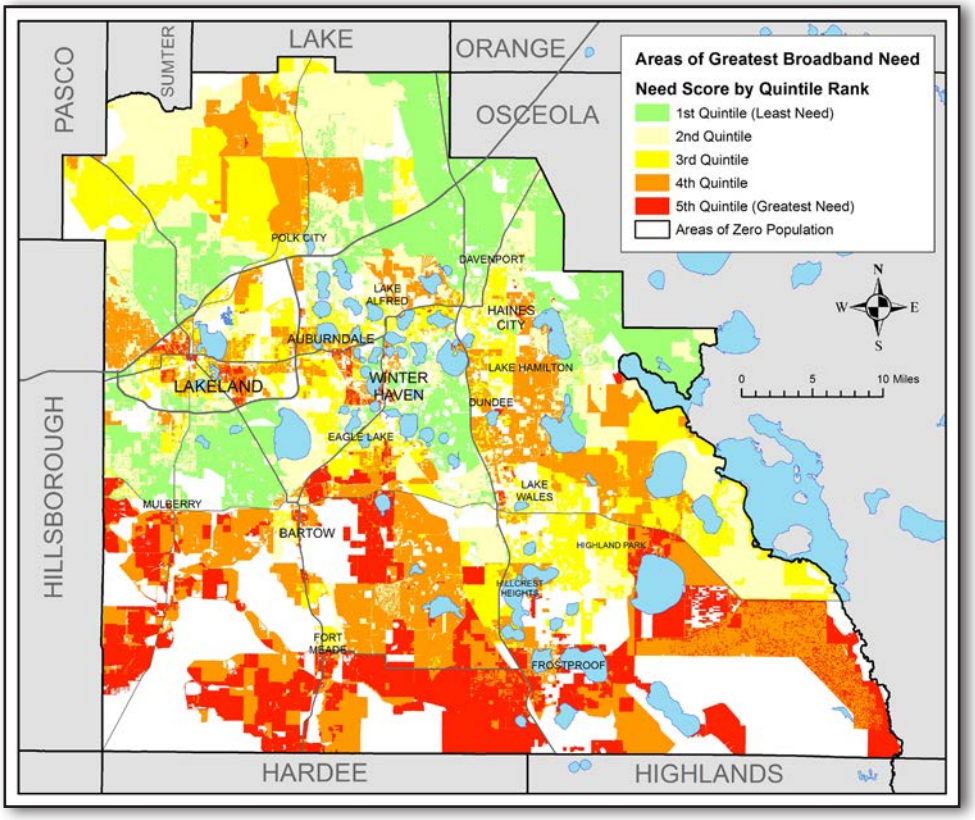


Figure 3. Areas of Greatest Broadband Need

Future Demand

Anchor Institutions and Businesses

Broadband demand is expected to increase in all industry sectors and for all types of Community Anchor Institutions. Local governments will require more sophisticated broadband technology as government services and processes become more fully electronic. Healthcare facilities will require greater bandwidth as medical technology advances and remote diagnosis becomes more prevalent, especially in rural areas. Libraries will need more advanced broadband capabilities as e-books become more prevalent and internet access becomes more essential for the entire population. Schools will require better broadband access in order to prepare students to compete in an interconnected global economy, and colleges and universities will need higher broadband capacity to transfer data for research. Public safety agencies will require enhanced broadband access in order to keep improving the safety of communities as the population continues to grow. And as the economy becomes more globalized, businesses in Polk County will need better broadband access in order to advertise their products and services, connect with customers, and compete robustly amongst other regions of the country and the world.

Residents

Polk County's population is projected to grow 16 percent by 2020 and 52 percent by 2040. As the population continues to grow and internet access becomes more essential for all sectors of the population, residential broadband demand in Polk County can be expected to rise dramatically. This will be true for both urban and rural populations as residents continue to adapt to an increasingly networked culture and a competitive, globalized economy.

Demand Model

As part of the planning project, a spatial model was developed to project broadband demand in the year 2020 by producing a weighted broadband demand score for the county. The model produces a relative broadband demand score at the parcel level based on Future Land Use, projections of population and employment, and estimates of current broadband penetration. The purpose of the model is to identify geographic areas of relatively high broadband demand across all sectors. The results are shown in Figure 4. Areas of particularly high future demand can be observed in the far eastern part of the county, along the US Highway 27 corridor, and along the Polk Parkway (State Route 570).

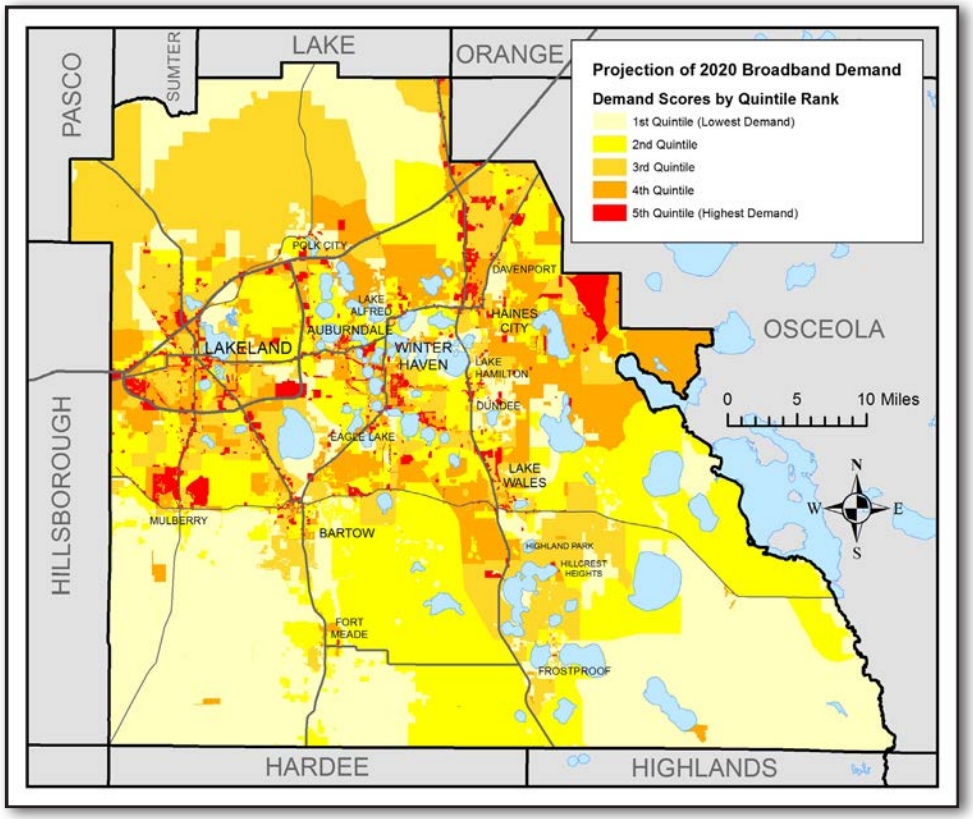


Figure 4. Broadband Demand Model

Goals, Strategies, and Action Items

The goals, strategies, and action items for the Polk County Broadband Plan were developed with input from Polk Vision and its Infrastructure Task Force, the Broadband Polk Advisory Committee, and Polk County citizens and businesses.

The following are the Plan's goals for the year 2020, listed in order of priority:

1. **Anchor Institutions such as schools, hospitals, libraries, and government buildings will have affordable access to a minimum of 1 gigabit per second broadband services.**
2. **Every resident of Polk County will have access to affordable high-speed internet services and the skills to utilize it, if they choose.**
3. **Anchor Institutions (including energy providers) will maximize utilization of broadband services and technologies in order to increase efficiency, maximize resources, and provide the best services possible to the businesses and residents of Polk County.**
4. **Every business and non-profit in Polk County will have access to affordable high-speed internet services**

and the skills to utilize it, if they choose.

5. **Polk County will have the fastest, most affordable, and most accessible mobile networks possible.**
6. **205,000 households (79% of households) in Polk County will have affordable access to actual download speeds of at least 100 megabits per second and actual upload speeds of at least 50 megabits per second.**

The following strategies were identified for achieving the goals:

1. **Co-location:** Advocate for communication, cooperation, and partnerships between utility providers, municipalities, transportation planning organizations and broadband providers; allowing resources, easements, rights-of-way and infrastructure to be shared when expanding or upgrading services to Anchor Institutions.
2. **Competition:** Increase affordability and improve services to Anchor Institutions by encouraging and advocating for robust broadband marketplace competition, including Next Generation Networks, Florida LambdaRail, and municipal fiber enterprises.
3. **Anchor Institution Funding Sources:** Ensure that Anchor Institutions are aware of, and utilizing, all available funding sources, including but not limited to e-rate programs, grants, tax incentives, and private financing.
4. **Neighborhood Broadband Centers:** Eliminate gaps in service, equity, and affordability by establishing broadband access points in community centers, churches, shopping centers, parks, schools, and other community-based organizations. Provide public-access computers where possible and increase capacity where such facilities already exist, such as in libraries.
5. **Wi-Fi Zones:** Encourage local municipalities and counties to provide public Wi-Fi, especially in central business districts and dense neighborhoods.
6. **Technical Literacy and Training:** Encourage providers and industry experts to conduct a variety of workshops and training exercises, ranging from basic computer skills to more advanced applications of broadband technology.
7. **Residential Funding Sources:** Encourage local governments and organizations such as CRAs and neighborhood groups to undertake projects that increase broadband availability, taking advantage of funding opportunities such as grants, tax incentives, and public-private partnerships.
8. **Broadband Audits:** Encourage annual evaluations of Anchor Institutions by broadband providers and/or industry experts to identify methods to increase efficiency and maximize resources.
9. **Employee Suggestion Programs:** Encourage Anchor Institutions to establish programs to reward employees who submit new ideas for utilizing broadband services efficiently, effectively, and for the benefit of Polk County businesses and residents.
10. **Attract Broadband Intensive Industries:** Partner with local municipalities, universities, and economic development agencies to attract high-tech industries, including research and development facilities that require very high capacity broadband infrastructure.
11. **Public-Private Partnerships:** Develop partnerships, programs, and incentives to provide broadband services to small towns and rural communities.
12. **Non-Residential Funding Sources:** Encourage business associations, downtown redevelopment agencies, and other business-related organizations to undertake projects that increase broadband availability, taking advantage of funding opportunities such as grants, tax incentives, and public-private partnerships.
13. **Increase Demand:** Increase public awareness of mobile broadband technology and applications through public service announcements, educational/training programs, technology fairs/conferences, and fostering a cultural change to maximize mobile broadband services at the local level.

14. **Decrease Obstacles:** Revise local regulations to eliminate potentially unnecessary restrictions or obstacles to installing services and infrastructure. Advocate at the State and Federal level for favorable regulations for the development of mobile systems, including the availability of spectrum.
15. **Development Policy:** Facilitate "fiber-to-the-home" infrastructure within new residential communities through the development and adoption of broadband infrastructure policies within the county and municipal comprehensive plans and/or land use and zoning codes.
16. **Share and Communicate Ideas:** Partner with broadband providers to share goals, assets, strategies, and obstacles.
17. **Local Government Broadband Enterprises:** Encourage local municipalities and counties with fiber or other broadband infrastructure to enter the broadband marketplace.
18. **Telecommuting/Work-At-Home Policies:** Increase residential demand by encouraging employers to adopt strategies and policies allowing employees the opportunity to telecommute.

The following action items were identified:

1. Develop and maintain a Broadband Polk website to serve as the central hub for information sharing, communication, cooperation, and partnerships.
2. Identify all Anchor Institutions in Polk County that do not have 1 gigabit per second broadband services.
3. Meet with broadband providers to identify any obstacles to providing 1 gigabit per second services to the identified Anchor Institutions.
4. Encourage municipalities and new commercial providers to enter the Polk County broadband market.
5. Meet with University of South Florida representatives to discuss how Polk County could access and utilize Florida LambdaRail services.
6. Utilize the Broadband Polk webpage, social media, and email distribution lists to promote and disseminate broadband infrastructure and program funding information to Anchor Institutions.
7. Review broadband use at every library in Polk County to ensure that they are utilizing all available broadband funding opportunities.
8. Identify gaps in broadband service and utilization, especially due to affordability or education, and seek to establish Neighborhood Broadband Centers (see Strategy #4) where none currently exist.
9. Research opportunities and establish funding sources for the development of Neighborhood Broadband Centers.
10. Meet with broadband providers to discuss and develop a broadband audit program within Polk County.
11. Meet with Anchor Institutions to introduce the broadband audit program and encourage participation.
12. Meet with Anchor Institutions to encourage the development of meaningful employee suggestion programs, specifically programs that encourage and/or incentivize employees to submit ideas that use broadband technology to increase efficiency and improve services.
13. Reward and/or recognize Anchor Institutions that implement policy or programs that utilize broadband technology to increase efficiency and improve services.
14. Meet with business owners and business associations to discuss broadband access, broadband training opportunities, and funding opportunities.
15. Work with Chambers of Commerce and local economic development organizations to identify broadband intensive industries to target.

16. Reward and/or recognize broadband providers that provide expanded access for businesses and business districts.
17. Provide incentives for broadband providers to offer workshops and training exercises.
18. Develop a series of Public Service Announcements designed to promote Polk County's broadband assets, including mobile broadband, and to brand Polk County as a technological and educational hub within Florida's High Tech Corridor.
19. Establish partnerships with print, radio, television, and internet media outlets to promote the development, and highlight the advantages, of the highest speed broadband technologies available, including mobile.
20. Promote technology fairs and conferences within Polk County that include the latest broadband and mobile broadband technologies and applications.
21. Encourage Polk County and local municipalities to review and revise (if necessary) their Comprehensive Plan policies, Land Development regulations, and Zoning codes to eliminate any unnecessary restrictions or burdens upon the installation of broadband infrastructure, including towers.
22. Establish a Polk County Broadband Advocacy Committee whose primary objective is to advocate for broadband development, education, and utilization at the local, State, and/or Federal level.
23. Encourage Polk County and all 17 local municipalities to develop and adopt broadband infrastructure policies within their comprehensive plans, establishing broadband as an essential infrastructure similar to roads, water, sewer, or electricity.
24. Establish quarterly meetings with representatives from local broadband providers to communicate ideas and share information.
25. Meet with local municipalities and Polk County to discuss the advantages and disadvantages of establishing local government broadband enterprises and providing broadband services to local business and residents.
26. Meet with local broadband providers to discuss the current obstacles to providing 100/50 mbps services to Polk County residents and explore solutions, including public/private partnerships.
27. Work with the local chambers of commerce to encourage and promote telecommuting for employees of Polk County businesses.

The connections between goals, strategies, and action items are shown in Table 1.

Table 1. Goals, Strategies, and Action Items

Goals	Strategies	Action Items
Anchor Institutions such as schools, hospitals, libraries, and government buildings will have affordable access to a minimum of 1 gigabit per second broadband services.	1, 2, 3	1, 2, 3, 4, 5, 6, 7, 10, 11, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25
Every resident of Polk County will have access to affordable high-speed internet services and the skills to utilize it, if they choose.	4, 5, 6, 7	1, 4, 7, 8, 9, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27
Anchor Institutions (including energy providers) will maximize utilization of broadband services and technologies in order to increase efficiency, maximize resources, and provide the best services possible to the businesses and residents of Polk County.	8, 9	1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 15, 18, 19, 20, 21, 22, 23, 24, 25
Every business and non-profit in Polk County will have access to affordable high-speed internet services and the skills to utilize it, if they choose.	10, 11, 12	1, 4, 10, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27
Polk County will have the fastest, most affordable, and most accessible mobile networks possible.	13, 14	1, 4, 10, 15, 16, 18, 19, 20, 21, 22, 23, 24, 27
205,000 households (79% of households) in Polk County will have affordable access to actual download speeds of at least 100 megabits per second and actual upload speeds of at least 50 megabits per second.	15, 16, 17, 18	1, 4, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27

Conclusion

"Broadband is the indispensable infrastructure of our 21st Century economy" according to Julius Genachowski, Chairman of the Federal Communications Commission. Planning to meet current broadband infrastructure needs and future broadband infrastructure demand is a critical task for communities and regions who desire to compete and excel in an increasingly global economy. The Broadband Polk Plan is the result of both the public and the private sectors coming together to plan for the future of broadband in Polk County. Public-private partnerships are a valuable tool that, when properly coordinated, can implement the goals, strategies and action items identified within the plan. As with any partnership, the keys to avoiding conflict are communication and cooperation. Public and private investment in broadband can exist side-by-side, benefitting one another and the community at-large.

INTRODUCTION AND BACKGROUND

Definition of Broadband

According to the definition in the National Broadband Plan, the term broadband refers to "high-speed Internet access that is always on and faster than the traditional dial-up access."[1] Broadband provides higher speeds of data transmission, access to high-quality internet services such as streaming media and interactive services, uninterrupted access that does not block phone lines, and less delay in transmission than dial-up access. From health care to education, public safety to commerce, broadband networks have the potential to dramatically change, enhance, and transform the way we live, work, and play.

Why Broadband is Important

Throughout history, infrastructure networks have served to connect people, places, ideas and products. The development of every great infrastructure network has facilitated American innovation, progress, and prosperity. Before the 1800s, port cities were the world's economic and educational hubs. In the 19th century, the transcontinental railroad system allowed people, goods, and ideas to branch out into new territories, creating new opportunities and encouraging entrepreneurship and prosperity. The 20th century saw the development of large-scale electric grids and the interstate highway system—innovations that, once again, allowed Americans to be more productive, mobile, and opportunistic. Similarly, communications infrastructure—telephony, radio and television—also transformed the American economy and culture. In many ways, the development of the internet at the end of the 20th century represented the culmination of these communication technologies.

As stated by Julius Genachowski, outgoing Chairman of the Federal Communications Commission, "Broadband is the indispensable infrastructure of our 21st century economy."[2] Communities and regions that develop their broadband infrastructure will have better, faster access to new ideas, innovations, and technologies. Being connected means having more and better jobs, a stronger educational system, a more efficient government, more effective public safety and health care providers, and a higher quality of life. Planning now to ensure that Polk County's future broadband infrastructure needs will be met is essential for sustainable economic development and prosperity within the county.

Why Broadband Planning is Important for Polk County

Like many areas of transitioning economy and culture, Polk County has experienced a decline in industries that previously provided ample employment. Manufacturing, construction, phosphate mining, and the citrus and cattle industries—former pillars of Polk County's economy—all employ fewer people than they used to.[3] Although this is partly the effect of the global recession that began in 2008, it is also an effect of a general shift in employment in the United States away from goods-producing industries toward service-providing industries. As employment continues to shift toward industries that require more advanced technological skills and more connectivity, an up-to-date broadband network will be essential for securing economic opportunities and preserving quality of life in the county. Additionally, industries that traditionally have not utilized broadband are becoming more dependent on it. For example, in the citrus industry, mobile devices with broadband connections are used for purposes such as logging worker hours and tracking vehicle locations.

Polk County is geographically large, approximately the same size as the State of Delaware, and consists of urban, suburban, and rural areas, 17 municipalities of varying population, and large areas of very low population density. Planning is essential for any region with such a wide variety of development patterns, in order to ensure that all populations—rural, suburban, and urban—have equitable access to infrastructure and services. In addition,

1 Federal Communications Commission. "What is Broadband?" http://www.broadband.gov/about_broadband.html
2 Federal Communications Commission. "Genachowski Remarks On Plan To Create 100,000 Jobs." http://www.fcc.gov/document/genachowski-remarks-plan-create-100000-jobs
3 Bureau of Labor Statistics. Employment data. http://www.bls.gov/data/

planning is important for any region with a large number of jurisdictions, in order to encourage cooperation and collaboration between them.

Like other counties along the I-4 Corridor, Polk County has experienced rapid population growth over the past decade. From 2000 to 2010, Polk County's population grew by 24.4 percent, compared to 23.9 percent for all the I-4 Corridor counties combined and 17.6 percent for the State of Florida[4] (see Table 2). This pattern of growth is projected to continue in Polk County, and the county is also flanked by fast-growing major metropolitan areas to the northeast (the Orlando area) and to the west (the Tampa Bay area). Polk County's population has also grown rapidly compared to other inland counties to the south, in the region known as Heartland Florida[5], where the 2000-2010 population growth was only 10.6 percent. When growth occurs as rapidly as it has in Polk County, planning—including broadband planning—is essential for preserving quality of life and opportunities for all people.

Table 2. I-4 Corridor Population Growth, 2000-2010

	2000	2010	Percent Change 2000-2010
Hillsborough County	998,948	1,229,226	23.1%
Orange County	896,344	1,145,956	27.8%
Osceola County	172,493	268,685	55.8%
Polk County	483,924	602,095	24.4%
Seminole County	365,196	422,718	15.8%
Volusia County	443,343	494,593	11.6%
Total for I-4 Corridor	3,360,248	4,163,273	23.9%
Florida	15,982,378	18,801,310	17.6%

There are numerous institutions of higher education in Polk County, granting undergraduate and graduate degrees: Florida Southern College, Polk State College, Southeastern University, the University of South Florida's Lakeland campus (scheduled to close in 2015), Warner University, Webber International University, and other private colleges. Florida Polytechnic, a newly created state university, is scheduled to open in 2013. Education is critical to quality of life, and broadband is critical to education. Broadband planning is necessary to ensure that the educational institutions in the county (not only the colleges and universities, but also K-12 schools) have access to the best bandwidth possible.

As such, the county has considerable potential to develop and sustain a vibrant economy and a world-class quality of life. However, sound infrastructure planning is necessary for the county to live up to this potential, adapt to economic changes, and keep up with the anticipated growth.

4 U.S. Census Bureau American FactFinder. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml
5 DeSoto, Glades, Hardee, Hendry, Highlands, Okeechobee Counties.

Project Background

Broadband Polk

Broadband Polk is a collaborative broadband planning effort involving Polk County citizens, business leaders, local governments, civic organizations, non-profits, educational institutions, economic development professionals, high tech experts, and key representatives from various segments of the local economy. Facilitated cooperatively by Polk Vision and the Central Florida Regional Planning Council, the Broadband Polk Advisory Committee has worked to raise awareness of the importance of robust broadband infrastructure in the 21st century economy and to develop a comprehensive broadband plan to address the current and future broadband needs of Polk County. The plan's time horizon is the year 2020.

Polk Vision

Polk Vision is an organization of Polk County citizens, led by private, public, and civic leaders, committed to addressing critical issues facing the community and developing a common purpose. Polk Vision's Guiding Principle is to cultivate a sense of community that fosters diversity, innovation, and pride in Polk County while emphasizing a sense of place and recognizing the many physical assets and unique cultures of the area.[6]

Broadband Planning Toolkit and Training Manual

The Central Florida Regional Planning Council, in partnership with the Southwest Florida Regional Planning Council and the Tampa Bay Regional Planning Council, received a grant from the State Department of Management Services (funded by the American Recovery and Reinvestment Act of 2009 via the NTIA) to develop a Local/ Regional Broadband Planning Toolkit and Training Manual. The Broadband Planning Toolkit contains all the databases, surveys, models, templates, and other tools necessary to assess broadband demand and create a comprehensive broadband plan. The Toolkit is applicable to any community or region, urban, suburban, or rural. The Broadband Planning Training Manual is intended to guide community leaders and stakeholders through the planning process, providing instruction as to the use and applicability of the Broadband Planning Toolkit.

Key Stakeholders

The following are the key stakeholders in the Broadband Polk planning effort.

- Broadband providers
- Businesses
- Colleges and universities
- Economic development organizations
- Healthcare facilities
- Libraries
- Local governments
- Public safety departments (police and fire)
- Residents of Polk County
- Schools (K-12, public and private, vocational)
- Utility companies

6 Polk Vision website. "About Polk Vision." http://polkvision.com/about-polkvision/

Broadband Polk Advisory Committee Members

The members of the Broadband Polk Advisory Committee are listed in Table 3.

Table 3. Broadband Polk Advisory Committee Members

First Name	Last Name	Organization
Wesley	Barnett	TreeTop Software
Brad	Bates	Polk County Library Cooperative
Terry	Brigman	City of Lakeland
Colleen	Burton	Polk Vision
Frank	Canovaca	City of Bartow
Rodney	Carson	Central Florida Development Council
Brian	Hartpence	Polk State College
Ken	Hunt	Polk State College
Cyndi	Jantomaso	Haines City Economic Development Council
Erwin	Jaropillo	Lake Wales Medical Center
Jim	Kragh	Florida LambdaRail
Bobby	Kuzma	Central Florida Technology Solutions, Inc.
Barry	Loomis	Polk County Board of County Commissioners
Brian	Mehaffey	Florida Polytechnic University
Rick	Montney	ProPak Software
Jeff	Nave	Lakeland Regional Medical Center
Theresa	Nelson	Polk County Sheriff's Office
Hiep	Nguyen	City of Winter Haven
Amy	Palmer	Central Florida Development Council/Auburndale
David	Petr	Winter Haven Economic Development Council
Gary	Pollard	DSM Technology Consultants
Gladys	Roberts	Polk County Library Cooperative
Sara	Roberts	Polk Vision
David	Robinson	DSM Technology Consultants
Tom	Rowles	Polk County Sheriff's Office
Mark A.	Rupert	The Rupert Group, Inc.
Kevin	Sayer	Saddle Creek Corporation
Stephen	Sowards	Inland Fiber and Data
Pat	Steed	Central Florida Regional Planning Council
Bud	Strang	6/10 Corporation
Abdu	Taguri	Polk County School Board
Bill	Ward	Polk County Sheriff's Office
David	Ware	FiberLight, LLC
Jason	Willey	City of Lakeland
Ed	Wolfe	Polk County Board of County Commissioners

The Planning Process

In general terms, comprehensive planning is an all-inclusive effort to guide the long-range future of a community, with a focus on physical development. A comprehensive plan typically consists of a study of existing conditions and a discussion of future trends, goals, and objectives, covering elements such as land use, housing, roadways and other infrastructure, population growth, economic development, and conservation.[7] In addition to having a comprehensive plan, many communities have separate plans for specific elements (for example, many cities have transportation plans). In Florida, state legislation has required all local governments to develop and adopt comprehensive plans since the 1980s.[8] The comprehensive planning process is the set of actions that are performed in order to complete the plan; this typically includes data collection, data analysis, goal setting, citizen and stakeholder participation, writing the final plan, and evaluating the effort in retrospect.

The Polk County Broadband Plan was developed following a Broadband Demand Planning Process that was established as part of the Local/Regional Broadband Planning Toolkit and Training Manual. The process has four major steps: Identification of community champions, data collection, needs analysis, and plan creation. The steps are described in detail in this section.

1. Identify Community Champion(s)
    a. Utilize an existing community organization, **or**
    b. Form a broadband committee, **or**
    c. Both

A community or regional broadband planning effort will require the dedication of an organization or group of individuals who are committed to the effort of planning for their region's future broadband needs. These people will be the "champions" of the effort. An existing community organization may be utilized or a committee of broadband experts and influential community leaders may be formed. In some cases it may be appropriate to utilize both a community organization and a broadband committee. The goal is to bring together a diverse group of individuals from the public and private sectors who care about broadband planning and have sufficient time and expertise to commit to the project.

2. Data Collection
    a. Community profile
    b. Assets analysis
    c. Broadband utilization/penetration
        i. Surveys
        ii. Discussion Guides
        iii. Interviews
        iv. Federal Communication Commission broadband data
    d. Projections
        i. Population
        ii. Employment

7 John B. Conglose. Ohio State University Comprehensive Planning Fact Sheet. http://ohioline.osu.edu/cd-fact/1269.html

8 Roy R. Carriker. "Comprehensive Planning for Growth Management in Florida." Food and Resource Economics Department EDIS document FE642. http://ufdc.ufl.edu/IR00001351/00001

The data collection step involves acquiring the data necessary for broadband planning. This includes not only broadband coverage data, but also a community profile containing background data regarding the demographic, economic, and social characteristics of the region. Such data are generally available from federal sources such as the U.S. Census Bureau and from state sources such as the Department of Economic Opportunity. GIS data are available from the Florida Geographic Data Library (www.fgdl.org), and from local jurisdictions, various state agencies, and federal sources.

Table 4 outlines the basic data necessary for broadband demand planning, where to find it, and how it will be utilized.

3. Needs Analysis
    a. Gap identification
        i. Current gaps
        ii. Future gaps

The Needs Analysis identifies gaps between broadband supply and demand—in other words, areas within a community or region where the current broadband availability does not meet current needs, or is anticipated not to meet future needs. The information collected in the Needs Analysis should be analyzed to determine where broadband infrastructure will be required within the planning period (10 years is suggested). Geographic areas of need can be identified using the following parameters:

- Projected population growth
- Projected employment growth
- Future land use (land-use-based broadband demand model)
- Known locations with current or predicted future broadband deficiencies
- Broadband adoption (use) data

Table 4. Data for Broadband Planning

Data	Source	Data Utilization
• Socioeconomic data (age, race, income, education, employment)	• U.S. Census Bureau • Bureau of Labor Statistics • Bureau of Economic and Business Research	Data will be used to gain an understanding of the general socioeconomic characteristics of the region in order to provide background for the broadband planning project.
• Business and population growth projections	• Local/regional planning agencies/departments • Bureau of Economic and Business Research	Projected future business and population growth will be a factor in estimating future broadband needs.
• Future Land Use	• Local governments • Regional Planning Councils	Used to project future broadband needs; can be included in a land-use-based broadband demand model.
• Community Anchor Institutions, employment clusters, and target industries	• Local/regional planning agencies/departments • Economic development organizations • Regional Planning Councils	Community Anchor Institutions, employment clusters, and target industries are the region's main large-scale current and future broadband users. Identifying them will be helpful for the assessment of current and future broadband needs.
• Broadband assets inventory (wireline, wireless, vertical assets, providers, public-owned spectrums, policies and regulations, funding opportunities)	• Broadband Florida • National Broadband Map project • Local broadband providers • Local government entities (school boards, etc.)	The region's existing broadband assets form the core network on which to build future broadband infrastructure. Reviewing these assets is an important step in defining broadband planning resources and strategies.
• Broadband utilization/ penetration data (residential and non-residential) (speeds, applications, cost) • Future broadband needs (residential and non-residential)	• Surveys • Focused discussions/ interviews • Public workshops • Economic development groups • Federal Communication Commission	Current utilization and penetration data and projections of future utilization will be used to identify appropriate strategies for the planning project.

Additionally, analysis should be conducted to identify need within employment sectors, industries and people groups. For example, data may indicate that the health care industry is projected to grow within a given planning area. As a heavy user of broadband infrastructure, this sector must be accommodated in the broadband plan. As another example, it may be noted from surveys that people with household incomes below the poverty level typically do not utilize broadband in the home. Therefore, the plan may outline some strategies to increase broadband usage within that demographic.

