



NORTHEAST COMPREHENSIVE CENTER

Ensuring Equal Access to Broadband for All Families

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Introduction

In today's digital age, the Internet has become a primary way society disseminates and accesses information. Society relies on the Internet in various sectors making it a vital tool in the day-to-day activities of citizens (National Telecommunications and Information Administration, 2010). The Internet has become embedded in the fabric of our society; and without it merely conducting our lives becomes a difficult feat (National Telecommunications and Information Administration, 2010). Additionally, Internet that is not reliable - due to poor connection - and not convenient - due to slow speeds - makes retrieving and sharing information a daunting task. Broadband Internet remedies the following issues through its 24/7 accessibility and fast speed. With society becoming increasingly fast-paced, access to broadband Internet is extremely necessary. Broadband Internet access is important because it provides users with the ability to disseminate and access information instantly, can spur economic growth, and meet major challenges in the education system.

Broadband Internet access provides users with the ability to send and receive data at volumes of increasingly high speed. According to Wallace (2008) broadband Internet provides continuous connections and transmits data at high speeds through its "always on" connection and "two way" capability. As a result, broadband Internet makes information quickly accessible and expedites the lines of communication. Broadband Internet access reduces the wait-time in browsing, downloading, uploading, and streaming, which also makes it convenient and enjoyable for all activities (Illinois Fiber Resources Group, 2011). The speed of broadband Internet characterizes its appeal to users and due to its efficiency it has been recognized as a means to spur economic development.

According to the National Telecommunications and Information Administration (NTIA) broadband Internet can help address challenges in various sectors of society, specifically the economy and education. Scott (2012) states that research has demonstrated several reasons why broadband deployment may spur economic growth. These reasons include trade with foreign economies in services and globalization, transforming research and development, access to data, and the government streamlining public services (Scott, 2012). The NTIA recognizes broadband infrastructure as a “key engine in economic development” and states that broadband infrastructure arguably enables communities to attract, retain, and expand jobs. Additionally, the agency states that broadband infrastructure can create businesses and institutions; both would thrive on broadband Internet to function and operate accordingly (National Telecommunications and Information Administration, 2010). Much like businesses and institutions, access to high speed broadband Internet for K-12 education is vital to its operation and functionality (Fox, Waters, Fletcher, & Levin, 2011).

Broadband Internet access is an important tool to help students, teachers, and parents meet major challenges in education (Federal Communications Commission, 2010). Through broadband Internet access teachers can collaborate with colleagues, participate in online professional development, and analyze the results from online assessments immediately, which allow them to instantly personalize instruction for each student (Fox, Waters, Fletcher, & Levin, 2011). Broadband Internet access in schools can improve the capacity of teachers in today’s digital age; moreover it can serve as development and academic tools for students.

Through broadband Internet access, students can create engaging text and multimedia projects and access online resources to supplement resources found in their classrooms or local

libraries (National Telecommunications and Information Administration, 2010). Access also allows students to collaboratively conduct research with other students (Fox, Waters, Fletcher, & Levin, 2011). Schools are beginning to implement new blended learning initiatives such as flipped classrooms, which enable students to explore additional online content that supplements current and existing curricula. Broadband Internet access enables blended learning initiatives to extend beyond the confines of the physical classroom, and traditional school day for students and teachers.

Broadband's swift transfer of data and accessibility allows users to garner and share information quickly and conveniently. These features also can arguably encourage economic development and student learning; however not everyone has the opportunity to experience the rewards of broadband Internet access due to lack of access.

The gap that exists between those who have access and those who do not has been identified as being onset by several political and economic factors, which include race and income (Farley, 2005). The United States Census released data on a study on computer and Internet use in the United States. According to the study, in 2011, 117,534 households reported having the Internet in their home. Out of 117,534 households, 13% of Black families and 12% of Latino families reported having Internet access in their home. By comparison, 69% of white families reported having the Internet in their home (File, 2013). Although this data does not specifically state what kind of Internet the individuals in the study used, the significant gap between races illustrates the importance of ensuring broadband Internet access for all families (File, 2013).

According to Wallace (2008), broadband Internet access provides opportunities for socio-economic mobility, civic participation, and self-determination for the “working poor.” Additionally, families classified in this group may have increased economic opportunities and expand their democratic freedoms through access to broadband Internet (Wallace, 2008). Although Wallace (2008) references the “working poor,” all members of society can experience similar benefits through broadband access. Policymakers believe that the disparities that exist in broadband access across the United States could have adverse economic and social consequences for those who have been identified as the “have nots” (Kruger & Gilroy, 2013).