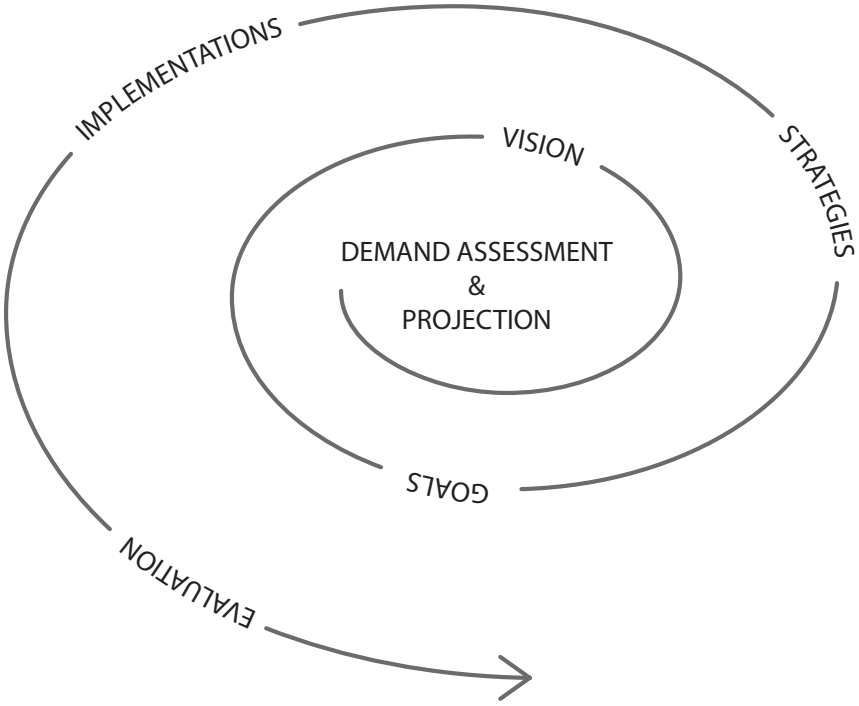


Figure 5. Planning Process Design

4. Plan Creation
   a. Vision
   b. Goals
   c. Strategies
   d. Implementation
   e. Evaluation

The basic framework of the strategic broadband plan is similar to that of plans for other types of infrastructure. The vision is the framework for the community/region and its development and utilization of broadband. Goals are developed to guide the community/region in the direction of its vision. Strategies are specific methods to achieve the identified goals. Implementation means putting the strategies into effect (the action phase of the plan). Evaluation is concerned with looking back at what strategies were effective and what strategies were not. The Evaluation is used to identify failed efforts and eliminate or modify them to make the plan more effective over time.

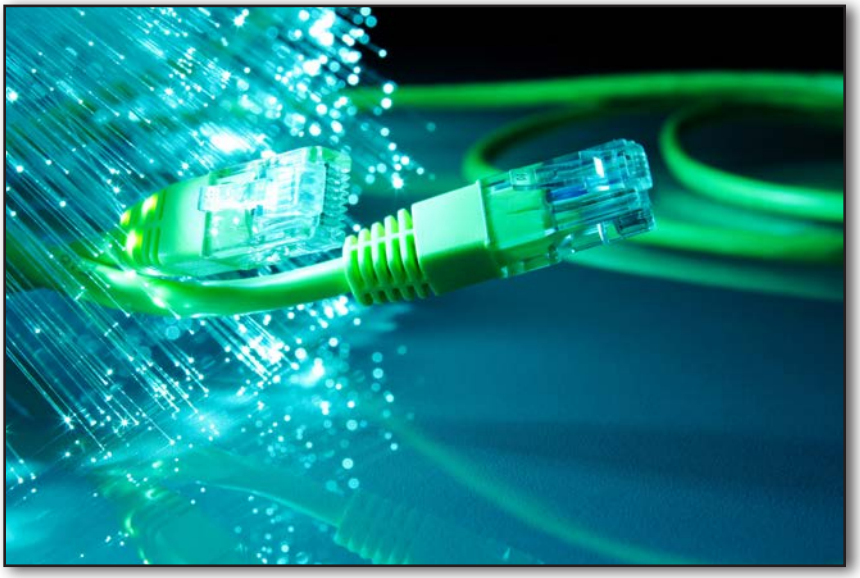
Public-Private Partnerships

Public-private partnerships are indispensable to the future of broadband in Polk County. In most communities and regions, government (federal, state, or local) is generally responsible for overseeing and regulating infrastructure, while broadband service is mostly provided by private companies in competition with one another. It is vital for government and the private sector to cooperate and collaborate with each other in order for new and improved broadband infrastructure to be put in place.

Public-private partnerships have already done many good things for broadband in the Central Florida region. For example, the City of Bartow currently provides internet service to a limited number of downtown businesses via the city-owned fiber network. Beginning in 2011, a partnership between the government of Hardee County and the private company Rapid Systems made wireless broadband available to residents and businesses throughout the entire county, with the most basic plan (3 mbps download speed) available at $19.95 per month.[9] Another example, further afield, is the City of Leesburg, which has been providing secure fiber optic capabilities to connect all regional medical facilities since 1992. [10]

Avoiding Conflict between Public - and Private -Sector Providers

Municipal broadband networks have the potential to provide high-quality, affordable broadband service to homes, businesses, and Anchor Institutions. Municipal broadband has been endorsed by the FCC as a "best practice."[11] However, Florida's regulations of municipal broadband are highly restrictive.[12] A number of municipalities in Florida currently provide broadband service, and rather than "crowding out" private investment, the reality has shown that where municipalities invest in broadband, there are more private providers of broadband services.[13] Municipalities frequently sell services to private communications firms, resulting in a symbiotic environment that benefits both consumers and the private sector. In addition, municipal broadband networks generally do not rely on tax exemptions or subsidies to any greater extent than private providers, and their tax burden is similar to that of private telecom firms.[14] Generally speaking, broadband deployment by any entity—public or private—should be encouraged in order to spur economic development, expand educational opportunities, and provide all the other benefits that come with broadband access.



The keys to avoiding conflict between commercial and public-sector providers are communication and cooperation. When properly coordinated, public and private broadband investment can exist side-by-side, benefiting one another and the community at large.

9 Rapid Systems. "Hardee County Frequently Asked Questions." http://rapidsys.com/hardee/faq.html

10 Florida Municipal Electric Association. "The Case for Municipal Broadband in Florida," p. 6. http://www.muninetworks.org/sites/www.muninetworks.org/files/2005%20-%20fmea_white_paper.pdf

11 Federal Communications Commission. "Deployment of Advanced Telecommunications Capability: Second Report." http://transition.fcc.gov/Bureaus/Common_Carrier/Orders/2000/fcc00290.pdf

12 Fiber To The Home Council. "FTTH Community Toolkit." http://www.ftthcouncil.org/p/cm/ld/fid=106#reg

13 "The Case for Municipal Broadband in Florida," p. 4.

14 Ibid.

VISION AND GOALS

At the start of the planning process, it is important to establish a vision that describes what the plan is intended to accomplish, and goals that state specific things to be achieved. Typically, the vision should be broad and qualitative, while the goals should be specific and quantitatively measurable. This section contains the vision and goals of the Polk County Broadband Plan.

The vision and goals for the Plan were developed with input from Polk Vision and its Infrastructure Task Force, the Broadband Polk Advisory Committee, and Polk County citizens and businesses. The vision and goals were refined during the course of two Advisory Committee meetings, with Committee members providing their suggestions to staff between meetings. Further input from the Committee and from the public was collected via a worksheet that allowed the 6 working goals to be prioritized.

Strategies to guide the implementation of the goals, and specific action items to be undertaken by those who will implement the plan, are described in the "Conclusion and Recommendations" section.

Vision

Broadband Polk's vision is to facilitate increased opportunity, innovation, and efficiency by ensuring that every individual, corporation, non-profit, visitor, government entity, and community partner in Polk County has access to affordable high-speed internet service.

Goals

Broadband Polk has six established goals for the year 2020, listed below in order of priority.

1. Anchor Institutions such as schools, hospitals, libraries, and government buildings will have affordable access to a minimum of 1 gigabit per second broadband services.
    - This goal is intended to emphasize the importance of Anchor Institutions in our communities and the enhanced services that they can provide to communities given the best broadband service possible. From improved internet access at libraries to streamlined medical care and more efficient government services, better broadband can transform the way Anchor Institutions serve communities. The full NTIA definition of Community Anchor Institutions is "schools, libraries, medical and healthcare providers, public safety, community colleges and other institutions of higher education, and any other community support organizations and entities that facilitate greater use of broadband services."

2. Every resident of Polk County will have access to affordable high-speed internet services and the skills to utilize it, if they choose.
   - This goal emphasizes the combination of access and skills. Currently, not all areas of Polk County have high-quality, affordable internet services. At the same time, not all residents of the county have access to high-quality, affordable computer training. In order to maximize the potential positive impact of broadband for the county's residents, training opportunities should be made available for those residents who wish to acquire the skills necessary to utilize broadband. At the same time, competition among providers should be increased and alternatives offered so that all residents who wish to include broadband in their household budgets can do so.
3. Anchor Institutions (including energy providers) will maximize utilization of broadband services and technologies in order to increase efficiency, maximize resources, and provide the best services possible to the businesses and residents of Polk County.
   - This goal places emphasis upon the necessity for Anchor Institutions to make the best use possible of broadband. Even the fastest broadband connections in the world are useful only when those who are connected utilize them effectively. If Community Anchor Institutions increase their efficiency and optimize their use of resources, they will be able to provide better services to the community, using technology to improve many aspects of life.
4. Every business and non-profit in Polk County will have access to affordable high-speed internet services and the skills to utilize it, if they choose.
   - This goal goes hand in hand with Goal #2. In terms of broadband, what will be beneficial for residents will also be beneficial for businesses; and at the same time, high-quality training is needed in order for workers to develop the new skillsets that enable them to maximize use of broadband technology.
5. Polk County will have the fastest, most affordable, and most accessible mobile networks possible.
   - This goal relates to the mobile sector of broadband. Mobile broadband connections are important in many sectors, from agriculture, where machinery and personnel are often managed through mobile broadband connections, to the office environment, where workers often use mobile broadband to stay connected during meetings. A state-of-the-art mobile network will allow people in the county to stay connected in any place, at any time.
6. 205,000 households (79% of households) in Polk County will have affordable access to actual download speeds of at least 100 megabits per second and actual upload speeds of at least 50 megabits per second.
   - This goal mirrors the national long-term goal set forth in the National Broadband Plan: "At least 100 million U.S. homes should have affordable access to actual download speeds of at least 100 megabits per second and actual upload speeds of at least 50 megabits per second."[15] The goal was adjusted proportionally for Polk County based on the total number of households projected for the year 2020.

Goal prioritization and strategy development are the result of a collective effort by the Broadband Polk Advisory Committee, Central Florida Regional Planning Council staff, and the public. Participants provided input via a worksheet on which goals could be prioritized and strategies submitted. The goal prioritization input from the forms is summarized in Table 5 and the worksheet is shown in Appendix A.

15 Federal Communications Commission. National Broadband Plan Executive Summary. http://www.broadband.gov/plan/executive-summary/

Table 5. Prioritization from Forms Submitted

	Anchor Institutions (including energy providers) will maximize utilization of broadband services and technologies in order to increase efficiency, maximize resources, and provide the best services possible to the businesses and residents of Polk County.	Anchor Institutions such as schools, hospitals, libraries, and government buildings will have affordable access to a minimum of 1 gigabit per second broadband services.	Polk County will have the fastest, most affordable, and most accessible mobile networks possible.	205,000 households (79% of households) in Polk County will have affordable access to actual download speeds of at least 100 megabits per second and actual upload speeds of at least 50 megabits per second.	Every resident of Polk County will have access to affordable high-speed internet services and the skills to utilize it, if they choose.	Every business and non-profit in Polk County will have access to affordable high-speed internet services and the skills to utilize it, if they choose.
Form 1	1	2	5	6	4	3
Form 2	4	2	1	5	3	6
Form 3	2	1	4	5	6	3
Form 4	5	4	1	6	3	2
Form 5	2	1	5	6	3	4
Form 6	3	6	5	4	2	1
Form 7	3	2	6	1	3	4
Form 8	4	2	3	1	5	6
Form 9	1	2	6	4	3	5
Form 10	2	1	6	5	3	4
Form 11	4	3	5	6	2	1
Form 12	3	1	6	5	2	4
Form 13	6	5	4	3	1	2
Form 14	2	1	3	6	4	5
Form 15	6	3	4	5	1	2
Sum	48	36	64	68	45	52
Lowest number indicates highest priority.						

EXISTING CONDITIONS

Polk County is located in the central inland region of the Florida peninsula. It is a large county geographically (with a land area of 1,798 square miles, the 4th largest county in Florida) and in terms of population (the 9th most populous county in Florida as of the 2010 Census).[16] It is approximately midway between the Orlando and Tampa metropolitan areas.

Polk County contains areas that are urban, suburban, and rural in nature. The largest city is Lakeland (population 98,589 as of the 2011 Census estimate). 77 percent of the population resides within the Census-designated Lakeland and Winter Haven Urbanized Areas, which include several smaller communities in addition to their principal cities. Some other communities, such as Fort Meade and Frostproof, are more rural in nature and are not part of any urbanized area.

A large portion of southwestern Polk County has been mined for phosphate, an important industry for central Florida. Citrus groves and cattle ranches are predominant land uses in the remainder of the county's rural areas. The Lake Wales Ridge, a geologically and ecologically unique area of higher elevation with numerous lakes, runs roughly north-south through the county. Interstate 4 (which connects Tampa and Orlando) passes through the northern part of the county. Much of the area north of I-4 is part of the Green Swamp, which is designated as a Critical Area of State Concern. It is an ecologically sensitive area upon which much of central Florida's water supply depends.[17]

Socioeconomic Conditions

Demographics

According to 2011 Census Bureau estimates, Polk County's population is 609,492. Like much of Florida, Polk County has experienced considerable population growth in the last few decades. Population growth has been consistently higher than the national growth rate, and from 2000 to 2010, the county's population grew at a higher rate than that of Florida as a whole (see Figure 6).

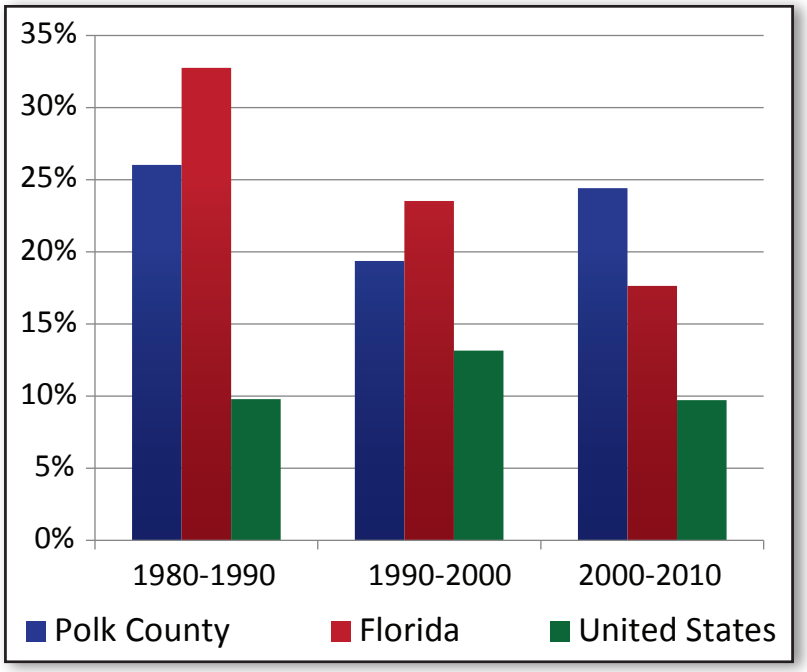


Figure 6. Population Growth Rates, 1980-2010

Data source: U.S. Census Bureau

16 United States Census Bureau, "State & County QuickFacts" (http://quickfacts.census.gov/qfd/index.html).

17 Southwest Florida Water Management District. "Green Swamp" (http://www.swfwmd.state.fl.us/education/interactive/greenswamp/greenswamp.html).

There are 17 municipalities in Polk County. The municipalities and their populations as of the 2010 Census are listed in Table 6. Their locations are shown in Figure 7.

Table 6. Populations of Municipalities in Polk County, 2010
Data source: U.S. Census Bureau

Municipality	2000 Population	2010 Population	Percent Change, 2000-2010
Auburndale	11,032	13,507	22.4%
Bartow	15,340	17,298	12.8%
Davenport	1,924	2,888	50.1%
Dundee	2,912	3,717	27.6%
Eagle Lake	2,496	2,255	-9.7%
Fort Meade	5,691	5,626	-1.1%
Frostproof	2,975	2,992	0.6%
Haines City	13,174	20,535	55.9%
Highland Park	244	230	-5.7%
Hillcrest Heights	266	254	-4.5%
Lake Alfred	3,890	5,015	28.9%
Lake Hamilton	1,304	1,231	-5.6%
Lake Wales	10,194	14,225	39.5%
Lakeland	78,452	97,422	24.2%
Mulberry	3,230	3,817	18.2%
Polk City	1,516	1,562	3.0%
Winter Haven	26,487	33,874	27.9%
Unincorporated	302,797	375,647	24.1%

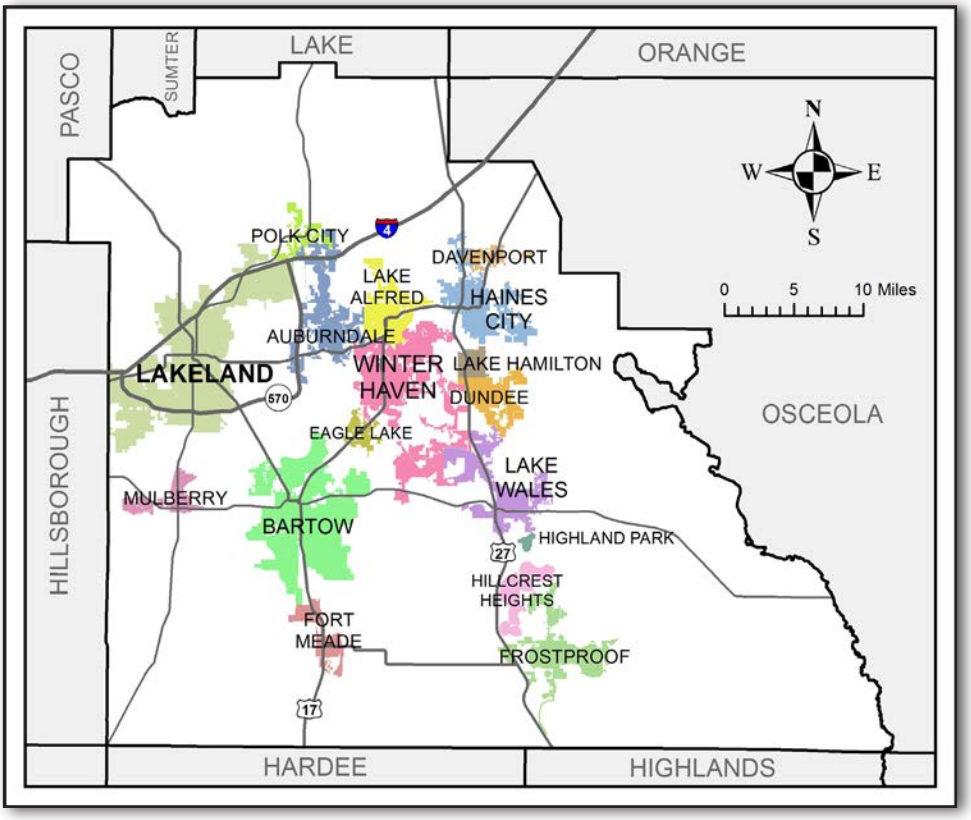


Figure 7. Municipalities in Polk County

Data source: Central Florida Regional Planning Council GIS database

As of 2011, the county's population was 80.4 percent White; 15.3 percent Black; 1.8 percent Asian; 0.6 percent American Indian and Alaska Native; 0.1 percent Native Hawaiian and Other Pacific Islander; and 1.8 percent reporting two or more races. Hispanic or Latino of any race were 18.1 percent of the population (see Table 7).

Table 7. Race and Ethnicity, 2011

Data source: U.S. Census Bureau

	Polk County	Florida	United States
American Indian and Alaska Native	0.6%	0.5%	1.2%
Asian	1.8%	2.6%	5.0%
Black	15.3%	16.5%	13.1%
Native Hawaiian and Other Pacific Islander	0.1%	0.1%	0.2%
Persons reporting two or more races	1.8%	1.8%	2.3%
White	80.4%	78.5%	78.1%
Hispanic or Latino of any race	18.1%	22.9%	16.7%

As of the 2010 Census, 18.0 percent of Polk County's population was over age 65 and 26.3 percent was under age 20. Measured in these categories, Polk County has a proportionally larger senior population when compared to Florida and the United States, and a proportionally larger youth population than Florida (see Figure 8).

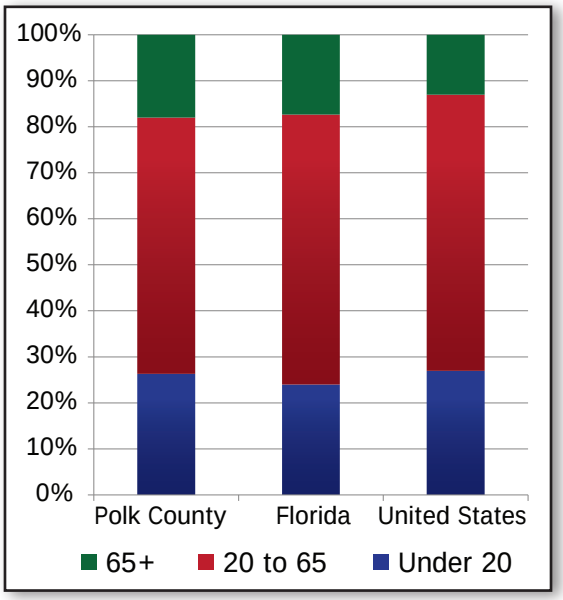


Figure 8. Age Groups, 2010

Data source: U.S. Census Bureau

According to the Census Bureau's 2011 five-year American Community Survey estimates, 17.9 percent of Polk County's population age 25 and older lacks a high school diploma, and 18.0 percent have a bachelor's degree or higher degree (see Figure 9). Compared to the United States and Florida, Polk County has a larger proportion of adults lacking a high school diploma and a smaller proportion holding a tertiary degree.

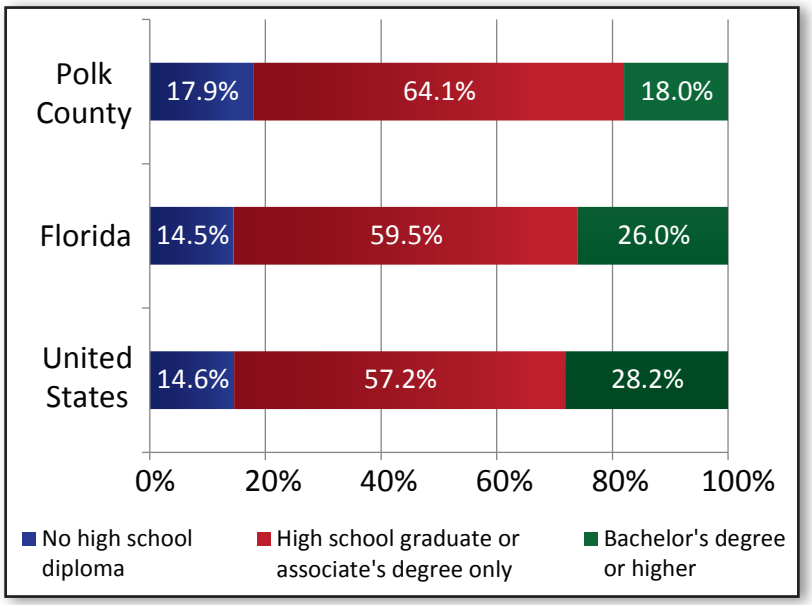


Figure 9. Educational Attainment for Persons Aged 25 and Older, 2011

Data source: U.S. Census Bureau

According to the Bureau of Labor Statistics, the annual unemployment rate in Polk County in 2011 was 11.6 percent, up from 3.6 percent in 2006 (see Figure 10). Since 2008, Polk County has had higher unemployment than Florida or the United States.

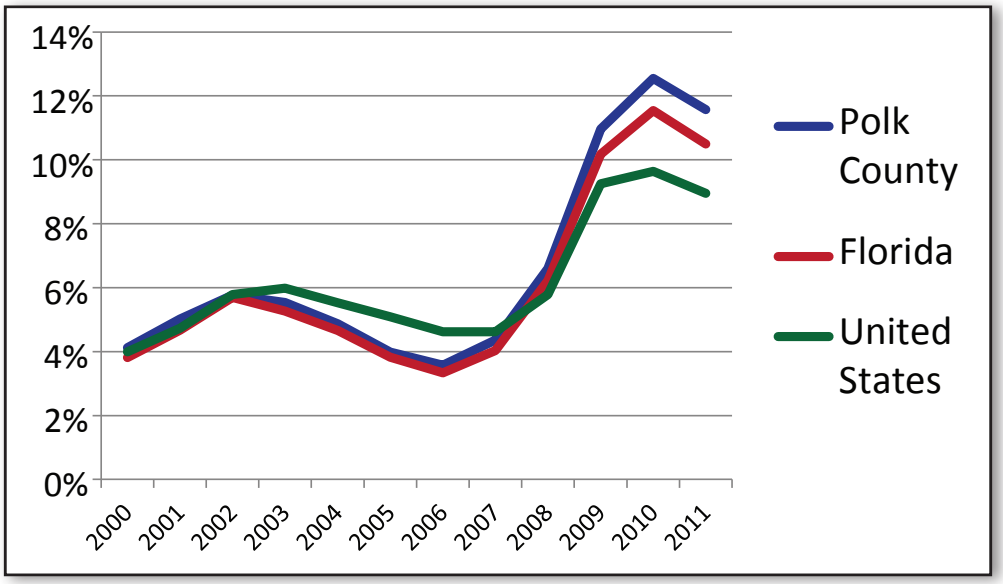


Figure 10. Annual Unemployment Rates, Not Seasonally Adjusted, 2000-2011

Data source: Bureau of Labor Statistics

According to 2011 Census estimates, the median household income in Polk County was $42,365 (see Figure 11).

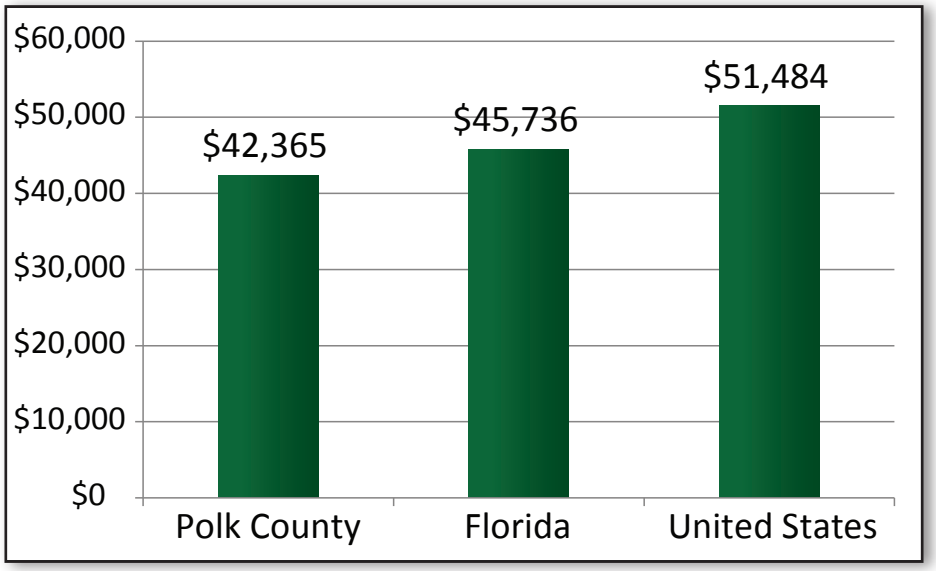


Figure 11. Median Household Income, 2011

Data source: U.S. Census Bureau

18 percent of the population and 28.9 percent of those under 18 were living in poverty, according to the same estimates. Polk County has higher poverty rates than Florida or the United States (see Figure 12).

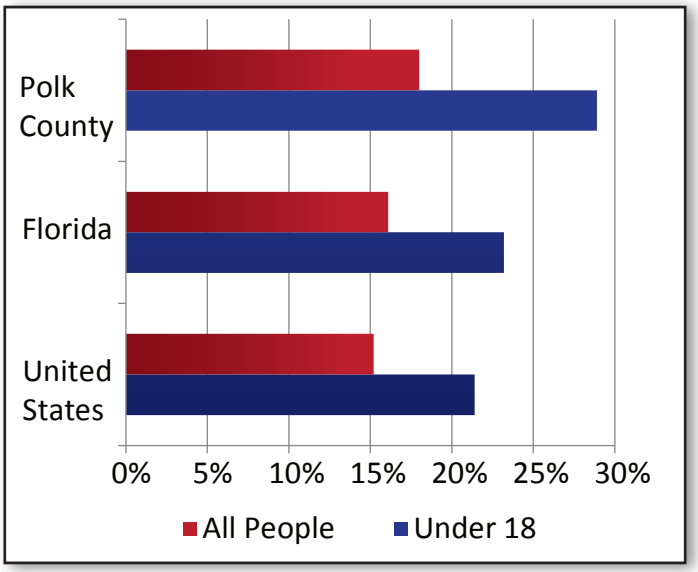


Figure 12. Percent of the Population Living Below the Poverty Threshold, 2011

Data source: U.S. Census Bureau

Population Density and Projected Growth

Figure 13 shows the population per square mile by census block in Polk County. The areas of higher population density correspond roughly to the areas that are incorporated into municipalities. In addition, there are several areas of higher population density in the northeast area of the county, closer to the Orlando metropolitan area.