Access to broadband Internet is far more than having the ability to browse, download, stream, or upload content rapidly; broadband Internet access is important because of its possibility to improve America’s quality of life (National Telecommunications and Information Administration, 2010). Moreover, broadband Internet reduces the gap between families who have access and those who do not, and arguably develops contributing members of society.

Definitions

The following is a list of basic terms used to provide context on the brief:

- **Broadband:** Broadband refers to telecommunication in which a wide band of frequencies is available to transmit information. Information can be multiplexed and transmitted on numerous frequencies or channels within the band concurrently, allowing more information to be transmitted (Schneiderman, 2006).
- **Digital Divide:** The digital divide is used to describe the disconnect between populations who do have access to technological resources and those who do not. Technological

resources can be defined as the telecommunication services, television, and/or the Internet (The Tech Dictionary and IT Encyclopedia, 2014). The digital divide describes populations who often have limited access to education, those living in rural communities and those who are negatively impacted by socioeconomic status.

- **Digital Literacy:** Digital Literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills (District Dispatch, 2013). Literacy includes the ability to read and interpret media, to reproduce data and images through digital manipulation, and to evaluate and apply new knowledge gained from digital environments (Jones-Kavalier and Flannigan, 2011).
- **Digital Training:** Digital Training, in regard to digital literacy, is the process of teaching digital skills in order to acquire greater digital literacy.
- **Multiple System Operator and Multiple Services Operator (MSO):** Multiple System Operator and Multiple Services Operator are used interchangeably. Multiple System Operators (MSO) manage and govern multiple cable television systems. The majority of system operators install cable systems in more than one community and supply services such as cable television, broadband Internet, and telephone service (Federal Communications Commission, 2010).

- National School Lunch Program: Students from families with incomes below 185% of the poverty level are eligible for free or reduced prices in the federal School Lunch Program. Students from families reporting income between 130% and 185% of the federal poverty line are eligible for reduced-priced meals, while children from families with incomes below 130% of the federal poverty line are eligible for a fully subsidized, or “free” meal. The National Lunch Program provides cash subsidies for free and reduced-price lunches to students based on family income and size (National Center for Education Statistics, 2009).
- Rural: All territory, population, and housing units located in places with a population less than 2,500 (National Center for Education Statistics, 2014).
- Suburban: All territory, population, and housing units inside an urbanized area and outside a principal city (National Center for Education Statistics, 2014).
- Urban: All territory, population, and housing units located in places with a population of 2,500 or more (National Center for Education Statistics, 2014).

Develop a Detailed Sense of the Current Options available in New York

Providing Context on the Current Demography in New York

New York State is not free of the implications of the digital divide in regard to low broadband adoption (New York State Broadband Map, 2011). Approximately 1.225 million total

free and reduced lunch students accounting for 45.1 % of the total student population (National Center for Education Statistics, 2009) lack access to broadband Internet. Further, rural communities lack the infrastructure to access broadband Internet (New York State Broadband Map, 2011). Broadband Internet availability and broadband Internet adoption are two separate issues that impact broadband access in New York State (New York State Broadband Office, 2013). Broadband Internet availability refers to the physical access of high-speed Internet service to the population. Broadband adoption refers to the percentage of the population who subscribe to broadband service in their communities (New York State Broadband Office, 2013).

The number of people able to access broadband Internet in the state of New York has steadily grown over the past decade (New York State Broadband Program Office, 2013). As of 2012, 93% of households have access to broadband Internet, an 11% climb in availability from 82% in 2011 (New York State Broadband Program Office, 2013). There are approximately 18.3 million people in the state of New York that have broadband Internet access (New York State Broadband Program Office, 2013). However, there are approximately 1.1 million people who lack access to broadband Internet at the minimum speed threshold established by legislators in New York in 2012 for the ConnectNY program (New York State Broadband Program Office, 2013). Further, while availability of broadband Internet in regions throughout the state are above 90%, there are still several regions without access to broadband Internet. Particularly, in the Allegany, Chautauqua, Oneida, and Saratoga counties, less than 1% of the population has access to broadband Internet (New York State Broadband Program Office, 2013). While broadband is currently available to nearly 97% of the total population in the New York City metropolitan area, approximately 66% of those living in the New York City metropolitan area do

not have access to affordable high-speed Internet access (New York State Broadband Program Office, 2010; New York State Broadband Program Office, 2013).

There are two significant barriers to broadband Internet access: availability and price (Visser and Ball, 2010). These two barriers are determined by existing telecommunications infrastructure in the area of service, as well as by local, state, and federal telecommunications policies (Visser and Ball, 2010). Local infrastructure determines the availability of broadband services and the speed of broadband Internet. In New York State, there is a disparity between access to broadband Internet in urban and suburban communities, and rural communities (New York State Broadband Program Office, 2013). Communities with higher housing densities generate positive return on investment for MSOs, resulting in urban communities having increased availability of broadband Internet and higher broadband Internet speed (New York State Broadband Program Office, 2013). In less dense areas, MSOs do not possess enough consumers per square mile to allow for recovery of capital costs in order to build new infrastructure (New York State Broadband Program Office, 2007). MSOs are not able to generate enough revenue to support annual maintenance, pole rentals, and operating costs of serving customers (New York State Broadband Program Office, 2007). As a result, availability of higher quality broadband Internet, in regard to speed, is limited to urban and suburban communities, while rural communities remain underserved (New York State Broadband Program Office, 2013). Rural communities living in the last mile of broadband service lack the same quality of broadband Internet in regard to speed (Bajarin, 2013). The last mile of broadband service in rural communities does not possess capable infrastructure necessary for providing faster broadband Internet comparable to urban and suburban communities (New

York State Broadband Program Office, 2007). Infrastructure quality is higher in densely populated areas.

In 2012, nearly 70% of New Yorkers used broadband Internet in their home (New York State Broadband Program Office, 2013). This is slightly higher than the national average of 65% for those who have broadband Internet access in their homes (New York State Broadband Program Office, 2013). Since 2009, the percentage of customers has remained consistent (New York State Broadband Program Office, 2013). In addition, the numbers of Americans who have adopted broadband Internet have remained relatively consistent in regard to those who have adopted broadband Internet access in their home (New York State Broadband Program Office, 2013). There are approximately 6.4 million people who do not subscribe to broadband Internet (New York State Broadband Program Office, 2013). New York's low broadband adoption rate is similar to the national average.

The 18% of the population that does not have broadband Internet access state that cost is the main barrier (New York State Broadband Program Office, 2010). The mean broadband Internet cost in the state of New York in 2010 was \$47 per month (Creswell, 2011). This cost appears to be too high, because in 2010 only 37% of the population in New York State with annual income of \$20,000 per year or below subscribed to broadband Internet at home (Creswell, 2011). The Federal poverty income level in 2014 for a family of four is \$23,850 per year (U.S. Department of Health & Human Services, 2014). All free and reduced lunch students throughout the State of New York fall around the Federal poverty level. This is problematic because it means that there is a high likelihood that these free and reduced lunch students do not have access to broadband Internet.

There are also two significant barriers to broadband Internet adoption. (Visser and Ball, 2010) These barriers are perceived relevance of broadband Internet and digital literacy (Visser & Ball, 2010). Perceived relevance and digital literacy are influenced by individual behavior (Visser & Ball, 2010). A lack of digital literacy is common among those who do not have access to the Internet. Perceived relevance is a barrier for broadband Internet access (Visser & Ball, 2010). Without relevant content that people believe they can access, there is little motivation for those unfamiliar with broadband Internet to access broadband Internet (Visser & Ball, 2010). Relevant content is content that the web user finds informative, helpful, and engaging. Access to relevant content arguably increases the likelihood that those lacking access to broadband Internet will seek additional options to gain broadband Internet access (Visser & Ball, 2010).

According to a New York Broadband Program Office (2010) study, reasons for lack of adoption include:

- high risk due to malware
- offensive material
- threats to children
- lack of interest

In 2010, 44% of people in New York State with a high school education possessed broadband Internet access in their home (New York State Program Office, 2010). Those who pursue higher education typically possess professional, technical, and managerial jobs. Families with one or more parent with these jobs are more likely to use technology and rely on information access and connectivity for both their professional and personal activities (New York State Broadband Program Office, 2010). Consumers who are not provided accurate and detailed information

about the nature and cost of broadband service are unable to make informed decisions in regard to purchasing broadband Internet service. Since broadband Internet access is frequently bundled with cable television and telephone services, consumers are often unaware or unsure of the level and cost of each service (New York State Program Office, 2010).