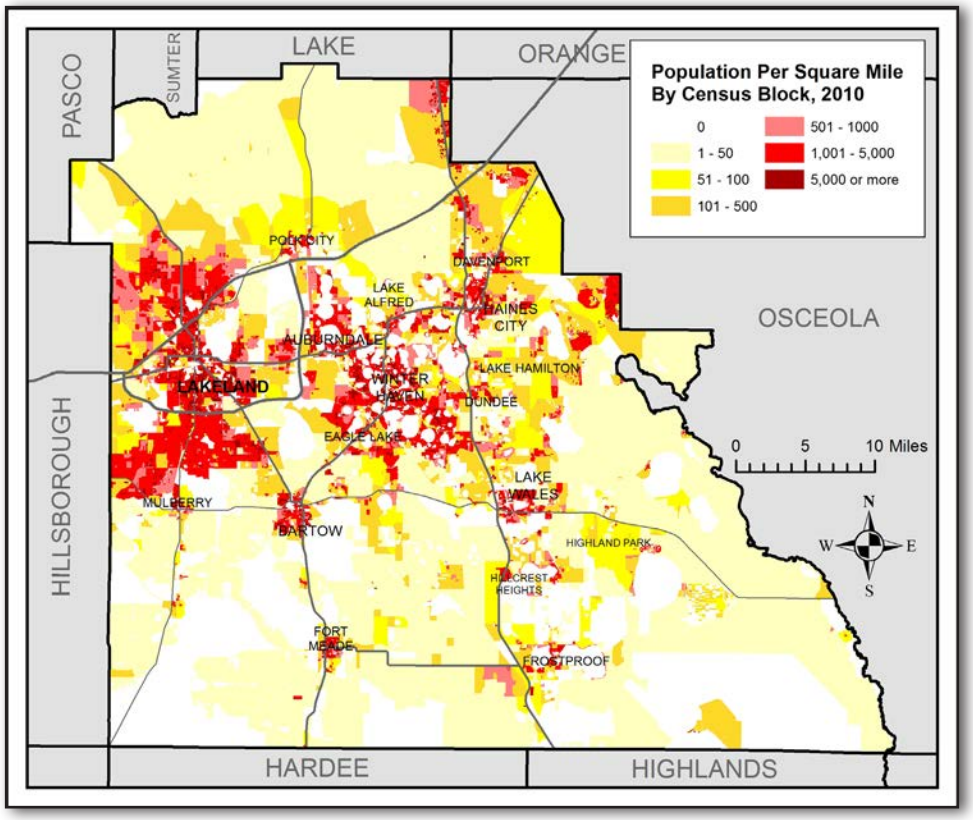


Figure 13. Population Density, 2010

Data Source: U.S. Census Bureau

Population projections are provided by the Florida Bureau of Economic and Business Research (BEBR). Given the medium level of projected growth, Polk County is expected to gain over 300,000 new residents between 2010 and 2040 (see Figure 14).

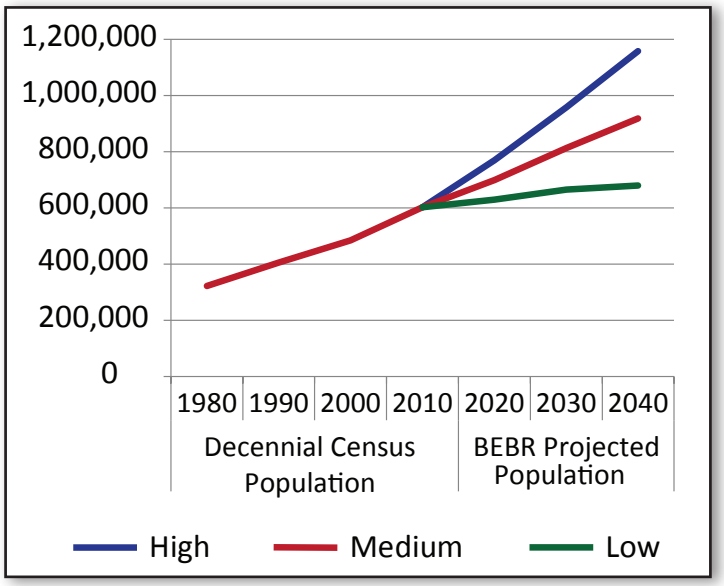


Figure 14. Polk County's Actual and Projected Population, 1980-2040

Data source: Bureau of Economic and Business Research

The Polk County Transportation Planning Organization (TPO) projects future population and employment levels at the Traffic Analysis Zone (TAZ) level. TAZs are defined by the Census Bureau.[18] Figure 15 shows the projected percent change in population per square mile for each TAZ in Polk County from 2010 to 2020.

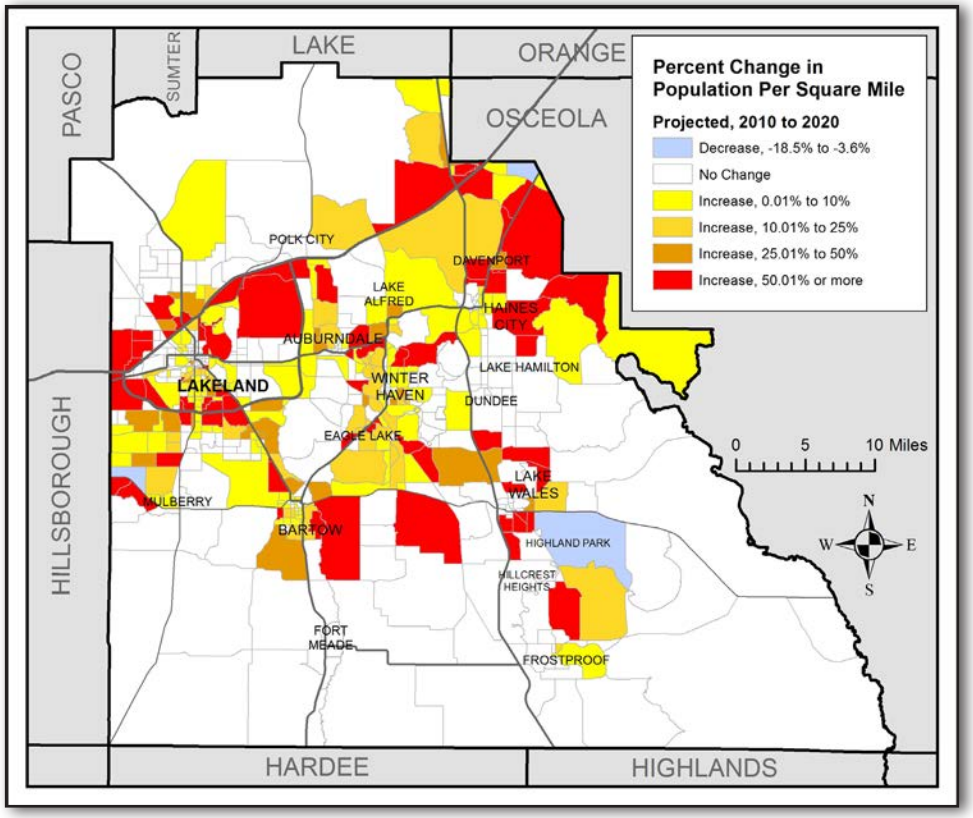


Figure 15. Projected Percent Change in Population Per Square Mile, 2010-2020

Data source: Polk Transportation Planning Organization

18 U.S. Census Bureau website. "Traffic Analysis Zones." http://www.census.gov/geo/www/cob/tz_metadata.html (retrieved Jan. 10, 2012).

Employment Growth and Industry Clusters

The Florida Department of Economic Opportunity projects that in 2019, there will be 244,900 persons employed in Polk County, a 13.2 percent increase from 2011.[19] Table 8 lists the 20 occupation categories (out of 414 total) with the greatest projected absolute growth (that is, the occupations that are expected to add the greatest total number of jobs in Polk County). Table 9 lists the 20 occupation categories with the greatest projected relative growth (that is, the occupations with the highest projected percentage growth in the number of jobs).

Table 8. Occupations with the Greatest Projected Absolute Growth
Data source: Florida Department of Economic Opportunity

Category	2011 Employment (Actual)	2019 Employment (Projected)	Absolute Growth, 2011-2019
Truck Drivers, Heavy and Tractor-Trailer	5,068	6,119	1,051
Retail Salespersons	6,140	7,155	1,015
Food Preparation & Serving Workers, Including Fast Food	6,298	7,206	908
Registered Nurses	3,861	4,747	886
Customer Service Representatives	3,913	4,698	785
Bookkeeping, Accounting, and Auditing Clerks	3,866	4,569	703
Nursing Aides, Orderlies, and Attendants	3,325	3,990	665
Amusement and Recreation Attendants	529	1,188	659
Sales Representatives, Services, All Other	3,116	3,744	628
Office Clerks, General	4,097	4,692	595
Stock Clerks and Order Fillers	5,032	5,627	595
Accountants and Auditors	2,060	2,584	524
Licensed Practical and Licensed Vocational Nurses	2,271	2,793	522
Secretaries, Except Legal, Medical, and Executive	4,500	4,995	495
Construction Laborers	1,868	2,309	441
Waiters and Waitresses	3,436	3,862	426
Cashiers	5,727	6,145	418
Landscaping and Groundskeeping Workers	2,907	3,308	401
Elementary School Teachers, Except Special Education	2,448	2,848	400
Home Health Aides	779	1,145	366

19 Florida Department of Economic Opportunity. "Employment Projections." http://www.floridajobs.org/labor-market-information/data-center/statistical-programs/employment-projections

Table 9. Occupations with the Greatest Projected Relative Growth
Data source: Florida Department of Economic Opportunity

Category	2011 Employment (Actual)	2019 Employment (Projected)	Relative Growth, 2011-2019
Amusement and Recreation Attendants	529	1,188	124.6%
Veterinary Technologists and Technicians	232	353	52.2%
Veterinarians	89	132	48.3%
Home Health Aides	779	1,145	47.0%
Loan Counselors	14	20	42.9%
Veterinary Assistants and Laboratory Animal Caretakers	74	105	41.9%
Computer-Controlled Machine Tool Operators, M & P	37	52	40.5%
Physician Assistants	102	143	40.2%
Personal Financial Advisors	155	215	38.7%
Medical Records and Health Information Technicians	392	530	35.2%
Refuse and Recyclable Material Collectors	119	160	34.5%
Network Systems and Data Communications Analysts	298	395	32.6%
Physical Therapists	320	423	32.2%
Computer Software Engineers, Applications	165	217	31.5%
Physical Therapist Assistants	58	76	31.0%
Medical Equipment Repairers	52	68	30.8%
Medical Assistants	844	1,103	30.7%
Mental Health and Substance Abuse Social Workers	129	167	29.5%
Extruding, Forming, and Pressing Machine Operators	75	97	29.3%
Heating, A.C., and Refrigeration Mechanics and Installers	946	1,217	28.6%

Table 10 lists the 10 industry categories (out of 74 total) with the greatest projected absolute growth, and Table 11 lists the 10 industries with the greatest projected relative growth.

Table 10. Industries with the Greatest Projected Absolute Growth
Data source: Florida Department of Economic Opportunity

Industry	2011 Employment	2019 Employment	Absolute Growth, 2011-2019
Administrative and Support Services	18,212	21,366	3,154
Ambulatory Healthcare Services	9,931	12,950	3,019
Local Government	23,953	26,596	2,643
Specialty Trade Contractors	6,106	7,877	1,771
Self-Employed and Unpaid Family Workers	15,166	16,585	1,419
Food Services and Drinking Places	12,697	14,050	1,353
Nursing and Residential Care Facilities	5,084	6,222	1,138
General Merchandise Stores	6,045	7,000	955
Amusement, Gambling, and Recreation Industries	1,913	2,834	921
Merchant Wholesalers, Durable Goods	4,348	5,202	854

Table 11. Industries with the Greatest Projected Relative Growth
Data source: Florida Department of Economic Opportunity

Industry	2011 Employment	2019 Employment	Relative Growth, 2011-2019
Amusement, Gambling, and Recreation Industries	1,913	2,834	48.1%
Lessors of Nonfinancial Intangible Assets	16	22	37.5%
Waste Management and Remediation Service	681	901	32.3%
Broadcasting (except Internet)	59	77	30.5%
Ambulatory Healthcare Services	9,931	12,950	30.4%
Specialty Trade Contractors	6,106	7,877	29.0%
Paper Manufacturing	623	779	25.0%
Furniture and Home Furnishings Stores	1,462	1,818	24.4%
Publishing Industries	485	600	23.7%
Nonmetallic Mineral Product Manufacturing	507	625	23.3%

These industries overlap, to some degree, with the seven "target industry clusters" identified in the Central Florida Development Council's 2008 "Industry Cluster Analysis of Polk County"[20] as being the most likely to spur economic development in the county. Industry clusters are groups of industries that are interrelated within the economy of a specific region. Clusters are typically determined through a specific analysis of the regional economy. The target industry clusters are as follows:

- Life Sciences and Medical Services
- Business Services
- Financial Services
- Logistics and Supply Chain Management
- Construction and Real Estate
- Research and Engineering Services
- Agriculture and Agribusiness

In addition, these industries overlap to some degree with the target clusters identified for the 5-county Central Florida region in the Central Florida Regional Planning Council's 2012 Comprehensive Economic Development Strategy. The clusters, identified for the 5-county region of DeSoto, Hardee, Highlands, Okeechobee, and Polk Counties, are as follows:[21]

- Agriculture
- Life Sciences an Healthcare
- Logistics
- Manufacturing
- Renewable Energy
- Research and Development
- Tourism and Ecotourism

The future broadband needs of selected target industries are discussed in detail below. Maximizing the use of broadband across these target industries in Polk County will expand economic opportunities, encourage innovation, and improve efficiency by allowing for optimal connectivity between all sectors of business and making the best use possible of the newest technology available.

Life Sciences, Medical Services, and Healthcare

This field, especially medical services, is a growing industry in the Central Florida region. Broadband applications for medical services include telemedicine and data management. Telemedicine allows some medical services to be provided at a distance. Patient assessment and other forms of clinical healthcare can be provided remotely, allowing multiple physicians to diagnose, collaborate, and determine treatment in a shorter amount of time. Telemedicine requires the sharing of data and images, as well as real-time interactive communication. Broadband is necessary for this, and the use of telemedicine is expected to increase.

20 Central Florida Development Council (2008). "Industry Cluster Analysis of Polk County." http://cfdc.org/wp-content/uploads/2009/03/industry-cluster-analysis-of-polk-county-11708.pdf (retrieved Jan. 11, 2012).

21 Central Florida Regional Planning Council. "Comprehensive Economic Development Strategy 2012: Economic Development District VII." http://www.cfrpc.org/CEDS-2012.pdf

Business Services

Business services that utilize broadband include data management, communication, and many information technology applications. For example, broadband can be used to conduct remote videoconferencing and data sharing between separate branches of a business. Remote computer access is also crucial for IT support applications.

Financial Services

Some applications of broadband in financial services include electronic fund transfers, communication between financial institutions, and online banking. When funds are being transferred, instant or near-instant communication between financial institutions is desirable in order to avoid errors. Online banking also has positive implications for the residents of any given region, allowing them to better manage their finances.

Logistics and Supply Chain Management

Broadband is used in logistics and supply chain management to communicate between transportation hubs and vehicles, coordinate the movement of goods, and keep track of inventories. Broadband connectivity can greatly increase efficiency in these industries. For example, the movement of freight through an intermodal transportation facility can be made more efficient when data are available regarding what shipments are in which location.

Construction and Real Estate

Applications of broadband for construction and real estate include the sharing of construction plans, project coordination and scheduling, budget management, and general communication. In addition, broadband is important for marketing purposes in the real estate industry, and may be necessary for electronic permitting processes in some areas.

Research, Development, and Engineering Services

Broadband access is important for research because it provides instant access to needed information. For example, given a high bandwidth, universities where research is conducted can share library resources and research databases instantly, either between branches of a single university or between multiple universities. The same is true for engineering services.

Agriculture and Agribusiness

Broadband has become very important for agriculture in recent years. When food production takes place on a large scale, broadband connectivity allows for better coordination in the field; for example, agricultural machines can communicate with each other to track which areas have been planted. The same is true for the application of fertilizer and pesticides, and for harvesting. Broadband access also allows the products of agriculture to be tracked in the supply chain. Inventories and shipments of produce and/or livestock can be tracked and coordinated, helping to avoid post-harvest loss and other inefficiencies.

Employment Centers

In addition to projecting population, the Polk TPO projects employment at the Traffic Analysis Zone level. Figure 16 shows employment per square mile as of 2010. The areas in the county with the greatest concentration of employment are Lakeland and Winter Haven. There are additional areas of high employment density in Bartow and Mulberry; in the communities along US Route 27 from Davenport south to Lake Wales; and in the far northeast area of the county around the intersection of US Route 27 and Interstate 4.

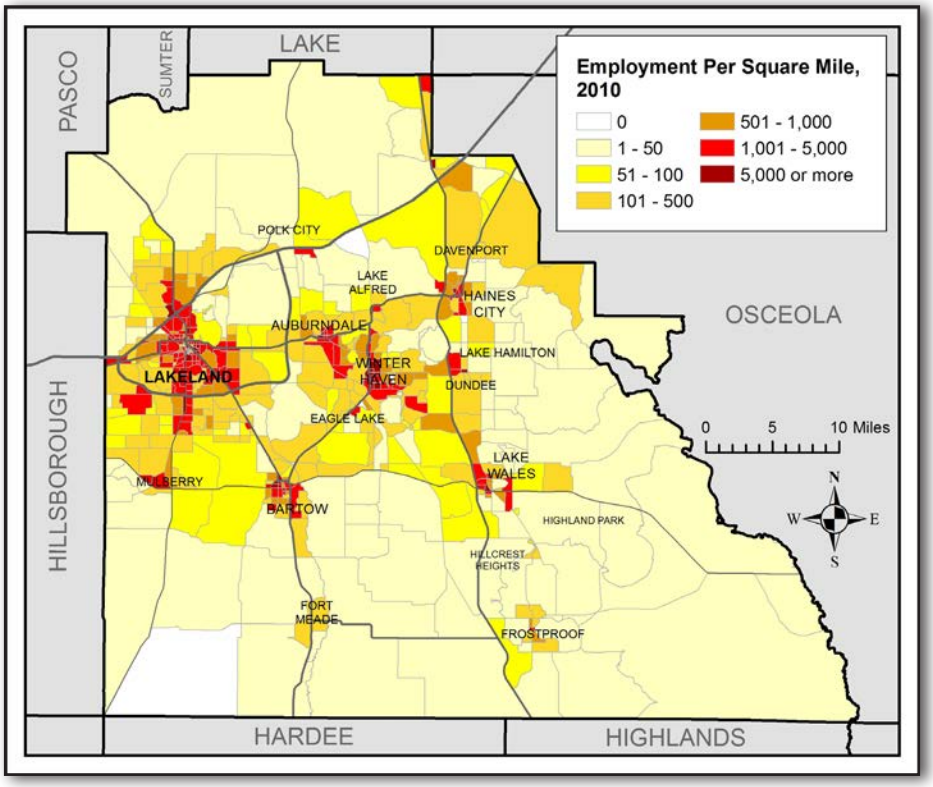


Figure 16. Employment Per Square Mile, 2010

Data source: Polk Transportation Planning Organization

By 2020, employment density is expected to grow particularly along State Route 60 between Bartow and Lake Wales, at the intersection of Interstate 4 and the Polk Parkway with the construction of the Florida Polytechnic campus, and in the northeast corner of the county (see Figure 17).

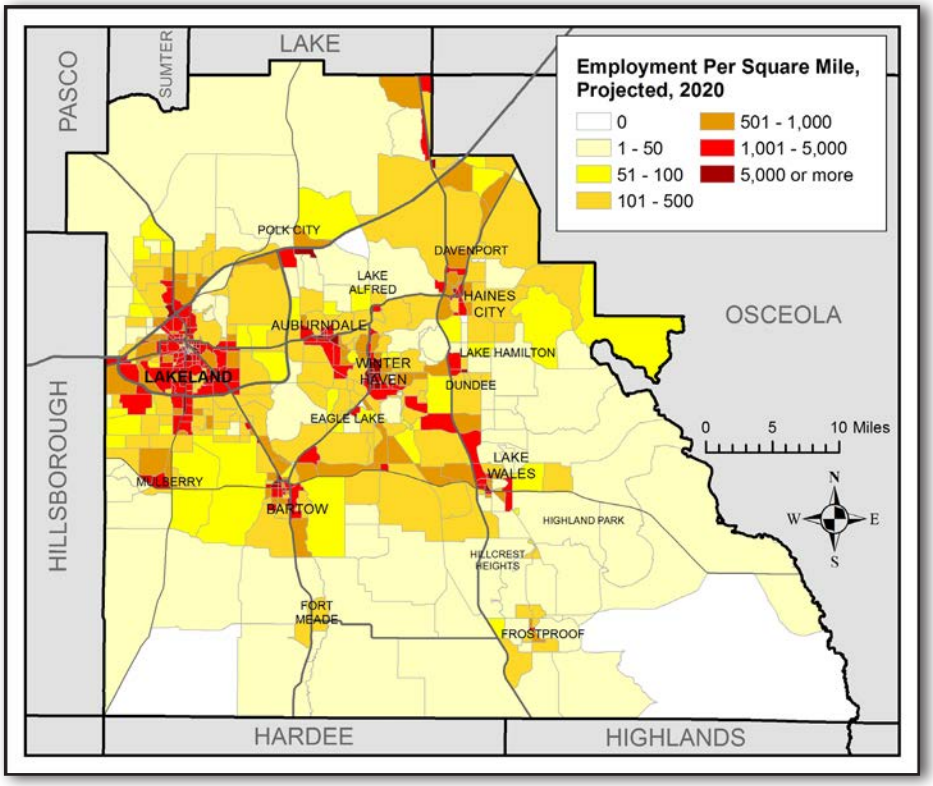


Figure 17. Employment Per Square Mile, Projected, 2020

Data source: Polk Transportation Planning Organization

Figure 18 highlights the areas of greatest projected employment growth by showing the percent change in employment per square mile for each TAZ in Polk County from 2010 to 2020 (in other words, the percent change between Figure 17 and Figure 18). The areas of the county that indicate the highest percent change in employment are transitioning from primarily rural/agricultural land uses to more intense land uses. The northeast portion of the county is highly influenced by the Orlando market and is adding many service-related jobs. The area around the northeast intersection of the Polk Parkway and Interstate 4 (north of Auburndale) is the location of the new Florida Polytechnic University. The area along State Road 60 between Bartow and Lake Wales has been adding new business parks, light industry, and manufacturing jobs.

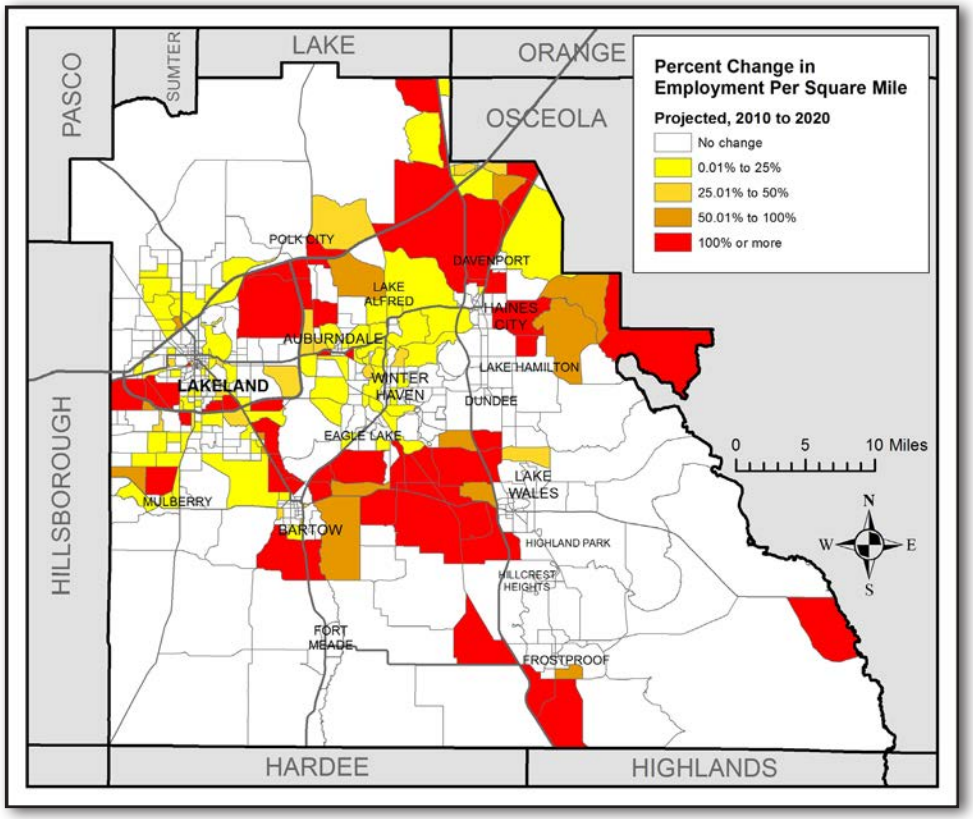


Figure 18. Projected Percent Change in Employment Per Square Mile, 2010-2020

Data source: Polk Transportation Planning Organization

Broadband Assets

Wireline

For households and businesses, broadband connections via fiber, cable, and DSL are commercially available throughout much of the county. Measured by land area (excluding lakes), approximately 44 percent of the county has cable broadband coverage, 26 percent has DSL coverage, and 7 percent has fiber coverage. Measured by census block, an estimated 40,645 people in Polk County live outside areas covered by commercial wireline broadband service (fiber, cable, or DSL), comprising about 6.75 percent of the population. Approximately 174,000 people (29 percent of the population) live in areas where fiber broadband connections are commercially available. Approximately 555,000 people (92 percent of the population) live in areas where cable broadband is commercially available.

Figure 19 shows commercial wireline coverage by service type (Fiber, cable, and DSL). These services overlap in many areas. Areas where two or more service types overlap are shown in the color of the service type that typically offers the highest broadband speeds. Fiber is typically highest, followed by cable, then DSL.

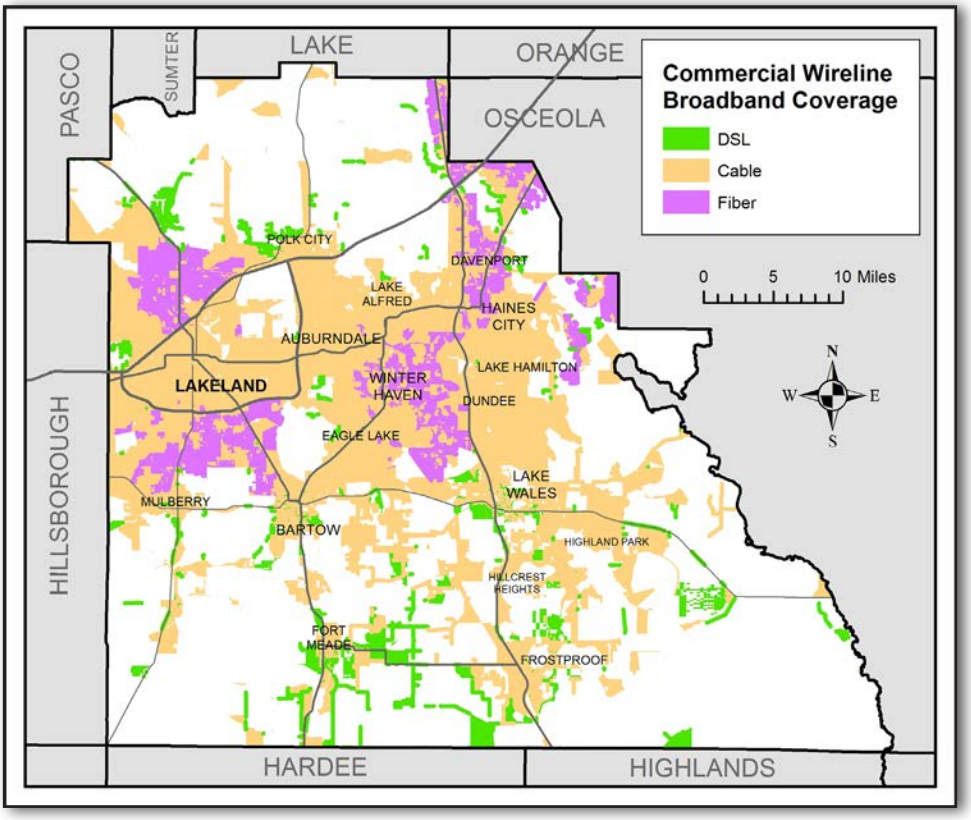


Figure 19. Commercial Wireline Broadband Coverage By Service Type

Data source: Broadband Florida

Figure 20 shows the maximum advertised download speeds available from commercial wireline broadband providers. Table 12 lists the typical download speed ranges required for a variety of broadband applications.