Research on the Current MSO Footprint in New York

There are 76 broadband Internet service providers in the state of New York (New York Broadband Service Map, 2014). Delivery methods include wireline service, wireless service, and satellite service (“How to find a broadband ISP,” 2013). The most prevalent method of supplying broadband Internet to households is through wireline service (New York Broadband Service Map, 2014). MSOs supply broadband Internet via wireline service. There are several MSOs that serve the state of New York. Location and service technology such as fiber, cable, or DSL determine the availability of broadband Internet, and also determine which MSO provides access to broadband Internet. Communities with higher housing densities, generally in urban and suburban areas, have more options available for accessing broadband Internet (New York Broadband Service Map, 2014). In contrast, communities with lower housing densities, generally rural areas, have fewer options for accessing broadband Internet (New York Broadband Service Map, 2014).

MSOs in the state of New York for wireline service include: Time Warner Cable, Verizon New York, Cablevision, Charter Communications, and Comcast (Federal Communications Commission, 2010). These are the top MSOs in the state of New York. Time Warner Cable, Cablevision, and Comcast use cable technology, while Verizon New York uses fiber technology. Verizon New York has fewer subscribers than Time Warner Cable, but has more square footage

of broadband Internet availability than Time Warner Cable (New York Broadband Service Map, 2014). Wireless service is the second most prevalent method of supplying broadband Internet to households. MSOs that provide wireless service include: AT&T Mobility, Clearwire, Sprint, T-Mobile USA and Verizon Wireless (Federal Communications Commission, 2010). The least prevalent method of supplying broadband Internet is through satellite communication. Satellite service providers include: Hughes, Skycasters, StarBand Communications Inc. and ViaSat (Federal Communications Commission, 2010).

Among the top MSOs in the state of New York, only Comcast currently offers affordable broadband Internet service. Internet Essentials is Comcast's flagship program for supplying discounted broadband Internet service to families with students who qualify for free and reduced lunch programs. Comcast currently offers the Internet Essentials program in the following cities in New York: Brewster, Carmel, Holmes, Hopewell Junction, Lagranville, Mahopac, Mahopac Falls, Monsey, Patterson, Pawling, Poughquag, Putnam Valley, Somers, and Stormville (Comcast, 2014). For \$9.95 a month, eligible families receive Comcast's XFINITY Economy Internet Service, and are offered Internet ready netbooks for \$149.99, (Comcast, 2013). Comcast XFINITY has speeds up to 2Mbps downstream and up to 768Kbps upstream, with no activation or installation charges. By comparison, Time Warner Cable offers an "Everyday Low Price" Internet option for \$14.95 a month speeds up to 2Mbps downstream and up to 1 Mbps upstream. Time Warner does not offer Internet ready netbooks (Time Warner, 2014).

In the state of New York, Connect2Compete offers FreedomPop and Mobile Beacon for families with students who qualify for free and reduced lunches. FreedomPop and Mobile Beacon are discount broadband Internet providers supplying broadband Internet through 4G wireless service. FreedomPop offers free access to broadband Internet, with 1 GB/month of data, and a \$49 setup fee plus shipping (FreedomPop, 2014). Mobile Beacon offers \$10/month, with unlimited data, and a \$36-\$39 setup fee plus shipping (Mobile Beacon, 2014). In comparison to the options offered by the MSOs in the state of New York, FreedomPop and Mobile Beacon have no download speed cap, and offer up to 1Mbps upstream.

Research on Sidebands, Spectrum and Fiber-Optic Deployments

The manner in which Internet connectivity is defined has become increasingly complex since the advent of the Advanced Research Projects Agency Network (ARPANET). ARPANET was the world's first operational network that was able to transfer packets of data over telecommunication lines. The Department of Defense (DOD) implemented it in 1969 to create a network that linked universities and research laboratories in the United States to share resources and information in the academic community (O'Neill, 1995). Few would argue the Internet, as it is known today, has clearly grown in size and scope over the past forty years. Access to the Internet became increasingly available to the general public in the mid to late 1990s with companies such as America Online (AOL) providing access the general public. While the initial offerings were considered slow by today's standards - 14.4Kbps over a standard telephone line - it was clear that a new and evolving world of communication was opening to the general public. Real-time communication became synonymous with a new perceived quality

of life.