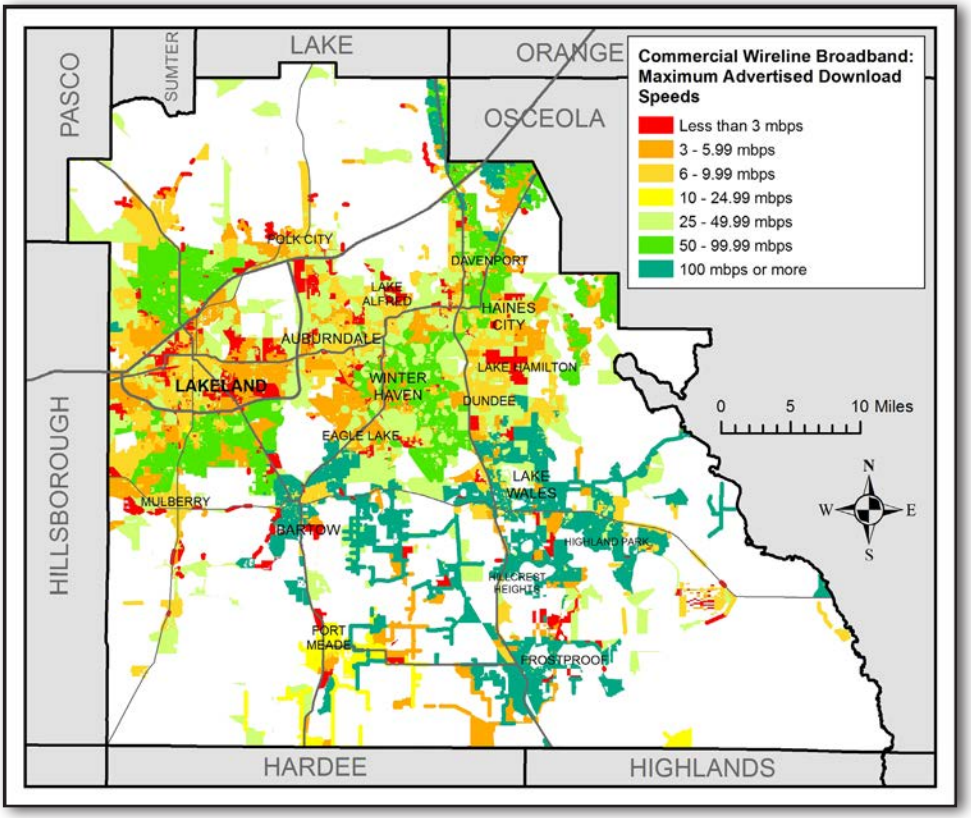


Figure 20. Commercial Wireline Broadband: Maximum Advertised Download Speeds

Data source: Broadband Florida

Table 12. Broadband Applications with Typical Speed Ranges Required[22]

Range	Application
500 kbps - 1 mbps	• Text Messaging (SMS)
500 kbps - 1.5 mbps	• Audio Streaming • Email (Basic) • Video (Low Definition/ YouTube) • Voice Over Internet Protocol (VOIP)
500 kbps - 4 mbps	• Web Browsing (Basic)
500 kbps - 5 mbps	• Music streaming
1-5 mbps	• Email (Large Attachments) • IPTV (Standard Definition, 1-3 Channels) • Remote Surveillance (Basic) • Telecommuting (Basic) • Web Browsing (Complex Sites)
1-6 mbps	• File sharing (Small/Medium Files)
3-6 mbps	• Video (Enhanced Definition)
5-10 mbps	• Building Control & Management • File sharing (HD Videos) • File sharing (Large Files) • IPTV (Standard Definition, 4+ Channels) • Medical File Sharing (Basic) • Remote Diagnosis (Basic) • Telecommuting (Converged Services) • Telepresence (Low Quality)
5-14 mbps	• Video (Standard Definition) • Video Conferencing (Basic) • Gaming (Basic)

Range	Application
5 mbps - 100 mbps	• Remote Education / Online Classes
10 mbps - 100 mbps	• Gaming (Complex) • IPTV (High Definition) • Remote Surveillance (HD) • Smart/Intelligent Building Control • Telecommuting (High Quality Video) • Telemedicine (Basic) • Telepresence (High Quality)
25-100 mbps	• Smart/Intelligent Building Control
50-100 mbps	• Video Conferencing (Multiple Users)
100 mbps - 1 gbps	• Gaming (Immersion) • IPTV (Full Channel Support) • Multiple Educational Services • Real-Time Data Collection • Remote Server Services for Telecommuting • Telemedicine (HD) • Video (High Definition)
50 mbps - 10 gbps	• Remote Supercomputing
100 mbps - 10 gbps	• Research Applications
1-10 gbps	• File sharing (Terabyte Datasets) • Interactive Remote Visualization and Virtual Reality • Live Event Digital Cinema Streaming • Remote Control of Scientific/ Medical Instruments • Telepresence (Using Uncompressed HD Video Streams)

22 Sources: Brookings Institution. "An International Look at High-Speed Broadband" by Darrell M. West, Feb. 2010. http://www.brookings.edu/reports/2010/0223_broadband_west.aspx
Missouri Broadband Now. "Broadband Speeds." http://mobroadbandnow.com/broadband-101/broadband-speeds/
State of New Hampshire Broadband Action Plan, Appendix. http://www.nheconomy.com/uploads/Broadband-Action-Plan-Appendices.pdf
State of Washington Department of Information Services. "Creating Opportunities for Washington: A Report on Broadband in Washington State." http://broadband.wa.gov/sites/default/files/docs/WashingtonStateBroadbandReport.pdf

Typical wireline download speed data (as opposed to maximum advertised speeds) are currently available only for a small area of southern Polk County surrounding the City of Fort Meade. Figure 21 shows the typical download speeds for the Fort Meade area.

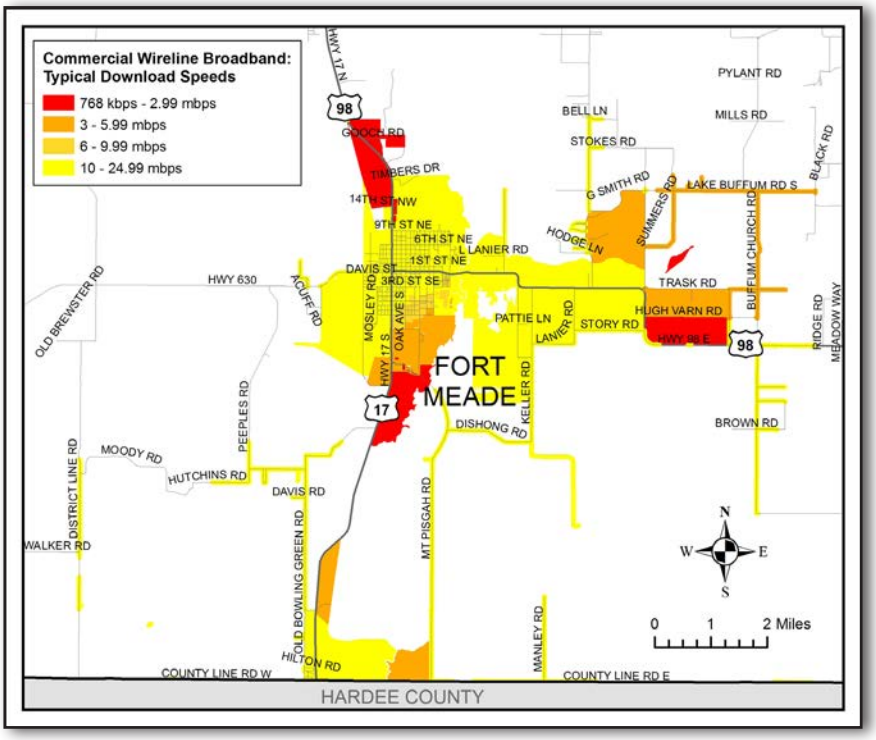


Figure 21. Typical Wireline Download Speeds, Fort Meade Area

Data source: Broadband Florida

Commercial wireline service (fiber, cable, and DSL) is provided by 5 companies in Polk County, according to Broadband Florida data: Bright House, CenturyLink, Comcast, TW Telecom, and Verizon. Figure 22 shows the locations served by each provider.

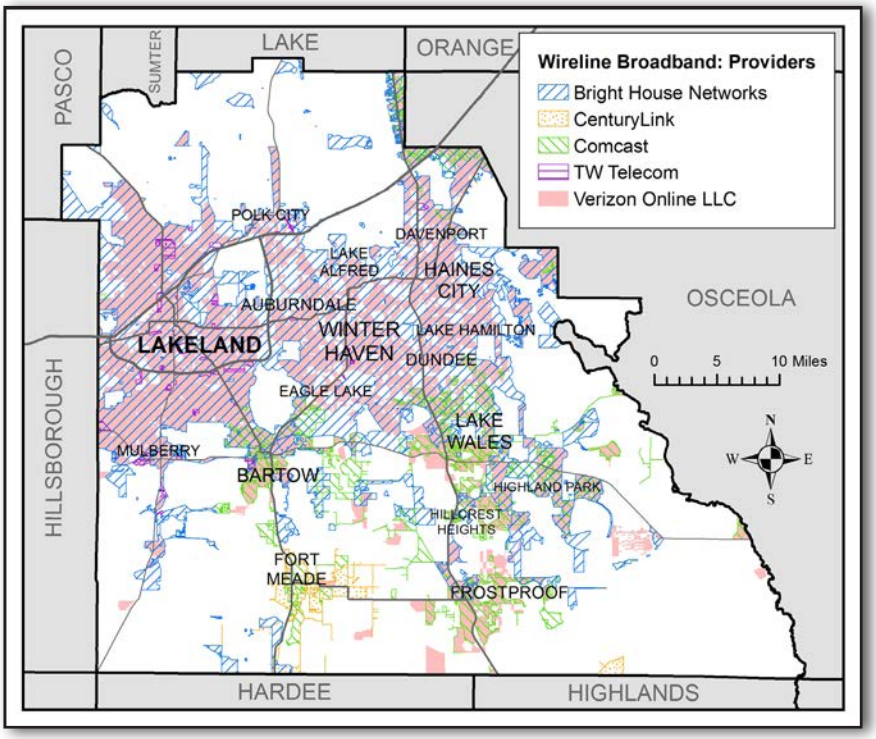


Figure 22. Wireline Broadband Mapped By Provider

Data source: Broadband Florida

The cities of Bartow, Lakeland, and Winter Haven own and operate fiber optic networks serving almost exclusively government facilities. Figure 23 shows those networks. Detailed views of the networks are shown in the subsequent three figures.

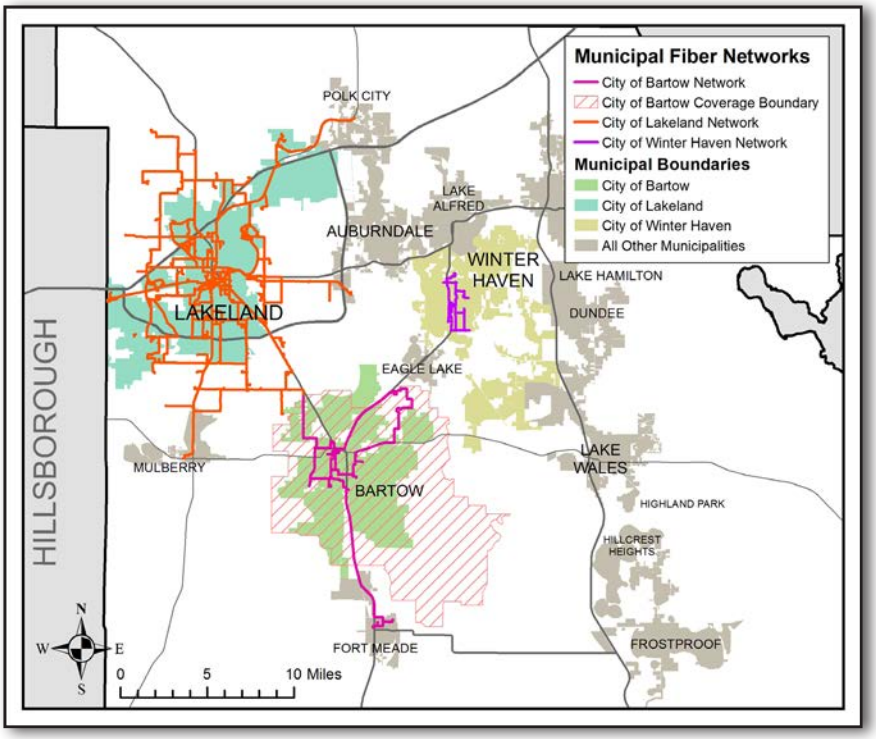


Figure 23. Municipal Fiber Networks

Data sources: City of Bartow, City of Lakeland, City of Winter Haven, FiberLight

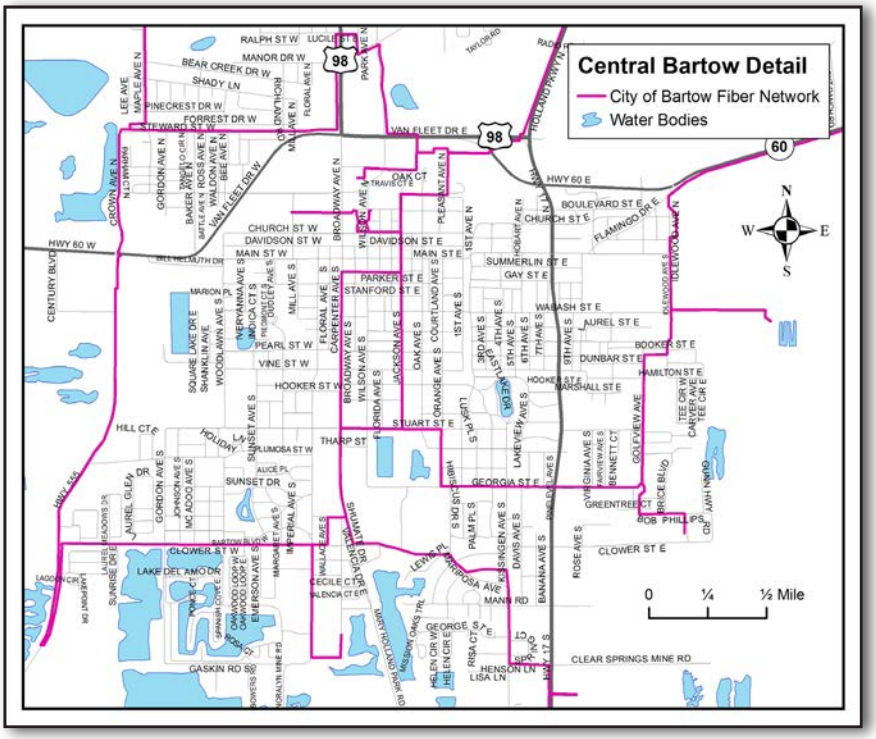


Figure 24. Bartow Fiber Network: Central Detail

Data source: FiberLight

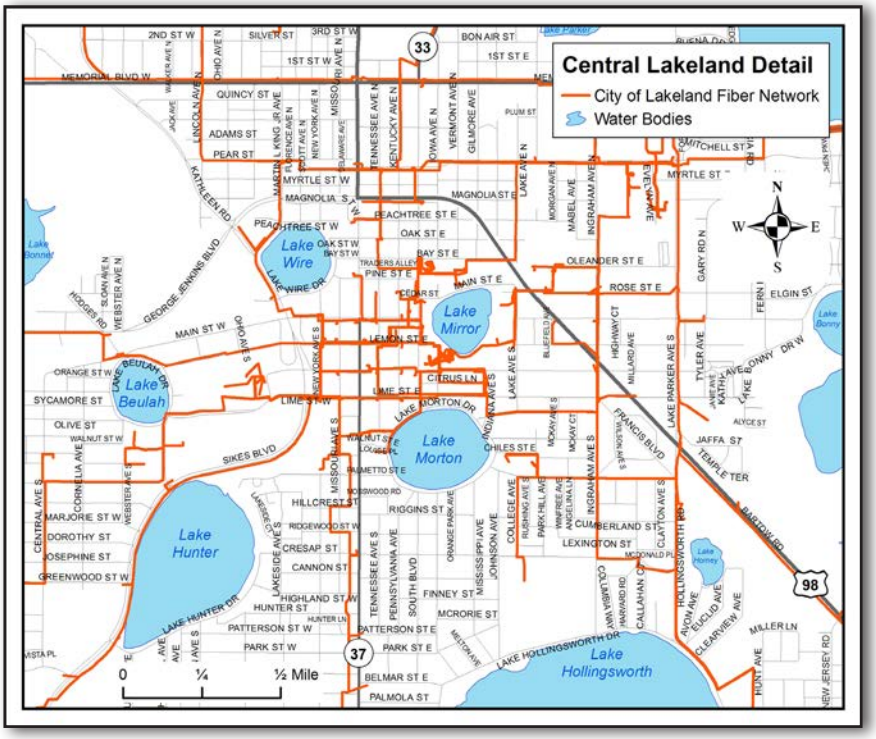


Figure 25. Lakeland Fiber Network: Central Detail

Data source: City of Lakeland

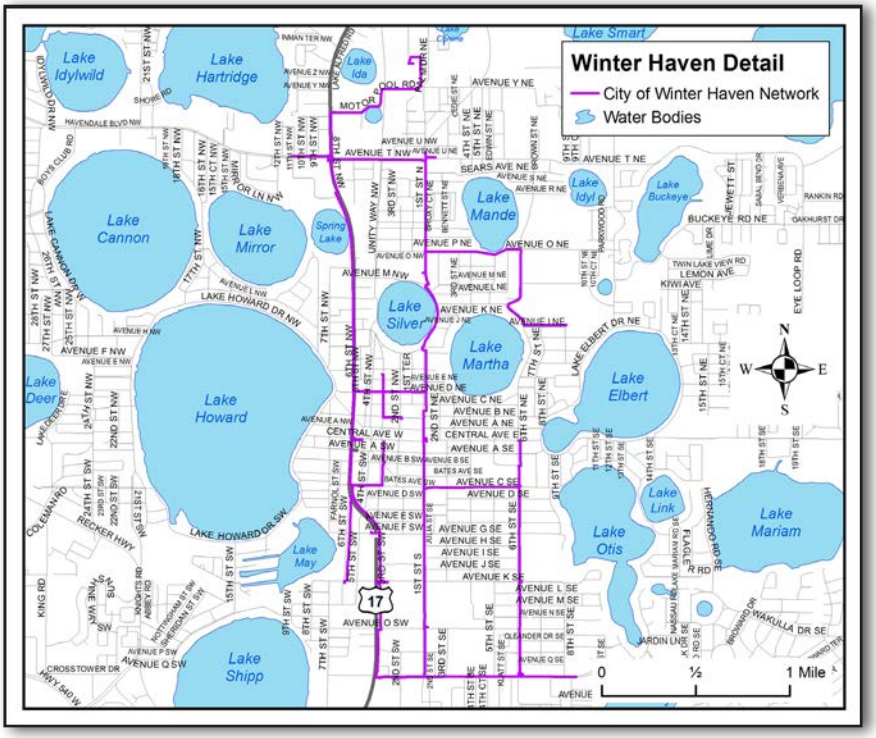


Figure 26. Winter Haven Fiber Network

Data source: City of Winter Haven

Wireless Broadband and Vertical Assets

According to Broadband Florida data, the entire county is covered by mobile wireless broadband service (the type of service that is accessed by smart phones, tablet computers, and other mobile devices typically using 3G or 4G networks). There are 42 active wireless broadband towers in Polk County. Figure 27 shows typical wireless broadband download speeds, according to data from Broadband Florida, as well as the locations, height, and type (guyed, monopole, and self-supporting) of wireless network towers.

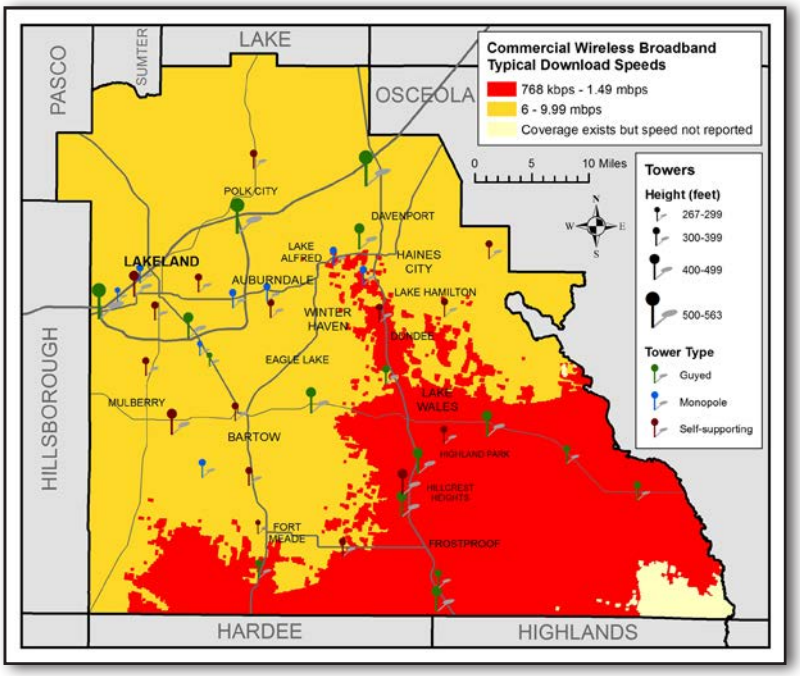


Figure 27. Typical Commercial Download Speeds & Tower Locations

Data source: Broadband Florida

Figure 28 shows coverage by wireless broadband providers in Polk County. According to data from Broadband Florida, there are 7 providers: AT&T, DISH, Hughes, Sprint, T-Mobile, Verizon, and WildBlue. Three of the providers cover the entire county and the remaining four cover most of the county.

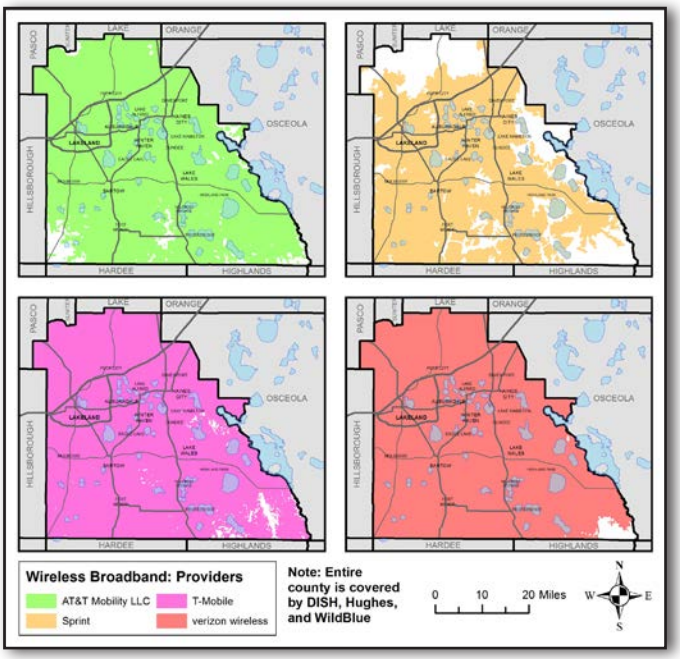


Figure 28. Wireless Broadband Providers

Data source: Broadband Florida

Spectrum Availability for Mobile Broadband

In the bands below 3.7 GHz, a total of 547 megahertz of bandwidth, at various levels, are currently licensed as flexible use spectrum that can be used for mobile broadband.[23] The 2010 National Broadband Plan calls for making an additional 500 megahertz available for broadband use by 2020, of which 300 megahertz of bandwidth between the levels of 225 MHz and 3.7 GHz should be made newly available for mobile use by 2015.[24] Frequency allocations for mobile broadband are scattered throughout the radio spectrum and are shared with other uses. As an example, the United States spectrum allocations for mobile broadband and other uses between 300 MHz and 512 MHz are shown in Figure 29.[25]

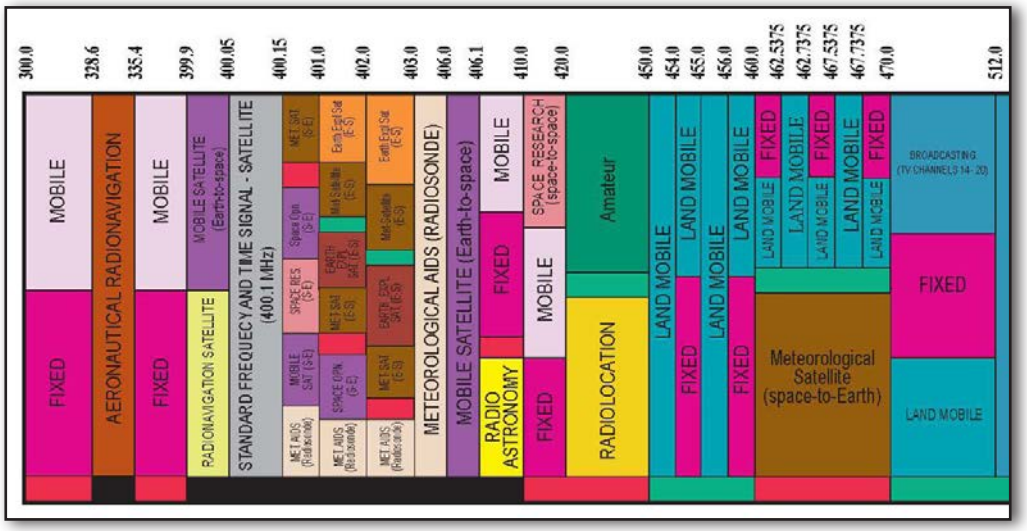


Figure 29. United States Frequency Allocations from 300 MHz to 512 MHz, 2011

Source: NASA

Policies and Regulations

FCC Notice of Inquiry 11-51, released in April 2011, seeks to work with "stakeholders including state and local governments, other federal agencies, Tribal governments, consumer advocates, and the private sector to identify means of improving rights of way policies and wireless facilities siting requirements."[26] The notice is a response to a congressional directive requiring the FCC to work to remove barriers to broadband-related infrastructure investment.

Counties and municipalities may also have policies and regulations that affect the construction and/or operation of broadband infrastructure and broadband services. Such regulations may be present in zoning codes, in comprehensive plans, in land development codes, or in right of way policies.

Funding Opportunities

The E-Rate program is administered by the Schools and Libraries Division of the Universal Service Administrative Company, an independent nonprofit company that administers the FCC's Universal Service Fund. E-Rate provides discounts (from 20% to 90%) on telecommunications services to libraries, public schools, and non-profit private schools.[27]

The Florida Department of Management Services provides Community Anchor Institutions with assistance in securing grant funding to improve broadband access, including funding opportunity updates, grant writing resources and training, project management, and partnership development support.[28] The American Recovery

23 Federal Communications Commission. National Broadband Plan, p. 84. http://download.broadband.gov/plan/national-broadband-plan-chapter-5-spectrum.pdf

24 National Broadband Plan, p. 75.

25 National Aeronautics and Space Administration. "Space Communications and Navigation." http://www.nasa.gov/directorates/heo/scan/spectrum/txt_accordion3.html

26 FCC. "Notice of Inquiry." http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-11-51A1.pdf

27 U.S. Department of Education. "E-Rate Program." http://www2.ed.gov/about/offices/list/oii/nonpublic/erate.html

28 Department of Management Services. "Grants Assistance for Community Anchor Institutions." http://www.dms.myflorida.com/suncom/

and Reinvestment Act of 2009 made over $7 billion available for expanding broadband availability.[29] All ARRA broadband funds have now been awarded; $8,877,028 was awarded to the state of Florida.[30]

Public-private partnerships have funded many successful broadband projects in other locations. An example is the countywide wireless broadband service in Hardee County, directly south of Polk County. In 2009, Rapid Systems (a private company) and the Hardee County Industrial Development Authority filed a joint application with the Hardee County Economic Development Authority for a grant to fund the construction and maintenance of broadband infrastructure and related equipment and services to serve the entire county (residences and Anchor Institutions) with high-speed internet access.[31] The lowest-cost residential service available is currently priced at $19.95 per month, with an advertised download speed of 3 mbps.[32]

Community Anchor Institutions

Community Anchor Institutions are defined by the NTIA as "schools, libraries, medical and healthcare providers, public safety, community colleges and other institutions of higher education, and any other community support organizations and entities that facilitate greater use of broadband services."[33]

Libraries

Figure 30 shows the connection speeds and number of computers available for patrons at Polk County libraries. There are 15 public libraries in the county that provide public internet access. Internet access at libraries is an essential service for many residents of the county who have no internet access at home. Broadband is also important for the overall function of all modern library systems. The Polk County Library Cooperative maintains an online catalog, databases, book reservation and renewal system, and other resources that make use of broadband. Computers at all library branches are connected to this system.

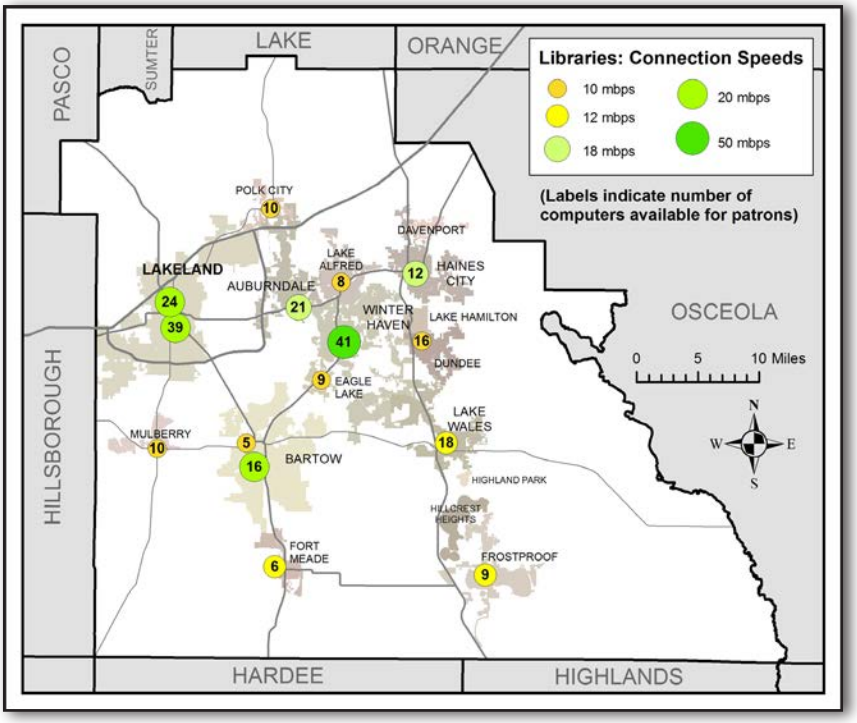


Figure 30. Connection Speeds & Computers Available at Polk County Libraries, 2012

Data source: Polk County Library Cooperative

broadband_florida_initiative/broadband_grants_assistance_team

29 Recovery website. "Update: Recovery Broadband Funds 100 Percent Awarded." http://www.recovery.gov/news/featured/pages/broadband.aspx

30 NTIA. "State Broadband Initiative." http://www2.ntia.doc.gov/SBDD

31 Rapid Systems. "Hardee County Broadband Project." http://www.rapidsys.com/hardee/default2.asp

32 Rapid Systems. "Hardee County Frequently Asked Questions." http://rapidsys.com/hardee/faq.html

33 Department of Management Services. "Grants Assistance for Community Anchor Institutions." http://www.dms.myflorida.com/suncom/broadband_florida_initiative/broadband_grants_assistance_team

Schools

Figure 31 shows the locations of Polk County schools, with the school connection speed (indicated by marker size) and the broadband provider (indicated by marker color). In recent years, broadband has become important for all levels of education. In K-12 schools, it provides students, teachers, administrators, and parents with a wide range of opportunities for interactive and hybrid learning. It can also help today's students to acquire the technological skills that will be necessary for success as they come of age in an increasingly globalized and networked economy and culture.

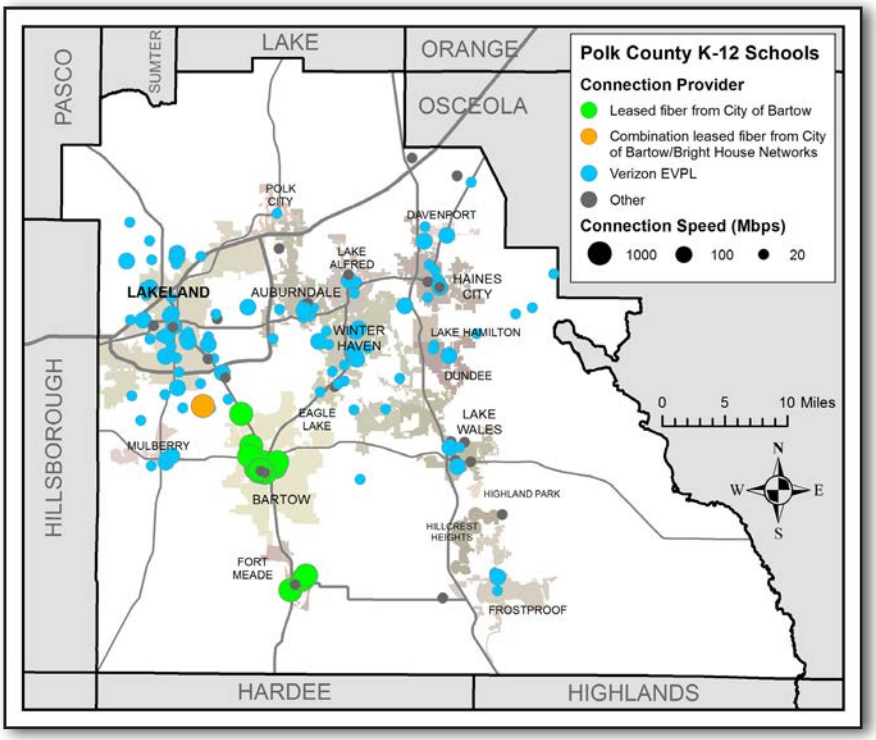


Figure 31. Connection Speeds and Providers for Polk County Schools

Data source: Polk County School Board

Colleges and Universities

Institutions of higher education based in Polk County include: Florida Southern College, Polk State College (with campuses in Lakeland and Winter Haven), Southeastern University, Warner University, and Webber International University, as well as other private colleges. In addition, there is a branch of the University of South Florida in Lakeland (formerly USF Polytechnic), scheduled to close in 2015. A new university campus, Florida Polytechnic, is under construction. Figure 32 show the locations of the colleges and universities in Polk County.

Broadband is an essential component of any college or university campus environment. In higher education, broadband provides access to databases, online books, articles, and many other research materials. Broadband is also essential for the wide range of applications used in distance learning, such as video conferencing, webinars, and online class interfaces. Increasing numbers of colleges and universities are now offering classes and even entire degree programs online. This provides students with increased flexibility, and opens up new opportunities to people who wish to pursue higher education but cannot relocate or leave their jobs in order to do so.

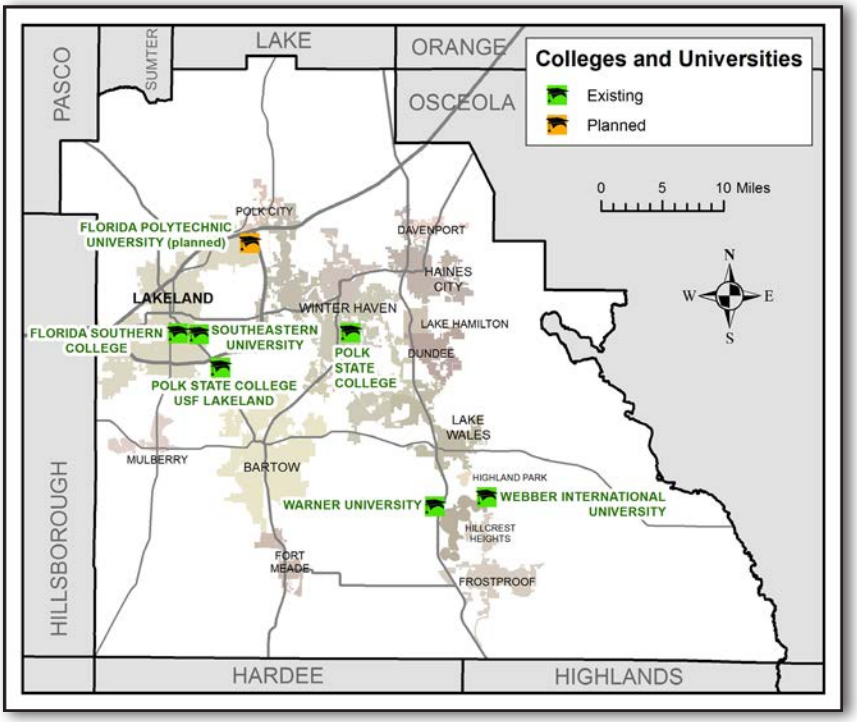


Figure 32. Colleges and Universities

Data source: Central Florida Regional Planning Council GIS database

Government

Figure 33 shows the locations of county government facilities for which broadband connection speeds have been reported, with facility type indicated by symbol shape and connection speed indicated by color. County facilities use a variety of broadband resources, including county-owned fiber, leased fiber, commercial cable, and relay towers. Broadband allows the different departments of local government to coordinate with one another and provides shared access to databases, emergency management systems, global positioning systems for vehicles, and many other resources.

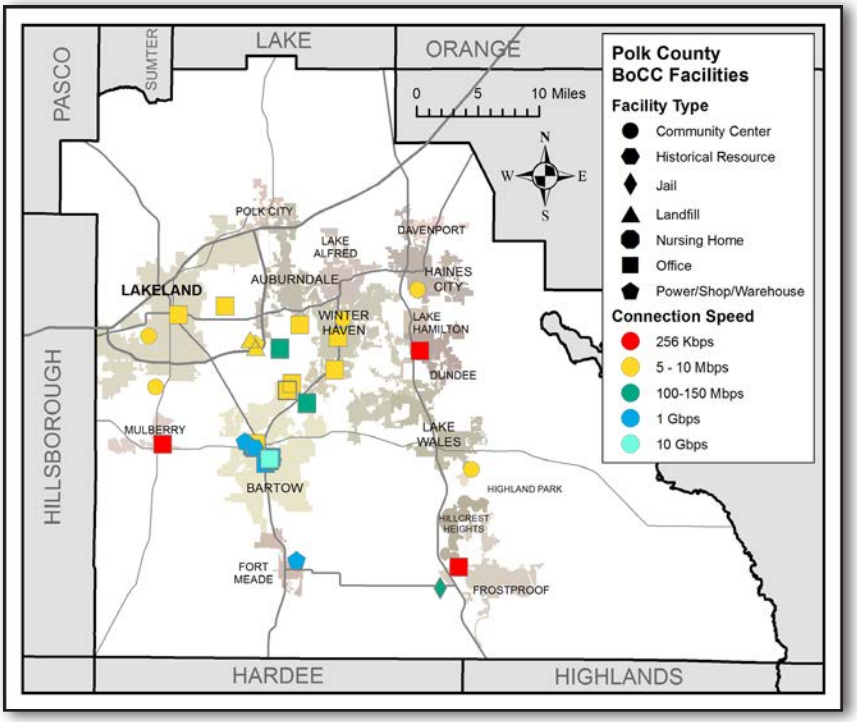


Figure 33. County Government Facilities and Connection Speeds

Data source: Polk County Board of County Commissioners

Healthcare

Figure 34 shows the locations of hospitals, doctors' offices, and state laboratories and clinics in Polk County. Broadband is important in the healthcare industry for applications such as telemedicine, remote diagnosis, and the transfer of medical records (especially when records include detailed images, such as MRI scans).

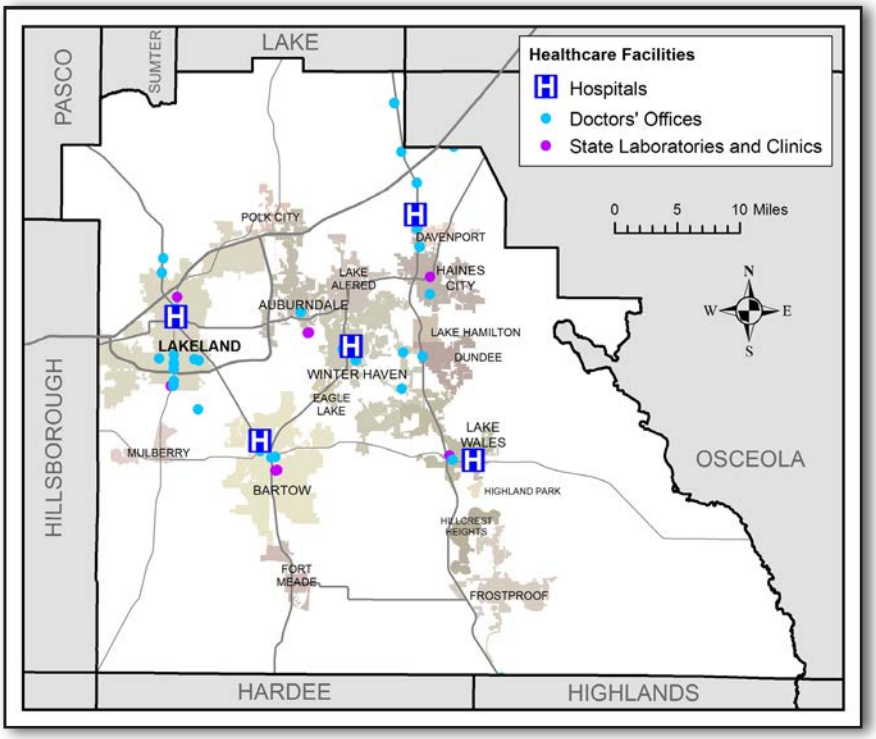


Figure 34. Healthcare Facilities

Data source: Florida Geographic Data Library

Broadband Utilization Survey Results

To gather data regarding broadband usage and needs in Polk County, two surveys were conducted. First, a telephone survey was conducted by a consulting firm in May 2012, in which 248 complete responses were obtained from businesses in Polk County and 249 from residents.[34] Second, two online surveys – one for businesses and one for residents – were made available through an online polling site. The online surveys were widely advertised throughout the public outreach stage of the planning process. From June 2012 to January 2013, 453 residential online surveys and 127 business surveys were completed. This section contains an analysis of the survey results, combining the results of the telephone and online surveys. The complete surveys are shown in Appendix B.

Businesses

Of 375 businesses surveyed, 94.4 percent had internet connections and 5.6 percent did not.

Among 354 businesses with internet connections:

- The average number of employees was 110.
- On average, 79.1 percent of employees at each business use the internet.

34 The telephone survey covered 10 counties in central and southwest Florida. This section analyzes the results for respondents in Polk County only.

Of 190 respondents who gave estimates of their organizations' monthly internet costs, the cost ranges were distributed as follows:

Table 13. Organizations' Monthly Internet Costs - Question 4

Cost Range	Percent of Businesses
Less than $25 a month	2.6%
$25 to $49/month	14.7%
$50 to $99/month	28.9%
$100 to $149/month	17.4%
$150 to $199/month	7.4%
$200 to $349/month	7.4%
$350 to $499/month	2.6%
$500 to $999/month	6.8%
$1,000 to $1,499/month	2.1%
$1,500 or more a month	10.0%

For 39.8 percent of respondents, that monthly cost included something other than the internet connection, such as phone systems or security. Respondents were asked whether their internet service was an excellent, good, fair, or poor value, based on the price they paid and the service they received.

Of 283 businesses that gave an answer rating their internet connections, the distribution was as follows:

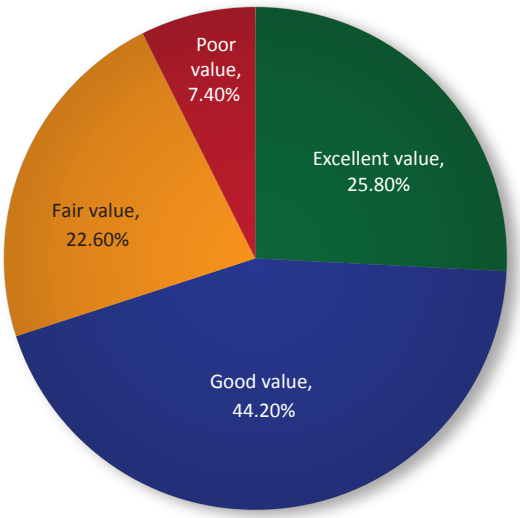


Figure 35. Rating of Businesses Internet Connection - Question 6

Respondents reported using the internet for the following applications:

Table 14. Applications of Internet Use - Question 7

Application	Percent of Businesses
Research	96.3%
Social media	79.7%
Selling merchandise or products or services	64.4%
Communication	64.4%
Finance/banking	63.3%
Supply chain management	54.2%
Teleconferencing	44.1%
Data management	40.7%
Telecommuting	34.2%
Marketing	33.6%
Education/continuing education	31.1%
Geographic information	16.9%
Security	12.4%
Entertainment	12.1%

Other uses mentioned included computer base testing, video production, engineering purposes, scheduling, gaming, providing direct customer services, law enforcement applications, advertising, off site file storage, and providing access to others less fortunate. Using a 10-point scale to rate internet speed, with 10 being exceptional and 1 being severely limiting, the average rating was 7.4 (see Figure 35).

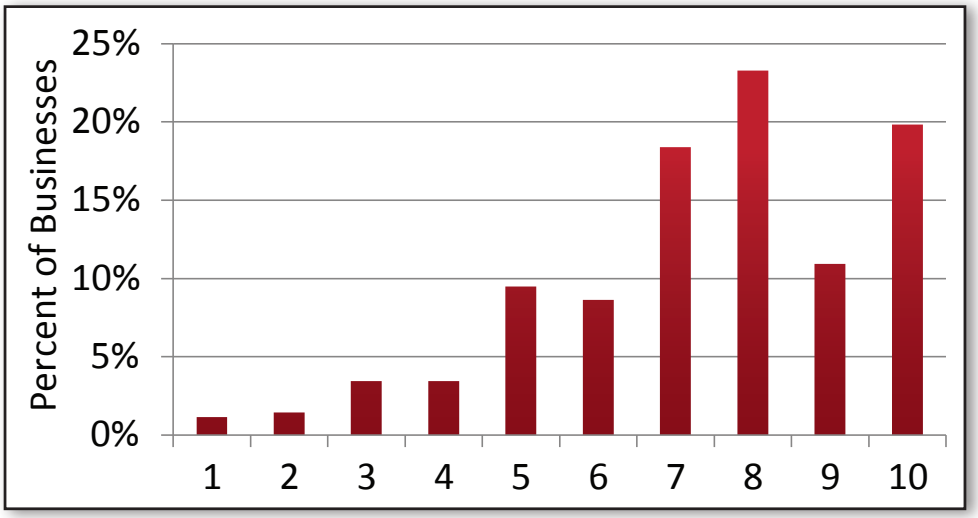


Figure 36. Internet Connection Speed Rating - Question 9

Using a 10-point scale to rate the likelihood of needing a faster internet connection, with 10 meaning definitely and 1 meaning definitely not, the average rating was 5.4 within the next year (see Figure 36) and 6.6 within the next 3 years (see Figure 37).

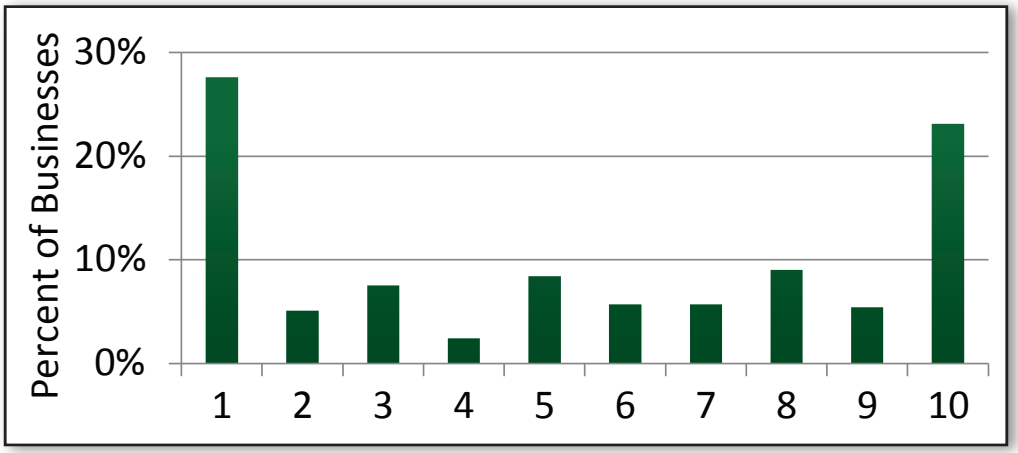


Figure 37. Likelihood of Needing Faster Internet in the Next Year - Question 10, Part 1

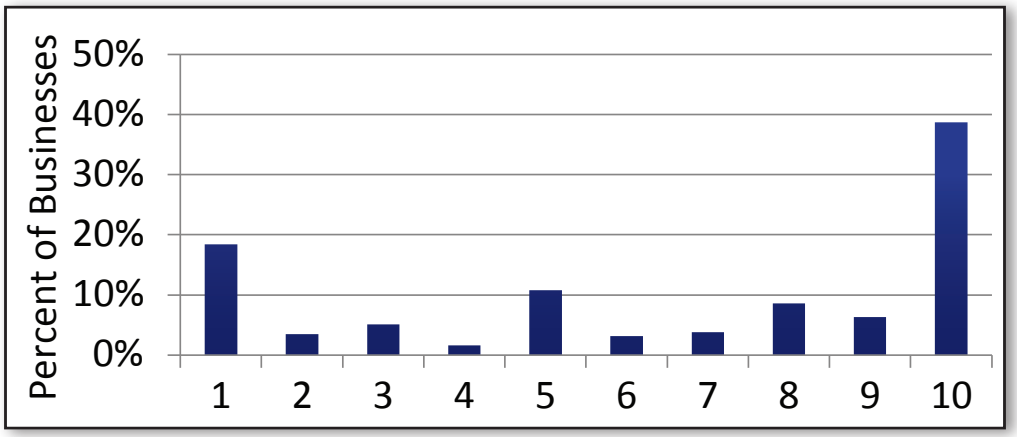


Figure 38. Likelihood of Needing Faster Internet in the Next 3 Yrs - Question 10, Part 2

Respondents were asked what their organizations would like to do that they cannot do now because of the speed of their internet connection. Most respondents reported that there was nothing additional they would like to do. However, some respondents indicated the following activities:

- Increase connectivity with remote locations
- Stream videos faster without interruptions
- Better quality teleconferencing
- Better telecommuting
- Transfer larger files
- File documents online
- More interactive marketing
- Voice over IP for phone systems
- Widespread online testing
- Pull up multiple accounts
- Online banking
- Future state of the art services

Respondents were asked what factors, if any, prevented their organization from getting a faster internet connection.

Of the 354 businesses with internet connections, respondents cited the reasons as follows:

Table 15. Factors that Prevent Obtaining a Faster Internet Connection - Question 12

Factors	Percent of Businesses
Boss/corporate doesn't value a faster connection	64.4%
Not in the budget	16.1%
Have fastest connection available	9.0%
Too expensive	6.2%
Don't really need a faster connection	5.6%
The connection speed will still vary, so it's not worth it	4.2%
Up-front costs are too high	3.4%
Costs more than it's worth	3.1%
Business is not good - poor economy	2.0%

Respondents were asked for what reasons high speed internet service is important for their organizations. Responses were distributed as follows:

Table 16. Reasons High-speed Internet is Important - Question 14

Reasons	Percent of Businesses
Banking	75.7%
Marketing	65.0%
Computer system	54.2%
Supply chain management	49.2%
Government forms and registrations	49.2%
Telephone system	48.6%
Getting to websites	39.5%
Teleconferencing	33.3%
Accessing continuing education	22.3%
Networking	21.8%
Access to data sources	18.1%
Accessing global markets	16.1%
Selling our products and services	11.3%

Other important uses included telecommuting, uploading large files, time management, software support, security, research, records management, direct customer service, file storage and retrieval, data management, and connection to remote servers. Respondents rated the degree to which they agreed or disagreed with the following statements.

A fast internet connection is critical for maintaining your company's competitiveness:

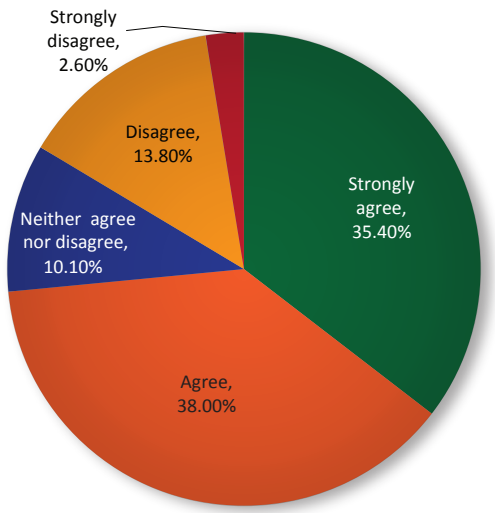


Figure 39. Fast Internet is Critical for Competitiveness - Question 17

A fast internet connection is critical for being able to produce and deliver the services or products your company provides to customers:

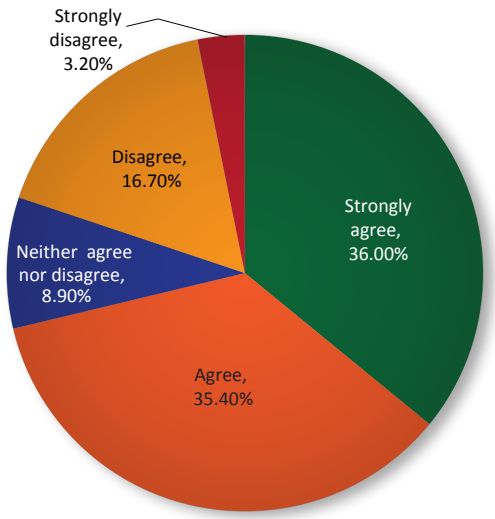


Figure 40. Fast Internet is Critical to Produce & Deliver Services - Question 18

A fast internet connection is critical for the survival of your company:

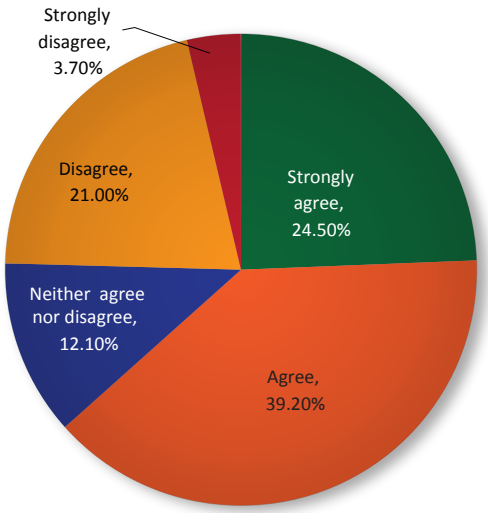


Figure 41. Fast Internet is Critical for Survival of Your Company - Question 19

79.1 percent of businesses had wireless internet ("Wi-Fi") connections. The average number of devices that connect to the internet (such as computers, iPads, tablets, smart phones) per organization was 92. On average, among business surveyed, there were 0.77 such devices per employee. Respondents were asked how many additional such devices their organization expected to add in the next year; the average number was 26 devices, but 48.6 percent of respondents expected to add no new devices in the next year. Respondents' download and upload speeds, measured during the survey process via an online speed test site, are summarized in Figure 42.

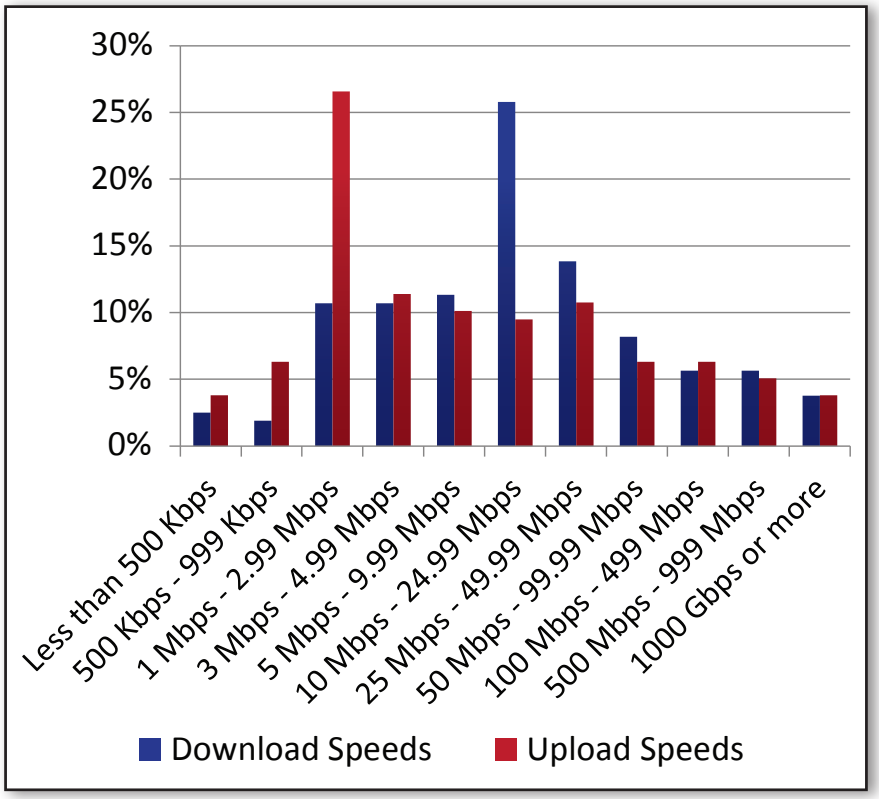


Figure 42. Download & Upload Speeds - Questions 23-26

Among 21 businesses without internet connections, 62 percent had computers, 38 percent did not.

Asked for the number one reason why they did not have internet service, respondents answered as follows:

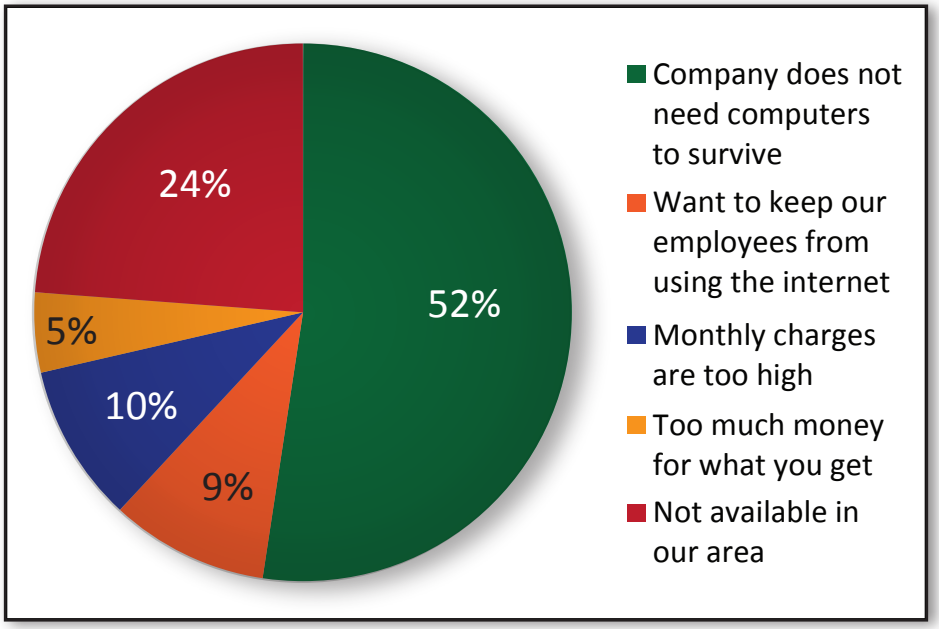


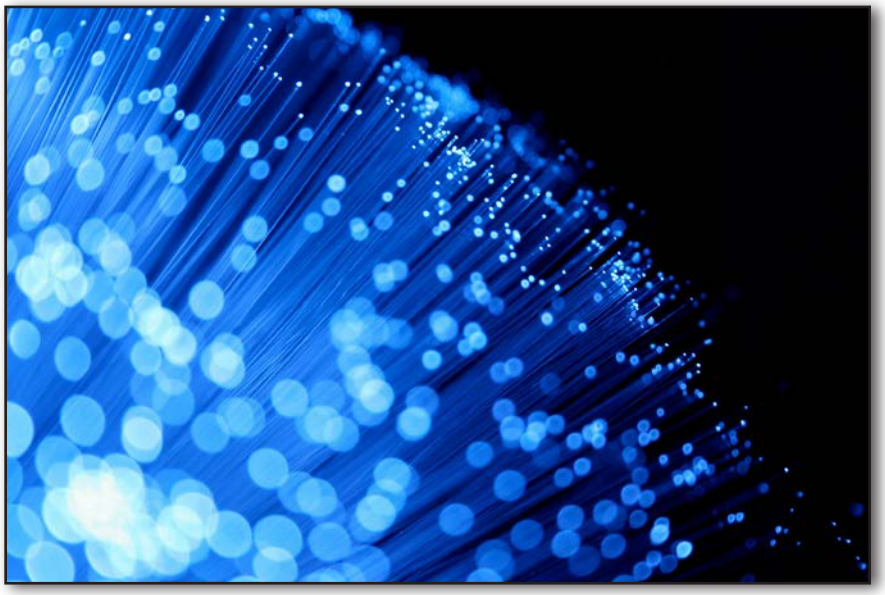
Figure 43. Top Reason for Not Having Internet - Question 28

Households

Of 702 residential respondents, 80.3 percent reported that they had internet service at home, and 19.7 percent reported that they had no home service. It was initially expected that the phone survey would reach a larger proportion of people without home internet service; however, in the final results, 20.1 percent of respondents to the online survey reported having no internet service at home, while 18.9 percent of respondents to the phone survey reported having no service. Thus, each survey captured a similar proportion of residents with no home internet service.

Among 564 respondents with home internet service:

- 92.2 percent had a high speed connection (DSL, cable modem, or fiber).
- 12.1 percent had mobile internet (the technology used for smart phones and tablets).
- 2.5 percent had a dial-up connection.
- 3.5 percent had some other type of connection.
- 1.2 percent indicated under the "other" category that they had a satellite connection.
- 9.6 percent reported having two types of connection (e.g. high speed and mobile), and 0.5 percent reported having three types of connection.
- 82.4 percent reported having a wireless router (to provide Wi-Fi) in their home.
- 15.2 percent reported that someone in their household had a home business.
- 19.0 percent reported that someone in their household sometimes telecommuted.
- 48.9 percent reported that someone in their household sometimes did business-related work on a home computer.



The average number of devices that connect to the internet reported for each household was 4.5. Respondents expected to add, on average, 1.5 new devices in the next year.

Using a 10-point scale to rate the importance of high speed internet to members of their households (with 10 being the most important and 1 being the least important), respondents gave an average rating of 8.3. 45.5 percent of respondents gave a rating of 10, and 3.6 percent gave a rating of 1.