Internet usage grew significantly in the late 1990s. AOL reported nearly 10 million active subscribers to their dial-up service in 1995. While this number only represented roughly 4% of the total population of the United States at the time (United States Census, 1995), this was a dramatic increase over the comparatively low number of users of ARPANET. Internet usage has grown exponentially since the late 1990s. In 2012, Nielsen reported that nearly 2 billion people, one third of the world’s population, has access to the Internet in some capacity. This equates to a 566% increase in usage since 2000 (Nielsen, 2012). AOL was the first to offer turn-key services that have since become synonymous with modern Internet usage – electronic mail messages (email), instant messaging services and chat rooms. While electronic messaging was implemented in ARPANET, this was the first time like services were provided in mass the general public. A new era of global communication erupted and the notion of on-demand services became commonplace.

World Regions	Population 2012	Internet Users 2000	Internet Users 2012	Growth
Africa	1,073,380,925	4,514,400	167,335,676	3,606.7%
Asia	3,922,066,987	114,304,000	1,076,681,059	841.9%
Europe	820,918,446	105,096,093	518,512,109	393.4%
Middle East	223,608,203	3,284,800	90,000,455	2,639.9%
North America	348,280,154	108,096,800	273,785,413	153.3%
Latin America / Caribbean	593,688,638	18,068,919	254,915,745	1,310.8%
Oceania / Australia	35,903,569	7,620,480	24,287,919	218.7%
World Total	7,017,846,922	360,985,492	2,405,518,376	566.4%

(Nielsen Online, 2012)

Broadband Internet access, a then new and emerging technology, became available in the late 1990s. Entry-level Internet access speeds increased from 14.4Kbps to 768Kbps through Digital Subscriber Line (DSL) connections. This innovation was seen as a pivotal enhancement not only due to the increase in access speed, but also because subscribers were not required to dedicate an entire phone line for Internet transmission. Voice communication and data communication were permitted to utilize the same copper connection because they operated on separate sections of the total frequency allowed on the copper connection. Voice communication occupied a specific section of the total frequency transmission, while data communication occupied a separate section. Early adopters of DSL were required to use devices that filtered the frequency band of data communications (3.4 kHz and higher). Telecommunication companies, such as AT&T, saw increases in revenue due to DSL subscribers. It was only a matter of time before other media service providers, such as cable companies, would enter the growing Internet Service Provider (ISP) market.

In recent years, there are myriad regional and national vendors that have entered the market as ISPs. Vendors include Comcast, Time Warner Cable and Verizon. They offer various combinations of wired and wireless services. While the offerings appear to unending, there are a finite amount of resources available for transmitting data via wired and wireless connections. Data is transmitted over a limited spectrum of available frequencies. This is particularly true in regard to wireless transmission. The wireless spectrum is shared by radio transmission, cellular phone transmission and other wireless broadcast protocols, such as wireless home telephones and wireless Internet routers. The Federal Communications Commission (FCC) regulates the use of the wireless spectrum. The FCC, which is an independent regulatory agency, administers

spectrum for non-Federal use (i.e. state, local government, commercial, private internal business, and personal use) and the NTIA, which is an operating unit of the United States Department of Commerce, administers spectrum for Federal use. Within the FCC, the Office of Engineering and Technology (OET) provides advice on technical and policy issues pertaining to spectrum allocation and use. The FCC has committed to make more of the wireless spectrum available for use by 2020 to accommodate an increasing number of Internet-connected devices. This will increase the total wireless bandwidth available by over 35% (Myslewski, 2013).

There are unused portions of the wireless spectrum, commonly referred to as white space, that companies such as Google and Microsoft have used to provide Internet access to remote communities. This has been most recently implemented in South Africa (Meyer, 2013). White space in the spectrum is created when buffers are placed between existing frequency allocations. White space varies by geographic location, but generally exists between 470 MHz and 790 MHz (Gibbs, 2013). By leveraging the space between frequency allocations, Google is able to provide white space broadband to ten schools in Cape Town (Meyer, 2013). The schools are able to sustain Internet connection speeds of up to 2.5Mbps. This allows students to engage with rich online resources and communicate via videoconference services, such as Skype.

In order to satisfy the need for increasing Internet connectivity speeds, ISPs are using a combination of wired and wireless connections to supply the bandwidth necessary to customers. A national fiber-optic network has been built to supply regional wireless access transmission towers with the bandwidth necessary to serve communities that are experiencing an increase in growth. The national fiber-optic network is often compared to the national railway system in that fact that it provides access to a large portion of the national population.

However, the national railway system is regulated by the United States Department of Transportation, while telecommunications companies largely privately own the fiber-optic network.