Respondents reported their internet usage, and the usage of all members of their households, for entertainment purposes (games, movies, social networking, etc.) as follows:

Table 17. Internet Usage for Entertainment Purposes - Questions 9-10

Usage	Individuals	All Household Members
Almost constantly when I'm home	21.6%	22.7%
Several times a day	26.6%	27.4%
A few times a day	15.4%	15.8%
About once a day	7.6%	7.3%
4 or 5 times a week	4.8%	4.7%
2 or 3 times a week	7.3%	6.9%
Once a week	5.1%	4.7%
Once every few weeks	2.1%	2.3%
Almost never	3.7%	3.4%
Never	5.0%	4.1%
Not sure	0.7%	0.8%

Individual and household internet usage for online shopping was reported as follows:

Table 18. Internet Usage for Online Shopping - Questions 11-12

Usage	Individuals	All Household Members
Almost constantly when I'm home	1.4%	1.5%
Several times a day	3.2%	3.4%
A few times a day	3.5%	3.8%
About once a day	5.7%	5.8%
4 or 5 times a week	8.3%	8.6%
2 or 3 times a week	11.0%	11.4%
Once a week	11.2%	11.3%
Once every few weeks	14.9%	15.6%
About once a month	9.4%	9.6%
A few times a year	13.5%	12.9%
Almost never	6.2%	5.8%
Never	11.3%	10.1%
Not sure	0.4%	0.2%

Individual and household internet usage for banking or paying bills was reported as follows:

Table 19. Internet Usage for Banking & Paying Bills - Questions 13-14

Usage	Individuals	All Household Members
Almost constantly when I'm home	8.0%	8.3%
Several times a day	4.8%	5.1%
A few times a day	2.8%	3.0%
About once a day	12.1%	12.6%
4 or 5 times a week	9.0%	9.4%
2 or 3 times a week	17.0%	17.6%
Once a week	11.7%	12.2%
Once every few weeks	5.9%	6.0%
About once a month	7.3%	7.3%
A few times a year	1.8%	1.7%
Almost never	2.8%	2.8%
Never	16.5%	14.1%
Not sure	0.4%	0.0%

Individual and household internet usage for educational purposes (online classes, research for school, etc.) was reported as follows:

Table 20. Internet Usage for Educational Purposes - Questions 15-16

Usage	Individuals	All Household Members
Almost constantly when I'm home	4.8%	5.1%
Several times a day	6.7%	6.9%
A few times a day	3.9%	4.1%
About once a day	4.8%	4.9%
4 or 5 times a week	4.6%	4.7%
2 or 3 times a week	7.6%	8.1%
Once a week	7.4%	7.1%
Once every few weeks	3.5%	3.4%
About once a month	4.4%	4.7%
A few times a year	9.6%	9.8%
Almost never	14.9%	15.6%
Never	27.1%	25.3%
Not sure	0.5%	0.4%

Individual and household internet usage for business purposes (telecommuting, doing work assignments, researching issues, etc.) was reported as follows:

Table 21. Internet Usage for Business Purposes - Questions 17-18

Usage	Individuals	All Household Members
Almost constantly when I'm home	8.0%	8.4%
Several times a day	9.6%	10.1%
A few times a day	3.5%	3.8%
About once a day	5.7%	5.6%
4 or 5 times a week	2.7%	2.6%
2 or 3 times a week	8.0%	8.4%
Once a week	6.4%	6.8%
Once every few weeks	4.1%	4.1%
About once a month	2.8%	3.0%
A few times a year	2.1%	2.3%
Almost never	11.2%	11.6%
Never	35.1%	32.6%
Not sure	0.9%	0.6%

Given an internet connection 5 times faster, the following percentages of respondents indicated that they would use the internet more for the purposes listed:

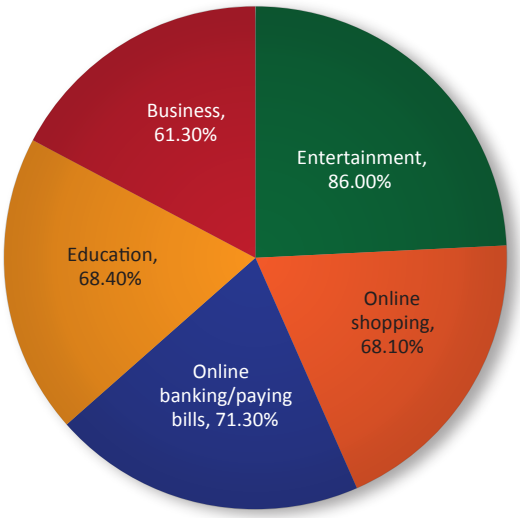


Figure 44. Faster Internet Could Increase Usage - Question 19

Respondents reported the cost of their home internet connections as follows:

Table 22. Internet Costs - Question 21

Price Range	Percentage
Less than $20 a month	4.1%
$20 to $29/month	8.4%
$30 to $49/month	21.4%
$50 to $74/month	27.0%
$75 to $99/month	9.4%
$100 to $124/month	14.4%
$125 to $149/month	8.7%
$150 to $199/month	5.5%
$200 or more a month	1.1%

53.6 percent of respondents reported that the cost included something additional besides the internet connection, such as cable TV or phones. Among respondents who had no home internet connection:

Given a home internet connection, respondents indicated that members of their household would use the internet for online shopping according to the following distribution:

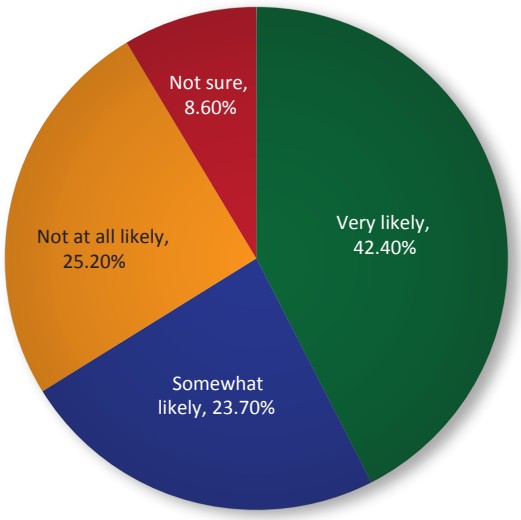


Figure 45. Likelihood of Internet Used for Shopping - Question 23

Given a home internet connection, the following was the reported likelihood of using the internet for education (online classes, school research, etc.):

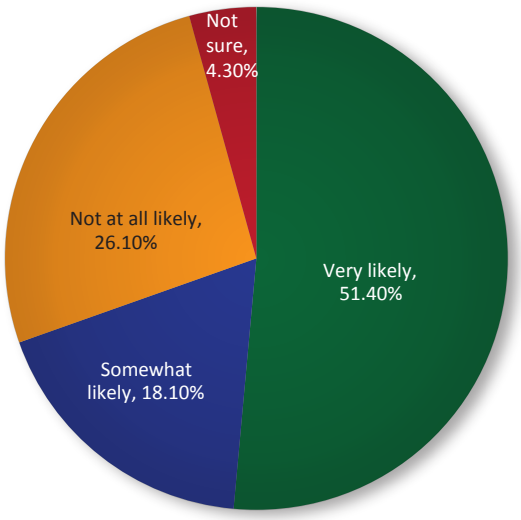


Figure 46. Likelihood of Internet Used for Educational Purposes - Question 24

Given a home internet connection, the following was the reported likelihood of using the internet for entertainment (games, movies, social networking):

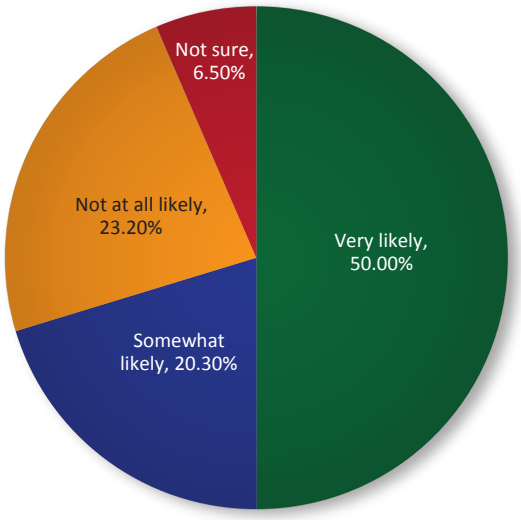


Figure 47. Likelihood of Internet Used for Entertainment - Question 25

Given a home internet connection, the following was the reported likelihood of using the internet for business (telecommuting, research issues, etc.):

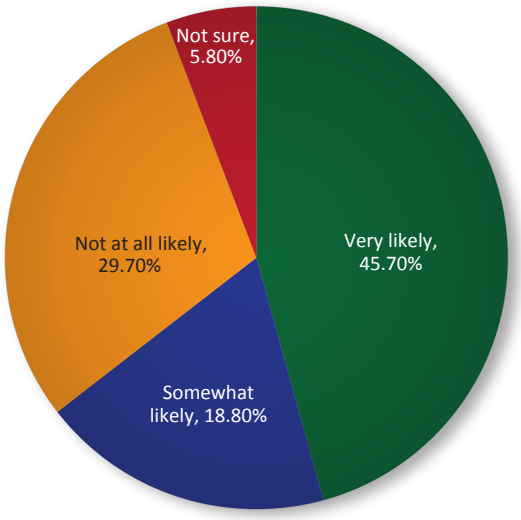


Figure 48. Likelihood of Internet Used for Business - Question 26

Given a home internet connection, the following was the reported likelihood of using the internet for online banking or paying bills:

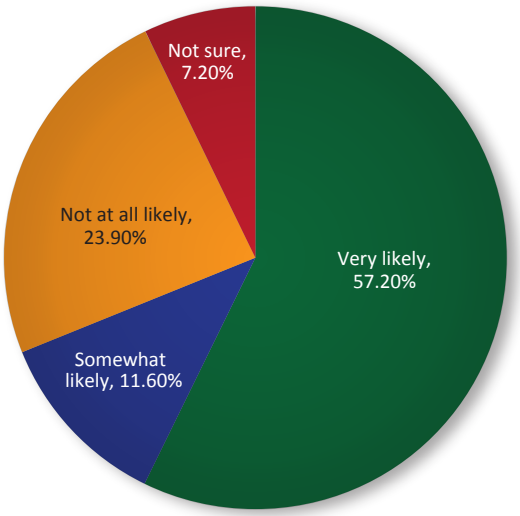


Figure 49. Likelihood of Internet Used for Banking & Bill Paying - Question 27

Respondents without a home connection were asked for the number one reason why they had no internet at home, and for additional reasons. The results are as follows:

Table 23. Top Reason for No Internet - Question 28

	Number One Reason	Other Reasons
Too expensive	49.6%	67.2%
Too much money for what you get	5.8%	29.2%
Slow connection in my area	3.6%	13.1%
Not available in my area	10.2%	5.1%
Don't know much about computers	8.0%	2.2%
Get internet at work, school, library, etc. Don't need it at home	8.0%	5.1%

The population surveyed had the following demographic characteristics.

Age was distributed as follows:

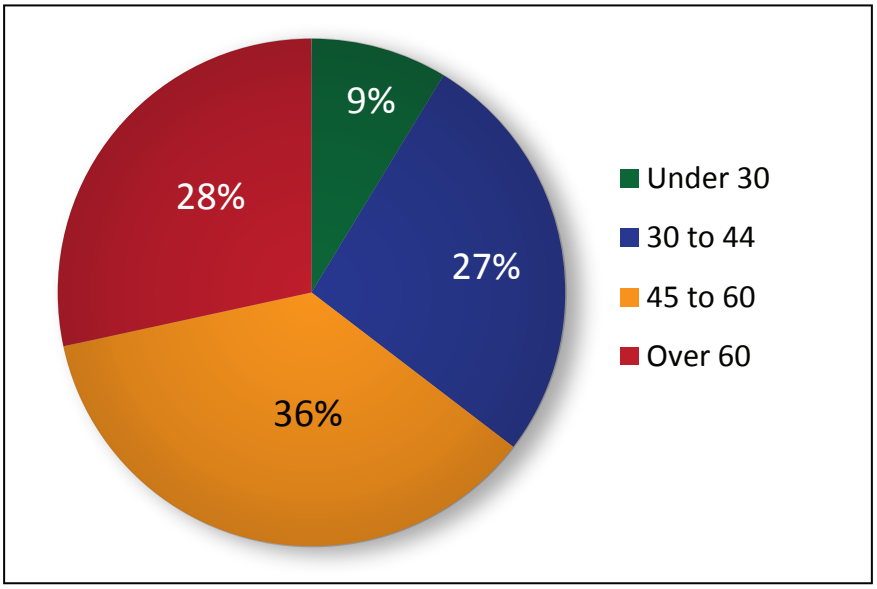


Figure 50. Age Distribution - Question 34

Households were reported to have persons of various age groups according to the following percentages

Table 24. Age Group Distribution - Question 35

	Number of persons from each age group							
	0	1	2	3	4	5	6	7
18 or younger	36.3%	17.6%	14.4%	3.6%	0.9%	0.5%	0.5%	0.2%
19 to 24	36.1%	8.5%	5.2%	1.8%	0.5%	0.2%	0.2%	0.2%
25 to 29	36.1%	5.9%	6.1%	2.3%	0.3%	0.2%	0.2%	0.0%
30 to 39	36.1%	10.0%	9.6%	3.0%	0.6%	0.5%	0.2%	0.2%
40 to 59	36.3%	13.7%	10.8%	2.6%	0.9%	0.2%	0.3%	0.2%
60 or older	35.1%	7.1%	5.5%	1.7%	0.2%	0.2%	0.2%	0.0%

Race and ethnicity was distributed as follows:

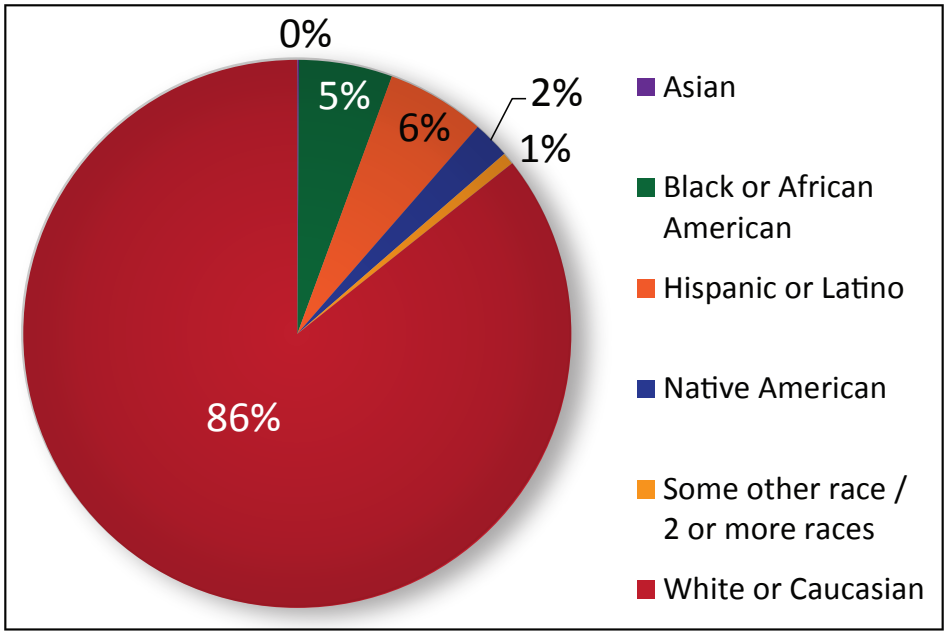


Figure 51. Race & Ethnicity Distribution - Question 36

Household income was distributed as follows:

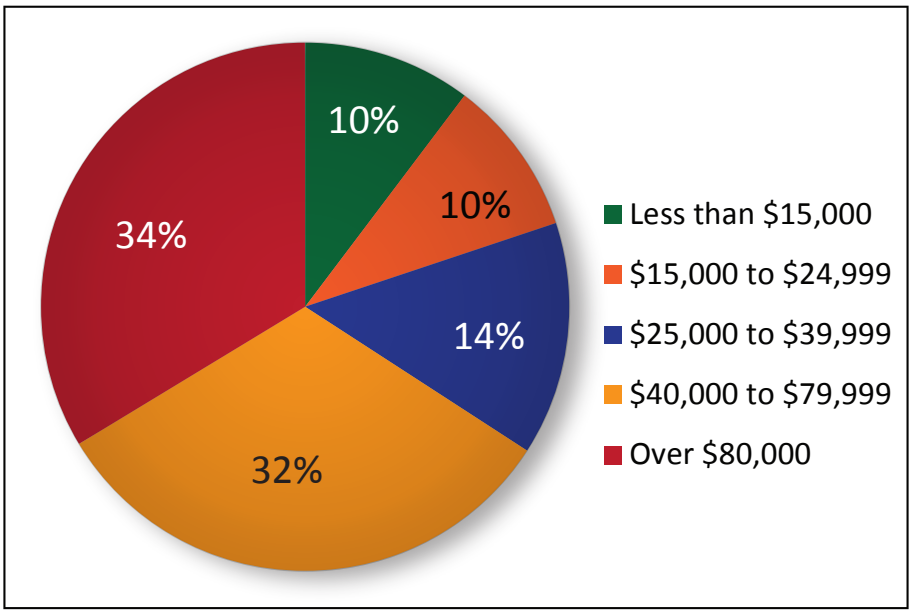


Figure 52. Household Income - Question 38

Educational attainment was distributed as follows:

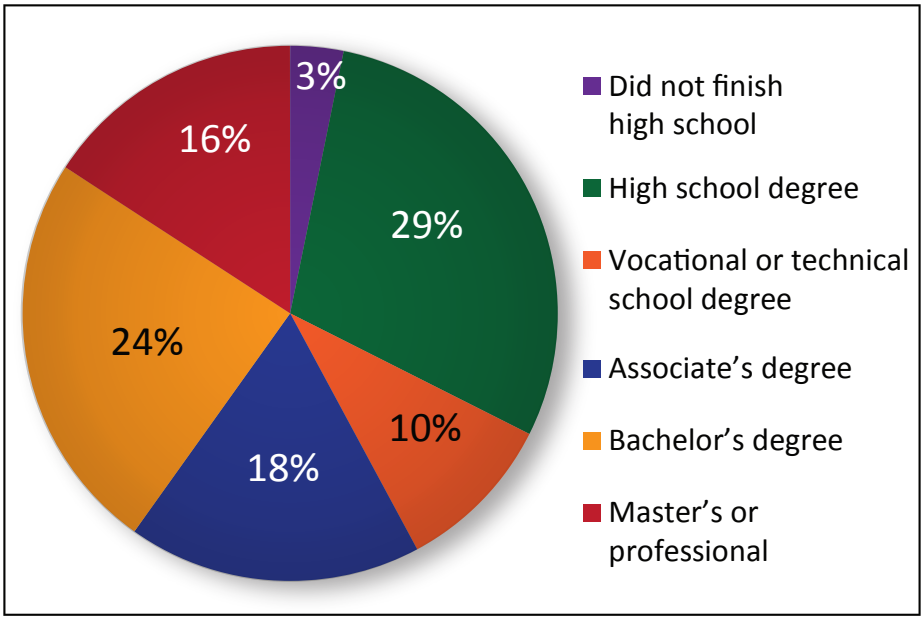


Figure 53. Educational Attainment - Question 39

Respondents were 53 percent male and 47 percent female.

Relationships between broadband access and income level, educational attainment level, and race and ethnicity are described in Table 25-27.

Table 25. Relationship between Broadband Access and Household Income Level

Household Income Level	Number of respondents with and without home internet		Percentage with and without home internet by income level		Percentage at each income level with and without home internet	
	With	Without	With	Without	With	Without
Less than $15,000	19	42	3%	30%	31%	69%
$15,000 to $24,999	29	28	5%	20%	51%	49%
$25,000 to $39,999	66	19	12%	14%	78%	22%
$40,000 to $79,999	172	19	30%	14%	90%	10%
Over $80,000	191	9	34%	7%	96%	5%
No answer	87	21	15%	15%	81%	19%
Total	564	138	100%	100%	80%	20%

Table 26. Relationship between Broadband Access and Education Attainment Level

Educational Attainment Level	Number of respondents with and without home internet		Percentage with and without home internet by education level		Percentage at each income level with and without home internet	
	With	Without	With	Without	With	Without
Did not finish high school	8	14	1%	10%	36%	64%
High school degree	143	56	25%	41%	72%	28%
Vocational or technical degree	50	16	9%	12%	76%	24%
Associate's degree	111	10	20%	7%	92%	8%
Bachelor's degree	138	28	24%	20%	83%	17%
Master's/ professional/ doctorate	102	6	18%	4%	94%	6%
No answer	12	8	2%	6%	60%	40%
Total	564	138	100%	100%	80%	20%

Table 27. Relationship between Broadband Access and Race/Ethnicity

Race/Ethnicity	Number of respondents with and without home internet		Percentage with and without home internet by race/ethnicity		Percentage at each income level with and without home internet	
	With	Without	With	Without	With	Without
Asian	1		0%	0%	100%	0%
Black or African American	17	20	3%	14%	46%	54%
Hispanic or Latino	23	16	4%	12%	59%	41%
Native American	4	1	1%	1%	80%	20%
Some other race / 2 or more races	10	5	2%	4%	67%	33%
White or Caucasian	487	91	86%	66%	84%	16%
No answer	22	5	4%	4%	81%	19%
Total	564	138	100%	100%	80%	20%

Areas of Greatest Broadband Need (Current)

To identify underserved areas in which improved broadband access may have a particularly strong impact and may offer much-needed new opportunities to residents, a geographic model identifying areas of need was developed. This model identifies areas where lack of service, lack of broadband adoption by households, and low income combine to create a demand gap. The following were the specific factors used in the calculation:

- Current lack of coverage (fiber, cable, and DSL; NTIA data)
- Current low rates of broadband penetration (low estimated percentages of households that have broadband connections; FCC data)
- Generalized existing land use (priority is given to agricultural and residential areas because these are where isolated, underserved populations are most likely to reside; Florida Department of Revenue data)
- Low income (Census data)

The need score (N) was calculated as:

$$N = L + P + U + I$$

Where L is a score based on lack of existing coverage; P is a score based on low rates of existing household broadband connections; U is a land use score that prioritizes agricultural and residential uses; and I is a score indicated low median household income. The final score N is a number between 1 and 6.5. The final map shows areas by percentile rank of their N score.

The following are the GIS procedures used to develop the geographic component of the need model:

1. Create a single polygon layer combining the NTIA broadband coverage data that is provided in two layers, road segment (line) and census block (polygon). To do this, create a 1-foot buffer around the road segment layer, erase the census block layer from the resulting buffer layer, then merge the buffer layer with the census block layer. To calculate coverage deficiencies by census block, select census blocks that intersect

with the combined layer, and invert the selection to select uncovered census blocks. Census blocks lacking broadband coverage are assigned 1 point if they are lacking fiber coverage, 1 point if they are lacking cable coverage, and ½ point if they are lacking DSL coverage. This results in an "L" score between 0 and 2.5.

2. Using FCC broadband penetration data,[35] calculate a field containing the variable P, which depends inversely on what estimated percentage of households have broadband connections (using the BTOP—Broadband Technology Opportunities Program—definition):[36]
   - 0-200 out of every 1,000 households: 1 point
   - 201-400 out of every 1,000 households: 0.8 point
   - 401-600 out of every 1,000 households: 0.6 point
   - 601-800 out of every 1,000 households: 0.4 point
   - 801-1,000 out of every 1,000 households: 0.2 point
3. Load census tract data showing median household income by census tract from the 2010 Census. For the variable I, 1 point is added for census tracts where the median income is below the countywide median income ($41,174 per the 2010 Census estimate). 2 points are added for census tracts where the median income is below 50 percent of the countywide median income ($20,587).
4. Using Department of Revenue parcel use code data, create the variable U by adding 1 point for agricultural and residential existing land uses.
5. Use the Union function to combine the L, P, and I layers.
6. Use the Spatial join function to join the result of the union onto the U (parcel) layer.
7. Calculate a new field with the final need score N = L + P + U + I.

The results of this model are shown in Figure 54. Population density is not part of this model, therefore some areas of very low population density are indicated as having a high level of need. However, areas of zero population were excluded from the model.

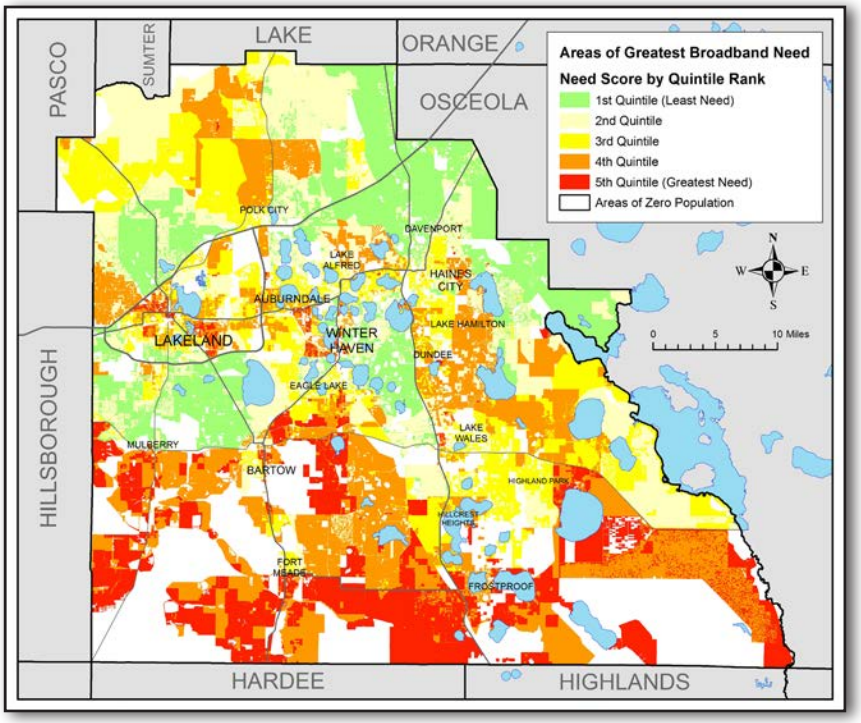


Figure 54. Areas of Greatest Broadband Need

35 FCC. "Local Telephone Competition and Broadband Deployment." http://transition.fcc.gov/wcb/iatd/comp.html
36 NTIA. "Broadband Technology Opportunities Program." http://www2.ntia.doc.gov/

PROJECTION OF FUTURE DEMAND

Although some methodologies for projecting broadband demand have been developed in the past,[37] no existing methodology was considered appropriate for applying to the Broadband Polk planning effort to project future demand. This was due in part to the unique characteristics of Polk County, in part to the limitations of existing methodologies (for example, some methodologies were designed for use in other countries, and some are based on outdated broadband technology such as DSL), and in part to the limitations of available data. Therefore, after a thorough literature review of broadband demand modeling methodology was conducted, an innovative spatial model was produced to project future broadband demand in Polk County.

This model projects broadband demand in the year 2020 by producing a weighted broadband demand score for all of Polk County, Florida. The weighted score is a number between 0 and 5, where 0 indicates the lowest broadband demand and 5 indicates the highest demand. The model inputs are Future Land Use, projections of population and employment, and estimates of current broadband penetration.

The smallest geographic units of measurement are land parcels. The model could also be aggregated to the level of census blocks, block groups, or tracts.

The model equation is as follows:

$$B = E + P + F + C$$

Where:

B is the broadband demand score (a number between 0 and 5).

E (see Figure 55) is the percentile rank of projected employment per square mile in 2020 for each TAZ. There are 621 TAZs in Polk County. This model ranks them according to their projected employment density in 2020, then assigns a percentile value (i.e. a number between 0 and 1) to each TAZ. The TAZs projected to have the highest employment density are in the 99th percentile, and thus receive a score of 0.99.

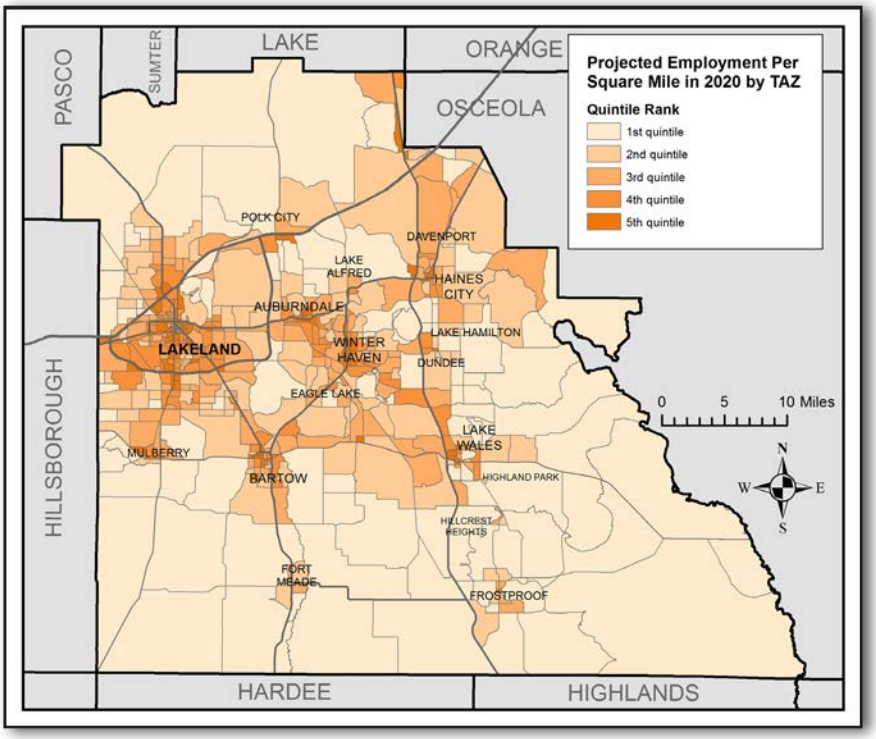


Figure 55. Percentile Rank of Projected 2020 Employment Per Square Mile (E)

37 For example: Carlo Hjelkrem, Kjell Stordahl, and Johannes Bøe. "Forecasting residential broadband demand with limited information – A long-term supply and demand model." Telektronikk 4.2004. http://www.telektronikk.com/volumes/pdf/4.2004/Page_043-049.pdf
Kjell Stordahl and Lars Rand. "Long term forecasts for broadband demand." Telektronikk 2/3.1999. http://www.telektronikk.com/volumes/pdf/2_3.1999/Page_034-044.pdf

P (see Figure 56) is the percentile rank of projected population per square mile in 2020 for each TAZ, calculated in the same manner as E.

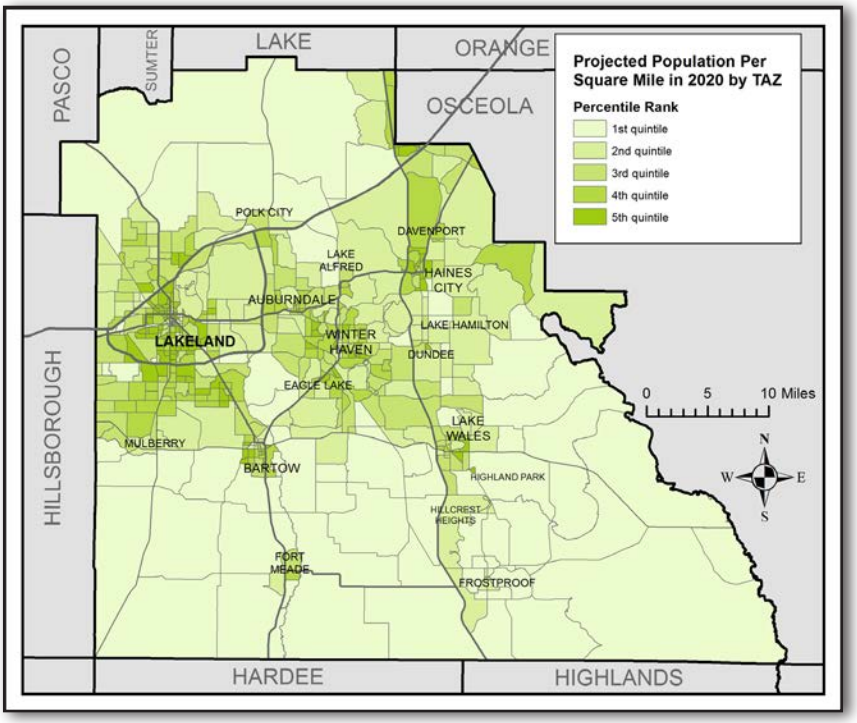


Figure 56. Percentile Rank of Projected 2020 Population Per Square Mile (P)

F (see Figure 57) is a Future Land Use score intended to give greater weight to Future Land Uses that are considered likely to have more intensive broadband needs. This score is either 0, 1, or 2. Polk County and the municipalities therein have approximately 150 different Future Land Use categories in total; these have been generalized, using a methodology previously developed by the Central Florida Regional Planning Council and based on the State of Florida's generalized Future Land Use categories, to produce a geographic dataset depicting 17 generalized Future Land Use categories for Polk County. (These categories are described in detail on page 100.)

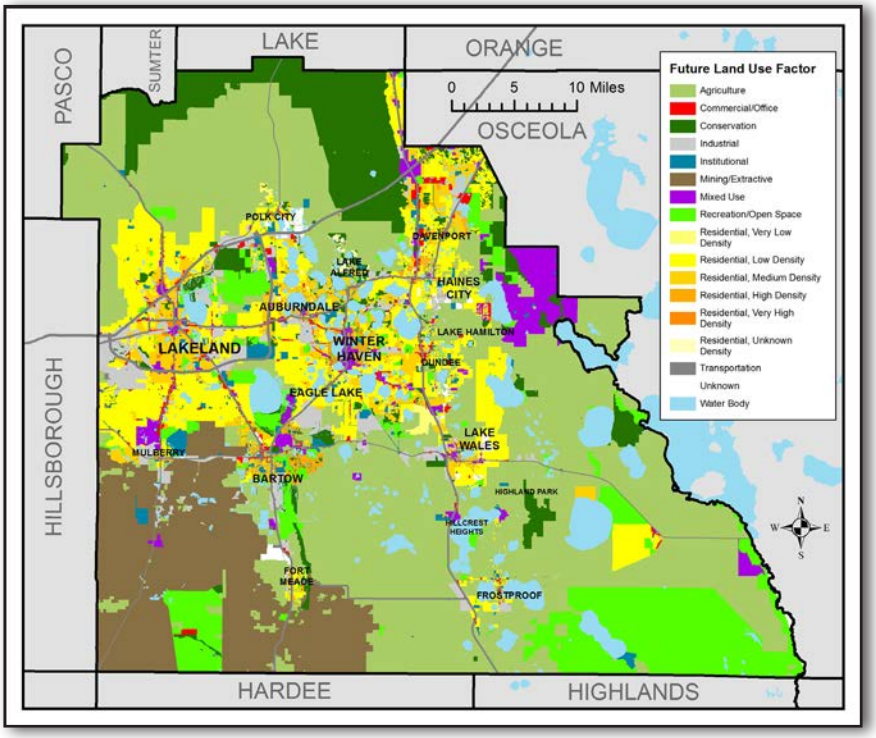


Figure 57. Future Land Use Score (F)

The Future Land Use scores assigned are listed in Table 28.

Table 28. Generalized Future Land Use Scores

Generalized Future Land Use	Score
Agriculture	1
Commercial/Office	2
Conservation	0
Industrial	1
Institutional/Public	2
Mining/Extractive	0
Mixed Use	1
Recreation/Open Space	0
Residential, High Density	1
Residential, Low Density	0
Residential, Medium Density	0
Residential, Unknown Density	0
Residential, Very High Density	1
Residential, Very Low Density	0
Transportation	0
Unknown	0
Water Body	0

Scores of F = 0 do not indicate that the area has zero projected broadband demand, because the other variables are still included in the broadband demand score. The Future Land Use categories expected to require the greatest overall bandwidth, Commercial/Office and Institutional/Public, are assigned a score of 2. Industrial, Mixed Use, and High/Very High Density Residential are assigned a score of 1. Other categories are assigned a score of 0.

C (see Figure 58) is the estimated number of fixed broadband (defined as 768 or more kbps download and 200 or more kbps upload) connections per 1,000 households. These data are collected at the census tract level by the FCC and are available at transition.fcc.gov/wcb/iatd/comp.html, listed under "Form 477 Filers by State." For the current iteration of this model, estimates as of June 30, 2011 were used.

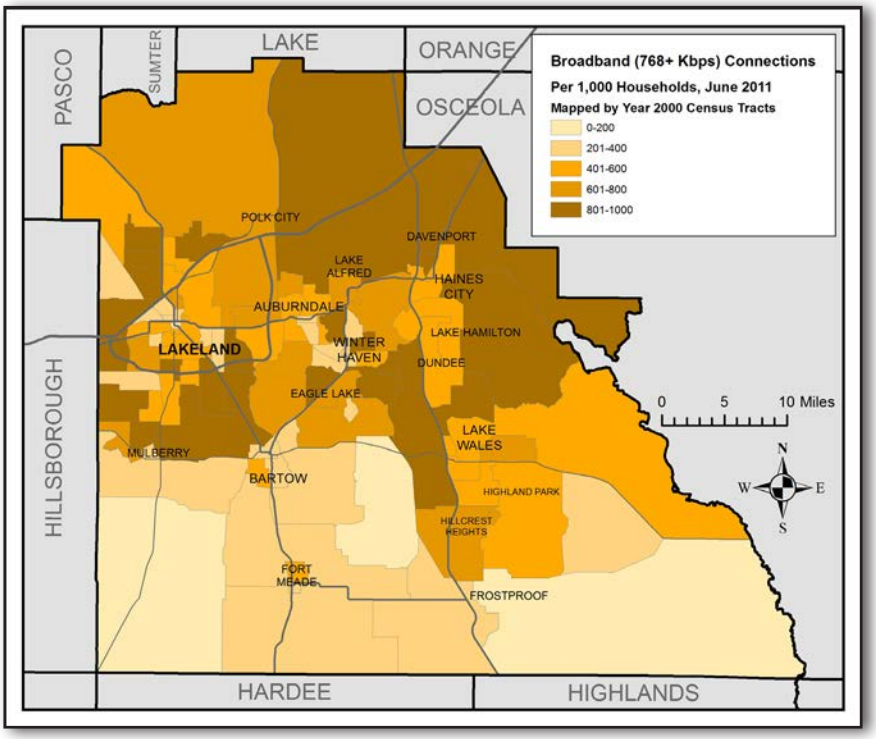


Figure 58. Estimated Broadband Connections Per 1,000 Households (C)

Connections per 1,000 households are scored as shown in Table 29.

Table 29. FCC Data Values for Variable "C"

Value of C	Connections per 1,000 Households
0	0
0.2	1 - 200
0.4	201 - 400
0.6	401 - 600
0.8	601 - 800
1	800 – 1,000

Weighted Broadband Demand Score

Finally, in order to produce a weighted score for a given county or region, a percentile ranking is generated for the original broadband demand scores (B) of all the geographic units. This percentile ranking is the final Weighted Broadband Demand Score. The combination of the four variables is illustrated conceptually in Figure 59.

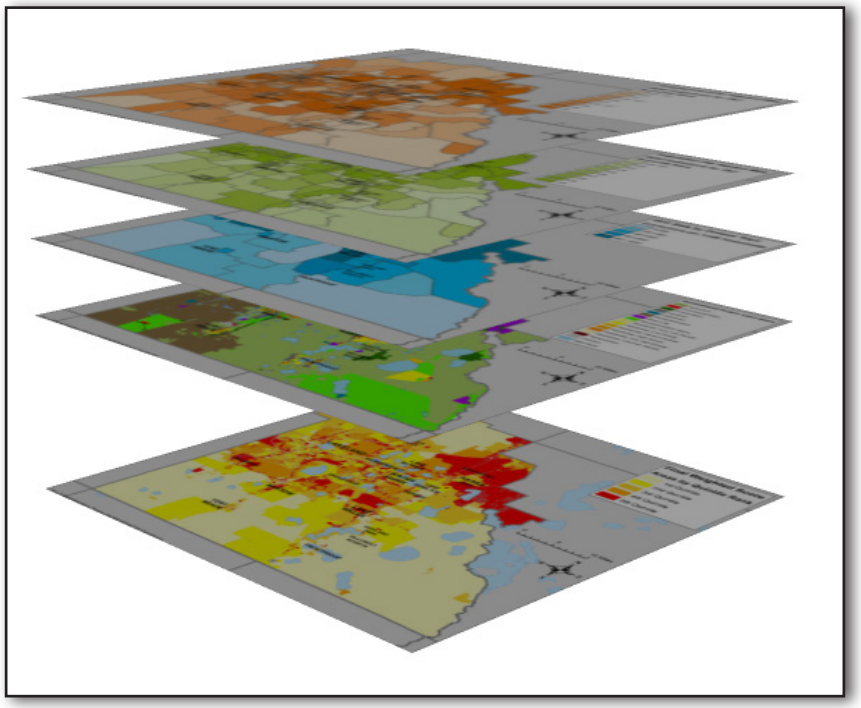


Figure 59. Data Layer Assembly to Produce the Final Model

GIS Analysis Procedure

The following geographic datasets were used:

- Polk County parcels
- Polk County Traffic Analysis Zones, with projections of population and employment for 2020, and percentile ranks of each TAZ's population and employment (percentile ranks were produced in Excel and joined to the existing TAZ feature class)
- Polk County Generalized Future Land Use (created by the Central Florida Regional Planning Council; see page 100 for a full description of this dataset) joined to the Future Land Use scores (Table 30)
- Census tracts joined to FCC broadband coverage data

The following steps were taken to produce the final Weighted Broadband Demand Score dataset:

1. In ESRI ArcGIS, perform a spatial join with the parcel layer as the target feature class and TAZs as the join feature class. The join operation is “Join one to one” and the match option is “Closest.” All target features are retained. No search radius is specified.
2. Union the resulting dataset to the Generalized Future Land Use feature class, using an XY tolerance of 10 feet to avoid producing very small features.
3. Union the resulting dataset to a census tract level dataset indicating the number of fixed broadband connections per 1000 households (FCC data available at http://transition.fcc.gov/wcb/iatd/comp.html, listed under “Form 477 Filers by State”). Use an XY tolerance of 10 feet.
4. Clip the dataset to the boundaries of the parcel layer to produce a clean parcel-level dataset.
5. Dissolve the resulting dataset at the level of the Parcel ID field, so that there is one record per parcel.
6. Clean up dataset as necessary (there may be extraneous fields).
7. Add and calculate a new field B = E + P + F + C in the resulting dataset.
8. The percentile ranking can be calculated and displayed in the final map.

Most operations were performed in a GIS ModelBuilder model that is shown in Figure 60.

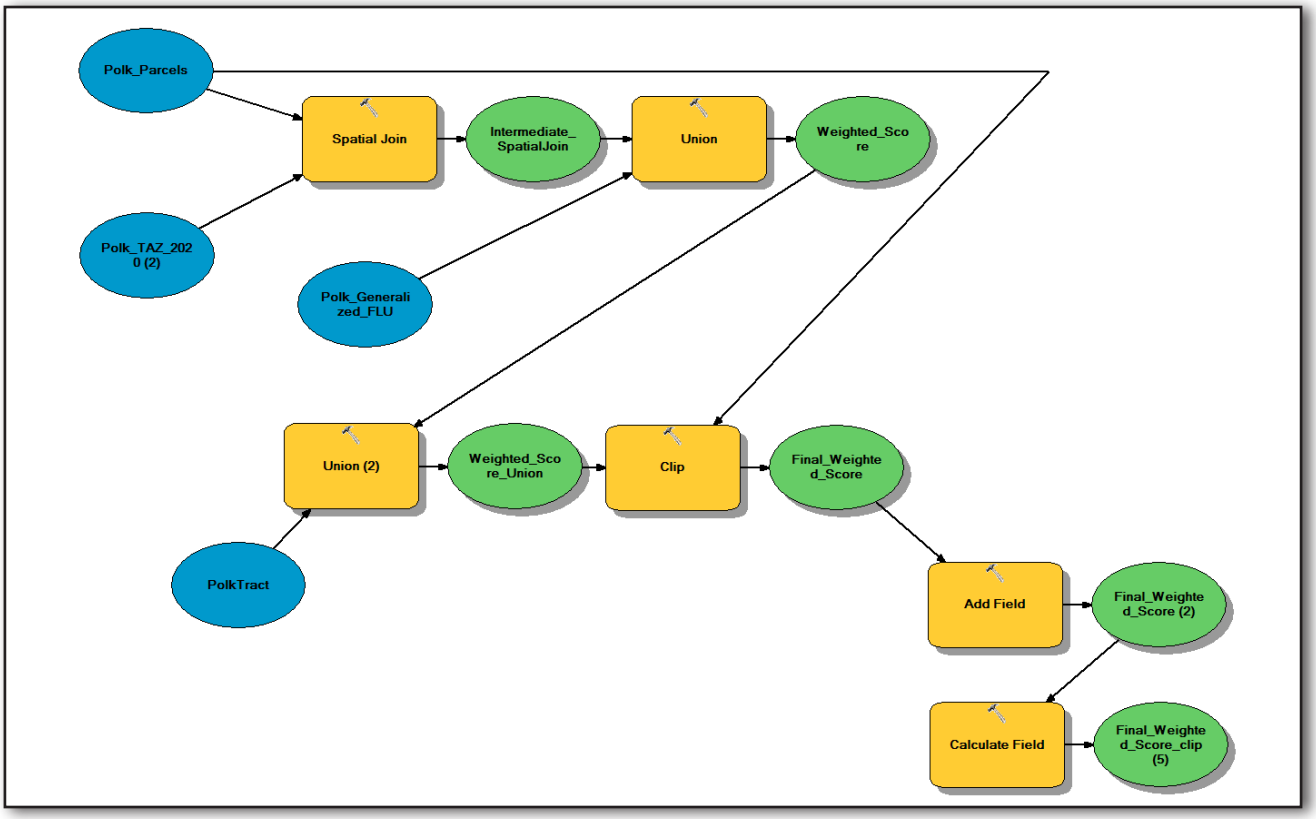


Figure 60. ESRI ArcGIS ModelBuilder Data Model

The final outcome of the demand model is shown in Figure 61.

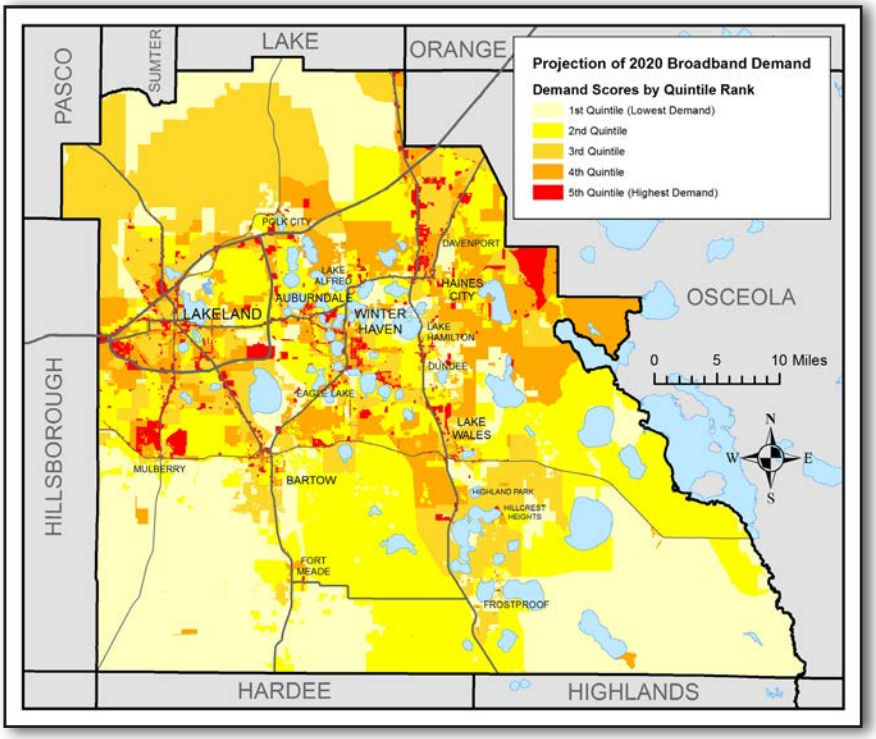


Figure 61. Weighted Broadband Demand, Projected for 2020

Data sources: Central Florida Regional Planning Council, Broadband Florida, Federal Communications Commission, Polk Transportation Planning Organization

The model results allow for the production of a more generalized "heat map" identifying the areas in the county that are likely to have the highest broadband demand. Figure shows an example of such a heat map: a ¼-mile buffer is drawn around all the areas that are in the top quintile (i.e. the areas shown in red in Figure 62).

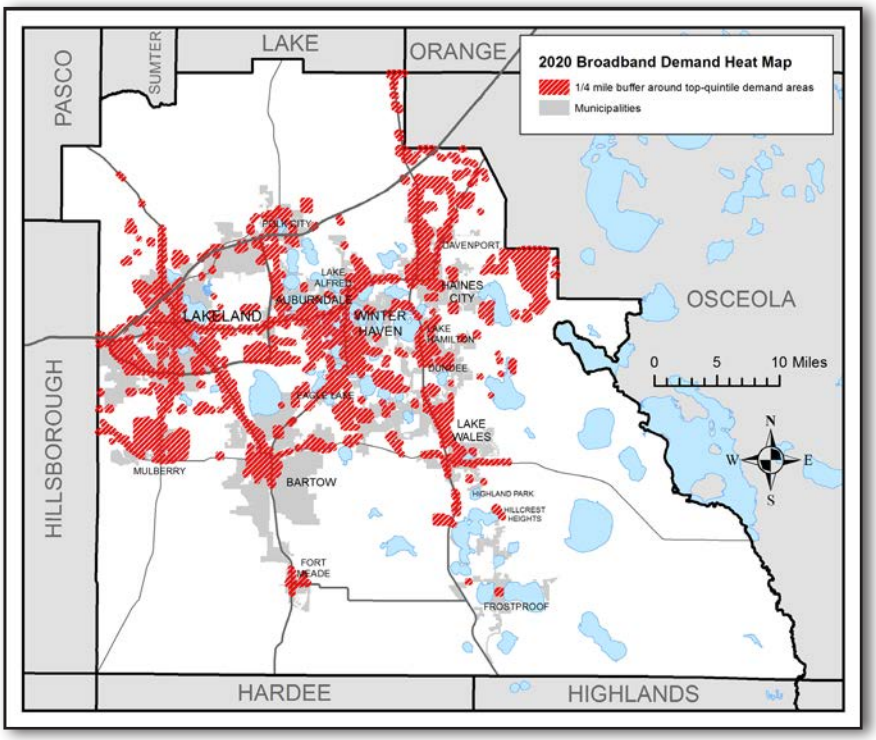


Figure 62. 2020 Broadband Demand Heat Map

Data sources: Central Florida Regional Planning Council, Broadband Florida, Federal Communications Commission, Polk Transportation Planning Organization

Generalized Future Land Use Methodology

Future Land Use Maps and Future Land Use goals, objectives, and policies were obtained for each jurisdiction. The goals, objectives, and policies in each Comprehensive Plan Future Land Use Element were reviewed to determine the definitions of the original Future Land Use categories for each jurisdiction. Standardized tables were created based upon the Future Land Use data acquired. Once table standardization was complete, the generalized Future Land Use categories were applied. It was imperative to review the jurisdictional definitions to determine the correct Generalized Future Land Use because some jurisdictions use the same, or similar, names for quite different land uses.

Each original Future Land Use category was assigned a generalized Future Land Use category. Classifications were determined individually for each local government to ensure the best fit with the generalized categories. For example,

If City X has categories for 1 – 3 dwelling units per acre, 3+ - 9 units per acre, and 9+ - 22 units per acre, these would be classified as Low Density Residential, Medium Density Residential, and High Density Residential.

If City Y has categories for 1 – 4 dwelling units per acre, 4.0+ - 7 units per acre, and 7+ – 12 units per acre, these would be classified as Low Density Residential, Medium Density Residential, and Medium Density Residential – there would be no High Density Residential for this city.

Note that each jurisdiction may include various land uses in one category. For example, one may have Central Business District in which the land uses are professional and commercial, which would be classified as Commercial. Another may include residential uses in the Central Business District, therefore causing this jurisdiction's CBD to be classified as Mixed Use.

A review of boundaries was performed. All Future Land Use datasets were restricted to their jurisdictional boundaries to ensure that no duplication or overlaps would occur that would otherwise distort results. A final general review and quality control check of sample areas was performed.

Generalized Future Land Use categories are described in Table 30.

Table 30. CFRPC Generalized Future Land Use Category Descriptions

Generalized Future Land Use Category	Description
Very High Density Residential (RVH)	Residential development 25 dwelling units (DU) per acre and greater, but generally greater than that allowed in the High Density Residential category.
Residential, High Density (RH)	Residential development up to approximately 25 dwelling units per acre, but generally greater than that allowed in the Medium Density Residential category.
Residential, Medium Density (RM)	Residential development up to approximately 12 dwelling units per acre, but generally greater than that allowed in the Low Density Residential category.
Residential, Low Density (RL)	Residential development up to approximately 5 dwelling units per acre, but greater than that allowed in the Very Low Density Residential category.
Residential, Very Low Density (RVL)	Residential development of less than one dwelling unit per acre.
Residential, Unknown Density (RU)	Residential development of which the density is unknown or unspecified.
Agriculture (AG)	Land specifically designated as Agricultural in the comprehensive plan. May include silvicultural or ranching uses. Occasionally includes extremely low residential densities, in the range of 1DU/100 acres primarily, but occasionally as high as 1 DU/10 acres. This is often the default Future Land Use for rural areas.
Recreation/Open Space (REC)	Public or privately owned/operated recreational sites or facilities to include both active and passive recreational opportunities (All Recreation, Open Space, Parks, Public Active, Water Dependent uses [beach], Institutional/ Recreational, recreational/public mixed use, Golf course, corridor open space, Multi-purpose open space, greenbelt, commercial recreation [low intensity outdoor rec uses-campgrounds, fish camps, etc.], natural resources/rec/open space, rural recreation and other recreational or open space categories).
Conservation (CONS)	Areas known to require environmental protection from development, areas being preserved that contain wetlands and/or habitats that serve to protect valuable threatened species and natural resources (Private and public conservation lands, Wetlands categories, passive recreation, institutional/conservation, marsh, conservation open space, public resource, wetland conservation, natural resource, conservation/floodplains, resource management/recreation, resource protection, passive park/buffer area, potential environmentally significant, preserve, environmentally sensitive lands, environmental systems corridor, conservation/protected, conservation/restricted).

Institutional/Public (INST)	Property designated as City, county, state, federal or other government, private or institutional entities (Institutional, governmental, public/semi-public, public facilities, public land [except parks], Federal, Military, church use/religious, educational/schools, private well field, public grounds [except park], hospitals, utilities [treatment plants, water wells], quasi-public).
Mining/Extractive (MINE)	Mining and mineral or natural resource extraction uses, including pits.
Industrial (IND)	Indoor manufacturing, assembling, fabricating, and warehouse activities conducted indoors, mini-storage (heavy, light and medium industrial, planned industrial, industrial, industrial park, planned industrial park, general industrial, industrial employment center, wholesale commercial, commercial/industrial, airport industrial).
Commercial/Office (COM)	Property designated as stores, offices or other establishments used to serve the needs of the public (General Commercial, Commercial, Neighborhood Commercial, commercial/manufacturing, low intensity commercial, general commercial development, limited commercial development, downtown business, marine commercial, high intensity commercial, commercial and services [including lodging], historical resources, marina, tourist commercial, local convenience center, mixed commercial industrial, central business district, office/commercial, office, wholesale, community commercial, highway commercial, mixed use commercial, water oriented commercial, business, retail services, historic commercial, lakefront commercial, business district overlay, regional commercial, integrated office commercial, limited interchange, commercial village, Lodging, hotel/resort, RV Park, tourist accommodations).
Mixed Use (MU)	Planned Unit Developments (PUDs) (Mixed Use, regional activity center, Commercial/Residential, commercial/industrial, shoreline mixed use, residential/recreation, regional mixed use, residential/professional, downtown mixed use, mixed use planning district, residential/business, community mixed development, mixed use neighborhood, urban village, town center, redevelopment area, DRIs, Coordinated Development District, Planned Community).
Transportation (TRAN)	Right of way, airports, transportation utilities, etc.
Water Body (WAT)	Not all Future Land Use maps include water as a category. In these cases, water bodies include a land use for an adjacent use.
Unknown (UNK)	Information not available.

CONCLUSION AND RECOMMENDATIONS

In a typical planning process, the goals that are set will require significant amounts of time and resources to achieve. Therefore, creative and strategic thinking is necessary in order to devise ways to achieve challenging goals while making optimal use of resources. To guide the implementation of goals, it is helpful to develop strategies. The strategies for the Polk County Broadband Plan were developed with input from a working session of the Broadband Polk Advisory Committee and via a worksheet on which goals could be prioritized and draft strategies submitted. Polk Vision, the Polk Vision's Infrastructure Task Force, the Broadband Polk Advisory Committee and the public all provided input for the strategies.

The strategies are accompanied by specific action items that will be undertaken by those who will implement the plan, in order to close identified current and future gaps in broadband coverage and to fulfill the vision and goals of the plan. The action items were drafted and reviewed by the Committee. The strategies and action items are presented in this final section. Table shows the relationships between specific goals, strategies, and action items.

Strategies

1. **Co-location:** Advocate for communication, cooperation, and partnerships between utility providers, municipalities, transportation planning organizations and broadband providers; allowing resources, easements, rights-of-way and infrastructure to be shared when expanding or upgrading services to Anchor Institutions.
2. **Competition:** Increase affordability and improve services to Anchor Institutions by encouraging and advocating for robust broadband marketplace competition, including Next Generation Networks, Florida LambdaRail, and municipal fiber enterprises.
3. **Anchor Institution Funding Sources:** Ensure that Anchor Institutions are aware of, and utilizing, all available funding sources, including but not limited to e-rate programs, grants, tax incentives, and private financing.
4. **Neighborhood Broadband Centers:** Eliminate gaps in service, equity, and affordability by establishing broadband access points in community centers, churches, shopping centers, parks, schools, and other community-based organizations. Provide public-access computers where possible and increase capacity where such facilities already exist, such as in libraries.
5. **Wi-Fi Zones:** Encourage local municipalities and counties to provide public Wi-Fi, especially in central business districts and dense neighborhoods.
6. **Technical Literacy and Training:** Encourage providers and industry experts to conduct a variety of workshops and training exercises, ranging from basic computer skills to more advanced applications of broadband technology.
7. **Residential Funding Sources:** Encourage local governments and organizations such as CRAs and neighborhood groups to undertake projects that increase broadband availability, taking advantage of funding opportunities such as grants, tax incentives, and public-private partnerships.
8. **Broadband Audits:** Encourage annual evaluations of Anchor Institutions by broadband providers and/or **industry experts to identify methods to increase efficiency and maximize resources.**
9. **Employee Suggestion Programs:** Encourage Anchor Institutions to establish programs to reward employees who submit new ideas for utilizing broadband services efficiently, effectively, and for the benefit of Polk County businesses and residents.
10. **Attract Broadband Intensive Industries:** Partner with local municipalities, universities, and economic development agencies to attract high-tech industries, including research and development facilities that

require very high capacity broadband infrastructure.

11. **Public-Private Partnerships:** Develop partnerships, programs, and incentives to provide broadband services to small towns and rural communities.
12. **Non-Residential Funding Sources:** Encourage business associations, downtown redevelopment agencies, and other business-related organizations to undertake projects that increase broadband availability, taking advantage of funding opportunities such as grants, tax incentives, and public-private partnerships.
13. **Increase Demand:** Increase public awareness of mobile broadband technology and applications through public service announcements, educational/training programs, technology fairs/conferences, and fostering a cultural change to maximize mobile broadband services at the local level.
14. **Decrease Obstacles:** Revise local regulations to eliminate potentially unnecessary restrictions or obstacles to installing services and infrastructure. Advocate at the State and Federal level for favorable regulations for the development of mobile systems, including the availability of spectrum.
15. **Development Policy:** Facilitate "fiber-to-the-home" infrastructure within new residential communities through the development and adoption of broadband infrastructure policies within the county and municipal comprehensive plans and/or land use and zoning codes.
16. **Share and Communicate Ideas:** Partner with broadband providers to share goals, assets, strategies, and obstacles.
17. **Local Government Broadband Enterprises:** Encourage local municipalities and counties with fiber or other broadband infrastructure to enter the broadband marketplace.
18. **Telecommuting/Work-At-Home Policies:** Increase residential demand by encouraging employers to adopt strategies and policies allowing employees the opportunity to telecommute.

Action Items

1. Develop and maintain a Broadband Polk website to serve as the central hub for information sharing, communication, cooperation, and partnerships.
2. Identify all Anchor Institutions in Polk County that do not have 1 gigabit per second broadband services.
3. Meet with broadband providers to identify any obstacles to providing 1 gigabit per second services to the identified Anchor Institutions.
4. Encourage municipalities and new commercial providers to enter the Polk County broadband market.
5. Meet with University of South Florida representatives to discuss how Polk County could access and utilize Florida LambdaRail services.
6. Utilize the Broadband Polk webpage, social media, and email distribution lists to promote and disseminate broadband infrastructure and program funding information to Anchor Institutions.
7. Review broadband use at every library in Polk County to ensure that they are utilizing all available broadband funding opportunities.
8. Identify gaps in broadband service and utilization, especially due to affordability or education, and seek to establish Neighborhood Broadband Centers (see Strategy #4) where none currently exist.
9. Research opportunities and establish funding sources for the development of Neighborhood Broadband Centers.
10. Meet with broadband providers to discuss and develop a broadband audit program within Polk County.
11. Meet with Anchor Institutions to introduce the broadband audit program and encourage participation.

12. Meet with Anchor Institutions to encourage the development of meaningful employee suggestion programs, specifically programs that encourage and/or incentivize employees to submit ideas that use broadband technology to increase efficiency and improve services.
13. Reward and/or recognize Anchor Institutions that implement policy or programs that utilize broadband technology to increase efficiency and improve services.
14. Meet with business owners and business associations to discuss broadband access, broadband training opportunities, and funding opportunities.
15. Work with Chambers of Commerce and local economic development organizations to identify broadband intensive industries to target.
16. Reward and/or recognize broadband providers that provide expanded access for businesses and business districts.
17. Provide incentives for broadband providers to offer workshops and training exercises.
18. Develop a series of Public Service Announcements designed to promote Polk County's broadband assets, including mobile broadband, and to brand Polk County as a technological and educational hub within Florida's High Tech Corridor.
19. Establish partnerships with print, radio, television, and internet media outlets to promote the development, and highlight the advantages, of the highest speed broadband technologies available, including mobile.
20. Promote technology fairs and conferences within Polk County that include the latest broadband and mobile broadband technologies and applications.
21. Encourage Polk County and local municipalities to review and revise (if necessary) their Comprehensive Plan policies, Land Development regulations, and Zoning codes to eliminate any unnecessary restrictions or burdens upon the installation of broadband infrastructure, including towers.
22. Establish a Polk County Broadband Advocacy Committee whose primary objective is to advocate for broadband development, education, and utilization at the local, State, and/or Federal level.
23. Encourage Polk County and all 17 local municipalities to develop and adopt broadband infrastructure policies within their comprehensive plans, establishing broadband as an essential infrastructure similar to roads, water, sewer, or electricity.
24. Establish quarterly meetings with representatives from local broadband providers to communicate ideas and share information.
25. Meet with local municipalities and Polk County to discuss the advantages and disadvantages of establishing local government broadband enterprises and providing broadband services to local business and residents.
26. Meet with local broadband providers to discuss the current obstacles to providing 100/50 mbps services to Polk County residents and explore solutions, including public/private partnerships.
27. Work with the local chambers of commerce to encourage and promote telecommuting for employees of Polk County businesses.

Table 31. Relationships between Goals, Strategies, and Action Items

Goals	Strategies	Action Items
Anchor Institutions such as schools, hospitals, libraries, and government buildings will have affordable access to a minimum of 1 gigabit per second broadband services.	1, 2, 3	1, 2, 3, 4, 5, 6, 7, 10, 11, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25
Every resident of Polk County will have access to affordable high-speed internet services and the skills to utilize it, if they choose.	4, 5, 6, 7	1, 4, 7, 8, 9, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27
Anchor Institutions (including energy providers) will maximize utilization of broadband services and technologies in order to increase efficiency, maximize resources, and provide the best services possible to the businesses and residents of Polk County.	8, 9	1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 15, 18, 19, 20, 21, 22, 23, 24, 25
Every business and non-profit in Polk County will have access to affordable high-speed internet services and the skills to utilize it, if they choose.	10, 11, 12	1, 4, 10, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27
Polk County will have the fastest, most affordable, and most accessible mobile networks possible.	13, 14	1, 4, 10, 15, 16, 18, 19, 20, 21, 22, 23, 24, 27
205,000 households (79% of households) in Polk County will have affordable access to actual download speeds of at least 100 megabits per second and actual upload speeds of at least 50 megabits per second.	15, 16, 17, 18	1, 4, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27

GLOSSARY OF TERMS

3G – The third generation of mobile broadband technology, used by smart phones, tablets, and other mobile devices to access the web.

4G – The fourth generation of mobile broadband technology, offering faster access than 3G.

Anchor institution – Schools, libraries, medical and healthcare providers, public safety, community colleges and other institutions of higher education, and any other community support organizations and entities that facilitate greater use of broadband services (NTIA definition).

Bandwidth – The amount of data transmitted in a given amount of time; usually measured in megabits per second (mbps).

Bit – The basic unit of information in computing and telecommunications. A contraction of "binary digit"

Broadband - High-speed Internet access that is always on and faster than dial-up access (National Broadband Plan definition).

Byte – A unit of digital information in computing and telecommunications that most commonly consists of 8 bits.

Cable – A form of broadband Internet access that uses cable television infrastructure.

CRA – Community Redevelopment Agency.

Dial-up - A technology that uses an existing telephone line to access the internet, using the same frequency range as voice communication and therefore blocking telephone calls while connected.

Download – To receive data to a local system from a remote system.

DSL (Digital Subscriber Line) – a technology that uses an existing telephone line to access the internet, using a higher frequency than voice communication and therefore allowing telephone calls to be made simultaneously with internet activity.

Fiber (Optical Fiber) – a flexible, transparent fiber made of glass (silica) or plastic, slightly thicker than a human hair, which transfers data by means of light, allowing for transmission of data over longer distances and at higher bandwidths than other forms of communication.

Florida High Tech Corridor – a region spanning 23 counties across the Florida peninsula, including Polk County as well as the Space Coast and the Orlando, Tampa Bay, Sarasota, and Daytona Beach metropolitan areas, designated by the Florida High Tech Corridor Council, an initiative of the University of Central Florida.

Gbps (gigabits per second) – 1,000,000,000 bits per second. A measure of how fast data can be transmitted.

Gigabyte – A unit of digital information equal to 1 billion bytes.

Guyed tower – A tower supported by guy-wires.

HD (High Definition) – Video of a higher resolution than is standard.

I-4 Corridor – The region along Interstate 4 in central Florida, consisting of the Tampa, Orlando, and Daytona Beach areas as well as Polk County.

IPTV (Internet Protocol television) – A system through which television services are delivered using the Internet, instead of being delivered through terrestrial, satellite signal, and cable television formats.

Kbps (kilobits per second) – 1,000 bits per second. A measure of how fast data can be transmitted.

Kilobyte – A unit of digital information equal to 1,000 bytes.

LambdaRail – A high-speed national network infrastructure owned and operated by the U.S. research and education community that runs over fiber-optic lines.

Mbps (megabits per second) – 1,000,000 bits per second. A measure of how fast data can be transmitted.

Megabyte – A unit of digital information equal to 1 million bytes.

Monopole tower – A self-supporting tower in which the conductor is a single straight rod-shaped conductor.

Remote Diagnosis – In medicine, the act of diagnosing a given symptom, issue, or problem from a distance by means of an information exchange via a wire or wireless connection.

Self-supporting tower – A free-standing tower that is not supported by guy-wires.

Server – A physical computer dedicated to run one or more services to serve the needs of the users of other computers on a network.

SMS (Short Message Service) – A text messaging service component of phone, web, or mobile communication systems, using standardized communications protocols that allow the exchange of short text messages between fixed line or mobile phone devices.

Spectrum – A range of radio-wave frequencies.

Streaming - A technology in which media (such as a video or music) is constantly received by and presented to the end-user while being delivered by a provider. Allows media to be viewed or listened to while it is being downloaded. Live streaming allows a live event (such as a lecture) to be viewed as it occurs.

Supercomputer – A computer at the frontline of current processing capacity, particularly speed of calculation.

Telecommuting – A work arrangement in which employees do not commute to a central place of work, but instead work at remote locations, such as their homes or public places.

Telemedicine – The use of telecommunication and information technologies to provide clinical health care at a distance.

Telepresence – A set of technologies that allow a person to feel as if they were present, to give the appearance of being present, or to have an effect, at a place other than their true location.

Upload – To send data from a local system to a remote system.

VoIP (Voice Over Internet Protocol) – A technology that employs a data network (such as a broadband connection) to transmit voice conversations in real time.

Wi-Fi – A technology that allows an electronic device to exchange data wirelessly (using radio waves) over a local area computer network.

Wireless – Internet service transmitted via cellular towers, satellite, Wi-Fi, or other technologies that do not require the use of land-based infrastructure lines.

Wireline – Internet service transmitted through infrastructure on, near, or under the ground, such as copper telephone wires or coaxial cable.

BIBLIOGRAPHY

Brookings Institution "An International Look at High-Speed Broadband" by Darrell M. West, Feb. 2010. http://www.brookings.edu/reports/2010/0223_broadband_west.aspx

Bureau of Labor Statistics Employment Data http://www.bls.gov/data/

Carriker, Roy R "Comprehensive Planning for Growth Management in Florida" Food and Resource Economics Department EDIS document FE642. http://ufdc.ufl.edu/IR00001351/00001

Central Florida Development Council (2008) "Industry Cluster Analysis of Polk County" http://cfdc.org/wp-content/uploads/2009/03/industry-cluster-analysis-of-polk-county-11708.pdf

Central Florida Regional Planning Council "Comprehensive Economic Development Strategy 2012: Economic Development District VII" http://www.cfrpc.org/CEDS-2012.pdf

Conglose, John B. "Ohio State University Comprehensive Planning Fact Sheet" http://ohioline.osu.edu/cd-fact/1269.html

Department of Management Services "Grants Assistance for Community Anchor Institutions" http://www.dms.myflorida.com/suncom/broadband_florida_initiative/broadband_grants_assistance_team

Department of Management Services "Grants Assistance for Community Anchor Institutions" http://www.dms.myflorida.com/suncom/broadband_florida_initiative/broadband_grants_assistance_team

Federal Communications Commission "Deployment of Advanced Telecommunications Capability: Second Report" http://transition.fcc.gov/Bureaus/Common_Carrier/Orders/2000/fcc00290.pdf

Federal Communications Commission "Genachowski Remarks on Plan to Create 100,000 Jobs" http://www.fcc.gov/document/genachowski-remarks-plan-create-100000-jobs

Federal Communications Commission "Local Telephone Competition and Broadband Deployment" http://transition.fcc.gov/wcb/iatd/comp.html

Federal Communications Commission "National Broadband Plan, p. 84" http://download.broadband.gov/plan/national-broadband-plan-chapter-5-spectrum.pdf

Federal Communications Commission "National Broadband Plan Executive Summary" http://www.broadband.gov/plan/executive-summary/

Federal Communications Commission "Notice of Inquiry" http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-11-51A1.pdf

Federal Communications Commission "What is Broadband?" http://www.broadband.gov/about_broadband.html

Fiber To The Home Council "FTTH Community Toolkit" http://www.ftthcouncil.org/p/cm/ld/fid=106#reg

Florida Department of Economic Opportunity "Employment Projections" http://www.floridajobs.org/labor-market-information/data-center/statistical-programs/employment-projections

Florida Municipal Electric Association "The Case for Municipal Broadband in Florida," p. 6. http://www.muninetworks.org/sites/www.muninetworks.org/files/2005%20-%20fmea_white_paper.pdf

Hjelkrem, Carlo, Kjell Stordahl, and Johannes Bøe "Forecasting residential broadband demand with limited information – A long-term supply and demand model" Telektronikk 4.2004 http://www.telektronikk.com/volumes/pdf/4.2004/Page_043-049.pdf

Missouri Broadband Now "Broadband Speeds" http://mobroadbandnow.com/broadband-101/broadband-speeds/

National Aeronautics and Space Administration "Space Communications and Navigation" http://www.nasa.gov/directorates/heo/scan/spectrum/txt_accordion3.html

National Telecommunications and Information Administration "Broadband Technology Opportunities Program" http://www2.ntia.doc.gov/

National Telecommunications and Information Administration "State Broadband Initiative" http://www2.ntia.doc.gov/SBDD

New Hampshire Broadband Action Plan, Appendix http://www.nheconomy.com/uploads/Broadband-Action-Plan-Appendices.pdf

Polk Vision website "About Polk Vision" http://polkvision.com/about-polkvision/

Rapid Systems "Hardee County Broadband Project" http://www.rapidsys.com/hardee/default2.asp

Rapid Systems "Hardee County Frequently Asked Questions" http://rapidsys.com/hardee/faq.html

Recovery website "Update: Recovery Broadband Funds 100 Percent Awarded" http://www.recovery.gov/news/featured/pages/broadband.aspx

Southwest Florida Water Management District "Green Swamp" http://www.swfwmd.state.fl.us/education/interactive/greenswamp/greenswamp.html

Stordahl, Kjell and Lars Rand "Long term forecasts for broadband demand" Telektronikk 2/3.1999. http://www.telektronikk.com/volumes/pdf/2_3.1999/Page_034-044.pdf

United States Census Bureau American FactFinder http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

United States Census Bureau website "Traffic Analysis Zones" http://www.census.gov/geo/www/cob/tz_metadata.html

United States Census Bureau "State & County QuickFacts" http://quickfacts.census.gov/qfd/index.html

United States Department of Education "E-Rate Program" http://www2.ed.gov/about/offices/list/oii/nonpublic/erate.html

Washington Department of Information Services "Creating Opportunities for Washington: A Report on Broadband in Washington State" http://broadband.wa.gov/sites/default/files/docs/WashingtonStateBroadbandReport.pdf

APPENDIX A: GOAL AND STRATEGY WORKSHEET

2020 Goals:

Please provide draft strategies to accomplish each goal in the blank spaces.

Please prioritize goals by writing the numbers 1 through 6 in the boxes, where 1 indicates the highest priority.

Goal #1:
Anchor Institutions (including energy providers) will maximize utilization of broadband services and technologies in order to increase efficiency, maximize resources, and provide the best services possible to the businesses and residents of Polk County.

Strategies:

Goal #2:
Anchor Institutions such as schools, hospitals, libraries, and government buildings will have affordable access to a minimum of 1 gigabit per second broadband services.

Strategies:

Goal #3:
Polk County will have the fastest, most affordable, and most accessible mobile networks possible.

Strategies:

Goal #4:
205,000 households (79% of households) in Polk County will have affordable access to actual download speeds of at least 100 megabits per second and actual upload speeds of at least 50 megabits per second.

Strategies:

Goal #5:
Every resident of Polk County will have access to affordable high-speed internet services and the skills to utilize it, if they choose.

Strategies:

Goal #6:
Every business and non-profit in Polk County will have access to affordable high-speed internet services and the skills to utilize it, if they choose.

Strategies:

BROADBAND Opportunity · Innovation · Efficiency Polk

CFRPC www.cfrpc.org

PolkVision CREATING OUR FUTURE www.polkvision.com

Proposed New Goals:

Please fax, scan and e-mail, or mail this form to Eric Labbe at the Central Florida Regional Planning Council.
Fax: (863) 534-7138
E-mail: elabbe@cfrpc.org
Mail: Central Florida Regional Planning Council, 555 E Church St, Bartow FL 33830
http://polkvision.com/areas-of-focus/infrastructure/broadband/

APPENDIX B: BUSINESS AND RESIDENTIAL SURVEYS

BUSINESS SURVEY

BROADBAND Polk
Opportunity · Innovation · Efficiency

"Access to high-speed Internet is no longer a luxury, but an essential tool to compete in this 21st-century economy. The availability of this technology is critical to attracting the business and development that will create the good paying jobs that stay in the United States."
- Kathy Dahlkemper, former U.S. Representative

The purpose of this survey is to gain an accurate idea of current and future broadband (High Speed Internet) needs in order to plan for future broadband infrastructure improvements. Thank you for your participation.

1. Does your organization have internet service?
   ❑ Yes ❑ No ❑ Not sure

   If you answered "No" or "Not sure" then please skip to Question 27.

2. About how many employees are there at your location? ☐

3. What is your best estimate of how many employees at your location use the internet at work? ☐

4. What is your best estimate of what your company's internet costs each month?
   - ❑ Less than $25 a month
   - ❑ $25 to $49/month
   - ❑ $50 to $99/month
   - ❑ $100 to $149/month
   - ❑ $150 to $199/month
   - ❑ $200 to $349/month
   - ❑ $350 to $499/month
   - ❑ $500 to $999/month
   - ❑ $1,000 to $1,499/month
   - ❑ $1,500 or more a month
   - ❑ Not sure

5. Does that cost include something else besides the internet connection, e.g., security, phone, etc.?
   ❑ Yes ❑ No ❑ Not sure

6. Based on what you pay for internet service and what it provides for your company, would you say your internet service is:
   - ❑ Excellent value
   - ❑ Good value
   - ❑ Fair value
   - ❑ Poor value
   - ❑ Not sure

7-8. For which of the following purposes does your organization use the internet? Select all that apply.
   - ❑ Research
   - ❑ Social media
   - ❑ Selling merchandise or products or services
   - ❑ Supply chain management
   - ❑ Finance/banking
   - ❑ Communication
   - ❑ Teleconferencing
   - ❑ Telecommuting
   - ❑ Data management
   - ❑ Marketing
   - ❑ Education/continuing education
   - ❑ Entertainment
   - ❑ Geographic information
   - ❑ Security
   - ❑ Other:_____

   _____

9. Please rate your organization's internet speed on a scale of 1 to 10. ☐
   (10 = exceptional, 1 = severely limiting)

10. On a scale of 1 to 10, where 10 means definitely and 1 means definitely not, how likely is it that your organization will need a faster internet connection in:

    The next year? ☐

    The next 3 years? ☐

11. What would your company like to do via the internet that it cannot do now because of the speed of your internet connection? _____

    _____

    _____

    _____

12-13. What prevents your company from getting a faster internet connection? Select all that apply.
   - ❑ Boss/corporate doesn't value a faster connection
   - ❑ Not in the budget
   - ❑ Up-front costs are too high
   - ❑ The connection speed will still vary, so it's not worth it
   - ❑ Business is not good - poor economy
   - ❑ Too expensive
   - ❑ Costs more than it's worth
   - ❑ Have fastest connection available
   - ❑ Don't really need a faster connection
   - ❑ Other:_____

   _____

   _____

14-15. High speed internet connections can be valuable to companies for many different reasons. For which of the following reasons is high speed internet most important to your company? Select all that apply.

- ❑ Banking
- ❑ Marketing
- ❑ Supply chain management
- ❑ Government forms and registrations
- ❑ Telephone system
- ❑ Computer system
- ❑ Teleconferencing
- ❑ Getting to websites
- ❑ Accessing global markets
- ❑ Accessing continuing education
- ❑ Networking
- ❑ Selling our products and services
- ❑ Access to data sources
- ❑ Other:_____

_____

_____

16. Please indicate to what extent you agree or disagree with the following statements:

17. A fast internet connection is critical for maintaining your company's competitiveness.

- ❑ Strongly agree
- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree
- ❑ Strongly disagree
- ❑ Not sure

18. A fast internet connection is critical for being able to produce and deliver the services or products your company provides to customers.

- ❑ Strongly agree
- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree
- ❑ Strongly disagree
- ❑ Not sure

19. A fast internet connection is critical for the survival of your company.

- ❑ Strongly agree
- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree
- ❑ Strongly disagree
- ❑ Not sure

20. Does your organization have a Wifi connection?

❑ Yes ❑ No ❑ Not sure

21. How many devices that connect to the internet, such as computers, iPads, tablets, smart phones, etc. does your organization have? [ ]

22. How many more such devices do you expect to add in the next year? [ ]

23-24. What are the download and upload speeds of your internet connection? (*Not sure? Please check at a free speed test site, such as www.speedtest.net or www.broadband.gov/qualitytest*)

25. What is your approximate download speed? *(in Mbps or Kbps)* [ ]

26. What is your approximate upload speed? *(in Mbps or Kbps)* [ ]

The next 2 questions are for businesses without internet *only*. If you answered questions 2 through 26, please skip straight to question 30.

27. Does your company have computers?

❑ Yes ❑ No ❑ Not sure

28-29. What is the ***number one*** reason why your company does not have internet service? (Select one)

- ❑ Company does not need computers to survive
- ❑ Want to keep our employees from using the internet
- ❑ Upfront costs are too high
- ❑ Monthly charges are too high
- ❑ Too much money for what you get
- ❑ Slow connection in our area
- ❑ Not available in our area
- ❑ Employees don't know much about computers
- ❑ Other:_____

_____

_____

30. We have some brief profile questions to ensure we're reaching a cross section of businesses:

31. In which county is this organization?

- ❑ Charlotte
- ❑ Collier
- ❑ DeSoto
- ❑ Glades
- ❑ Hardee
- ❑ Hendry
- ❑ Highlands
- ❑ Lee
- ❑ Okeechobee
- ❑ Polk

32-33. Which of these best describes your business sector?

- ❑ Government
- ❑ Public safety
- ❑ Schools K to 12
- ❑ Higher education
- ❑ Library
- ❑ Utilities
- ❑ Healthcare
- ❑ Retail
- ❑ Warehousing/distribution
- ❑ Office/professional
- ❑ Restaurant/entertainment
- ❑ Industrial/mining
- ❑ Manufacturing
- ❑ Agriculture
- ❑ Recreational
- ❑ Other:_____

34. What is your company's zip code? [ ]

RESIDENTIAL SURVEY

BROADBAND Polk
Opportunity · Innovation · Efficiency

"Broadband is the indispensable infrastructure of our 21st century economy."
- Julius Genachowski, Chairman of the Federal Communications Commission

The purpose of this survey is to gain an accurate idea of current and future broadband (High Speed Internet) needs in order to plan for future broadband improvements. Thank you for your participation.

1. Do you have internet service in your home?
   ❑ Yes ❑ No ❑ Not sure

   If you answered "No" or "Not sure" then please skip to Question 23.

2. To the best of your knowledge, what type of internet service do you have?
   ❑ High speed (e.g., DSL, cable modem, fiber)
   ❑ Mobile internet for a phone or tablet
   ❑ Dial up
   ❑ Not sure

3. If you have some other type of internet service, please indicate: _____

4. Do you have a wireless router set up in your home?
   ❑ Yes ❑ No ❑ Not sure

5. How many devices that connect to the internet, such as computers, iPads, tablets, Kindles, iPods, Tivo, xBox, PlayStation, etc., do you have in your home? ☐

6. How many more such devices will your household add in the next year? *(please give your best estimate)* ☐

7. On a scale of 1 to 10, how important is high speed internet to members of your household?
   10 = couldn't live without it!
   1 = no big deal. ☐

8. Including yourself, how many people live full-time in your household? ☐

The next few questions relate to your internet usage versus that of all members of your household.

Entertainment

9. How often do **you** use the internet at home for entertainment purposes like games, movies, Facebook, planning vacations, and other types of entertainment?
   ❑ Almost constantly when at home
   ❑ Several times a day
   ❑ A few times a day
   ❑ About once a day
   ❑ 4 or 5 times a week
   ❑ 2 or 3 times a week
   ❑ Once a week
   ❑ Once every few weeks
   ❑ Almost never
   ❑ Never
   ❑ Not sure

10. How often do **all members of your household** *(including yourself)* use the internet at home for entertainment purposes like games, movies, Facebook, planning vacations, and other types of entertainment?
   ❑ Almost constantly when at home
   ❑ Several times a day
   ❑ A few times a day
   ❑ About once a day
   ❑ 4 or 5 times a week
   ❑ 2 or 3 times a week
   ❑ Once a week
   ❑ Once every few weeks
   ❑ Almost never
   ❑ Never
   ❑ Not sure

Shopping

11. How often do **you** use the internet at home for online shopping?
   ❑ Almost constantly when at home
   ❑ Several times a day
   ❑ A few times a day
   ❑ About once a day
   ❑ 4 or 5 times a week
   ❑ 2 or 3 times a week
   ❑ Once a week
   ❑ Once every few weeks
   ❑ About once a month
   ❑ A few times a year
   ❑ Almost never
   ❑ Never
   ❑ Not sure

12. How often do **all members of your household** use the internet at home for online shopping?
   ❑ Almost constantly when at home
   ❑ Several times a day
   ❑ A few times a day
   ❑ About once a day
   ❑ 4 or 5 times a week
   ❑ 2 or 3 times a week
   ❑ Once a week
   ❑ Once every few weeks
   ❑ About once a month
   ❑ A few times a year
   ❑ Almost never
   ❑ Never
   ❑ Not sure

Finances

13. How often do you use the internet at home for online banking or paying bills?
- ❑ Almost constantly when at home
- ❑ Several times a day
- ❑ A few times a day
- ❑ About once a day
- ❑ 4 or 5 times a week
- ❑ 2 or 3 times a week
- ❑ Once a week
- ❑ Once every few weeks
- ❑ About once a month
- ❑ A few times a year
- ❑ Almost never
- ❑ Never
- ❑ Not sure

14. How often do **all members of your household** use the internet at home for online banking or paying bills?
- ❑ Almost constantly when at home
- ❑ Several times a day
- ❑ A few times a day
- ❑ About once a day
- ❑ 4 or 5 times a week
- ❑ 2 or 3 times a week
- ❑ Once a week
- ❑ Once every few weeks
- ❑ About once a month
- ❑ A few times a year
- ❑ Almost never
- ❑ Never
- ❑ Not sure

Education

15. How often do **you** use the internet at home for educational purposes like online classes, research for school, certification and other types of education?
- ❑ Almost constantly when at home
- ❑ Several times a day
- ❑ A few times a day
- ❑ About once a day
- ❑ 4 or 5 times a week
- ❑ 2 or 3 times a week
- ❑ Once a week
- ❑ Once every few weeks
- ❑ About once a month
- ❑ A few times a year
- ❑ Almost never
- ❑ Never
- ❑ Not sure

16. How often do **all members of your household** use the internet at home for educational purposes like online classes, research for school, certification and other types of education?
- ❑ Almost constantly when at home
- ❑ Several times a day
- ❑ A few times a day
- ❑ About once a day
- ❑ 4 or 5 times a week
- ❑ 2 or 3 times a week
- ❑ Once a week
- ❑ Once every few weeks
- ❑ About once a month
- ❑ A few times a year
- ❑ Almost never
- ❑ Never
- ❑ Not sure

Work

17. How often do **you** use the internet at home for business-related tasks such as telecommuting, accessing an office network, buying or selling related to work, checking out competitors, or doing work assignments?
- ❑ Almost constantly when at home
- ❑ Several times a day
- ❑ A few times a day
- ❑ About once a day
- ❑ 4 or 5 times a week
- ❑ 2 or 3 times a week
- ❑ Once a week
- ❑ Once every few weeks
- ❑ About once a month
- ❑ A few times a year
- ❑ Almost never
- ❑ Never
- ❑ Not sure

18. How often do **all members of your household** use the internet at home for business-related tasks such as telecommuting, accessing an office network, buying or selling related to work, checking out competitors, or doing work assignments?
- ❑ Almost constantly when at home
- ❑ Several times a day
- ❑ A few times a day
- ❑ About once a day
- ❑ 4 or 5 times a week
- ❑ 2 or 3 times a week
- ❑ Once a week
- ❑ Once every few weeks
- ❑ About once a month
- ❑ A few times a year
- ❑ Almost never
- ❑ Never
- ❑ Not sure

---

19. Let's say your home internet connection was 5 times faster than it is now. Would you use the internet at home more for any of the following things if your connection were 5 times faster? Check all that apply.
- ❑ Entertainment
- ❑ Online shopping
- ❑ Online banking/paying bills
- ❑ Education
- ❑ Business

---

20. Do you or any members of your household:
- ❑ Have a home business
- ❑ Telecommute
- ❑ Do business-related work on a computer at home

---

21. What is your best estimate of what your internet connection at home costs?
- ❑ Less than $20 a month
- ❑ $20 to $29/month
- ❑ $30 to $49/month
- ❑ $50 to $74/month
- ❑ $75 to $99/month
- ❑ $100 to $124/month
- ❑ $125 to $149/month
- ❑ $150 to $199/month
- ❑ $200 or more a month

---

22. Does that cost include something else besides the internet connection, such as cable TV, mobile phone, etc.?
- ❑ Yes
- ❑ No
- ❑ Not sure

NO INTERNET AT HOME?
Questions 23 through 31 are for households *without* an internet connection. *If you have an internet connection, please skip ahead to question 32.*

If you had an internet connection at home, how likely would your household members be to use the internet at home for…

23. Online shopping?
- ❑ Very likely
- ❑ Not at all likely
- ❑ Somewhat likely
- ❑ Not sure

24. Online classes, research for school, certification and other types of education?
- ❑ Very likely
- ❑ Not at all likely
- ❑ Somewhat likely
- ❑ Not sure

25. Games, movies, Facebook, planning vacations, and other types of entertainment?
- ❑ Very likely
- ❑ Not at all likely
- ❑ Somewhat likely
- ❑ Not sure

26. Business-related tasks such as researching issues, telecommuting, accessing an office network, buying or selling related to work, checking out competitors, or doing work assignments?
- ❑ Very likely
- ❑ Not at all likely
- ❑ Somewhat likely
- ❑ Not sure

27. Online banking or paying bills?
- ❑ Very likely
- ❑ Not at all likely
- ❑ Somewhat likely
- ❑ Not sure

28-29. What's the ***number one*** reason why you don't have internet service at home? Check only one.
- ❑ Too expensive
- ❑ Too much money for what you get
- ❑ Slow connection in my area
- ❑ Not available in my area
- ❑ Don't know much about computers
- ❑ Get internet at work, school, library, etc. (Don't need it at home)
- ❑ Other:_____

_____

30-31. What are some other reasons why you don't have internet service at home?
- ❑ Too expensive
- ❑ Too much money for what you get
- ❑ Slow connection in my area
- ❑ Not available in my area
- ❑ Don't know much about computers
- ❑ Get internet at work, school, library, etc. (Don't need it at home)
- ❑ Other:_____

_____

We have some brief demographic questions to ensure we're reaching a cross section of people.

32-33. In which county do you live?
- ❑ Charlotte
- ❑ Hendry
- ❑ Collier
- ❑ Highlands
- ❑ DeSoto
- ❑ Lee
- ❑ Glades
- ❑ Okeechobee
- ❑ Hardee
- ❑ Polk

34. How old are you?
- ❑ Under 30
- ❑ 45 to 60
- ❑ 30 to 44
- ❑ Over 60

35. How many of the people in your household are:

18 or younger?		30 to 39?	
19 to 24?		40 to 59?	
25 to 29?		60 or older?	

36-37. How do you describe yourself?
- ❑ White or Caucasian
- ❑ Black or African American
- ❑ Hispanic or Latino
- ❑ Asian
- ❑ Other:_____

38. How much was your total household income for 2011?
- ❑ Less than $15,000
- ❑ $15,000 to $24,999
- ❑ $25,000 to $39,999
- ❑ $40,000 to $79,999
- ❑ Over $80,000

39. What is the highest level of education you have achieved?
- ❑ Did not finish high school
- ❑ High school degree
- ❑ Vocational or technical school degree
- ❑ Associate's degree
- ❑ Bachelor's degree
- ❑ Master's or professional or doctorate degree

40. What is your zip code? [ ]

41. Are you:
- ❑ Male
- ❑ Female