Current Initiatives, Programs, and Grants in the State of New York Relating to Broadband Access

In 2010, the New York State Universal Broadband Strategy was created. New York developed a strategy that would make broadband Internet accessible and available to the whole state (New York State Broadband Program Office, 2010). The strategy placed emphasis on two goals. The first goal of the strategy was to accelerate Broadband Infrastructure build out for residential, commercial and governmental institutions (New York State Broadband Program Office, 2010). The strategy called for a public-private partnership (PPP) to work with communities to identify areas with the most critical needs. This would then increase the pace of development. Additionally, state and federal grant programs would provide capital, financial incentives, and money to advance infrastructure development (New York State Broadband Program Office, 2010). The strategy placed emphasis on underserved and urban communities. The second goal of the strategy was to increase adoption rates and digital literacy programs to improve computer proficiency levels for personal and professional use (New York State Broadband Program Office, 2010). The goal sought to solve issues such as affordability, availability, digital literacy, and capacity (New York State Broadband Program Office, 2010).

Over the past few years, broadband access has become a focus in New York State policy. Several initiatives, programs, and grants in the state of New York relating to Broadband access are being developed and implemented. The New York State Broadband Program Office created in 2010 - now under jurisdiction of the Empire State Development Agency (ESD) - seeks to

increase economic and social opportunities through universal broadband deployment (New York State Broadband Program Office, 2013). Together the New York State Broadband Program Office (BPO) and Empire State Development Agency have facilitated projects related to broadband access. These projects were passed through Consolidated Funding Application (CFA). In round 1 of the CFA, \$2 million in funding for broadband projects was awarded to four project sponsors (New York State Broadband Program Office, 2009). In round 2 of the CFA, \$6 million in funding was awarded to four broadband project sponsors to expand broadband in the North County Region. In round 3 of the CFA, Governor Cuomo announced grants for three broadband projects, and dedicated a \$6 million broadband fund for the North County. These projects total \$11.4 million in funding (New York State Broadband Program Office, 2013). Additionally, the ION Upstate New York Rural Broadband Initiative awarded in 2013, plans to build 10 new segments of fiber-optic broadband infrastructure. The ION project plans to construct a 1,308-mile network to offer faster broadband speeds to connect more than 100 new schools, libraries, state and community colleges, and state and county agencies (National Telecommunications and Information Administration, 2013). In addition, the project will enable wireline and wireless service of broadband Internet service available to 250,000 households and 38,000 businesses, providing investments to underserved areas of the state. In addition, the project proposes to provide broadband education, training, equipment, and support to educational entities and other community support organizations (National Telecommunications and Information Administration, 2013).

The Connect New York Broadband Grant Program was established in 2012. Connect NY provides \$25 million in grants through the Regional Councils and ESD to promote and expand

broadband Internet access in rural and urban areas (New York State Broadband Program Office, 2013). The Connect NY Broadband Grants are designed to spur investment by MSOs and expand broadband connectivity and economic development in each region (New York State Broadband Program Office, 2013). In March 2013, \$25 million was awarded to 18 project sponsors through the Connect NY Broadband Grant Program (New York State Broadband Program Office, 2013). The following nine projects were approved on December 19, 2013 (New York State Broadband Program Office, 2013):

- Open Access Fiber Network (Yates County) – \$2,407,049
- Clarity Connect, Inc. – Tompkins and Cayuga Ubiquitous Last Mile Coverage (Various Counties) – \$2,216,000
- Slic Network Solutions, Inc. – Schroon Lake Next Generation Broadband (Essex County) – \$2,162,656
- New Visions Communications – Parish Broadband (Oswego County) – \$1,999,584
- MTC Cable – MTC Broadband Build Out (Various Counties) – \$1,800,000
- Slic Network Solutions, Inc. – Bellmont North Next Generation Broadband (Franklin County) – \$1,012,366
- Slic Network Solutions, Inc. – Lyon Mountain Broadband (Clinton County) – \$976,426
- Southern Tier West Development Foundation – Southern Tier Broadband (Various Counties) – \$672,452
- Slic Network Solutions, Inc. – Long Lake Next Generation Broadband (Hamilton County) – \$1,370,306

These nine projects will deliver broadband access to 29,117 households, and will create 614 miles of new fiber (“Governor Cuomo Announces,” 2013). Additionally, 5 more projects were reviewed for approval in February 2014.

Another program relating to broadband access in New York State is the “Smart School” bond referendum. On January 8, Governor Andrew Cuomo delivered his 2014 State of the State address titled, *Building on Success*. In the State of the State address, Governor Cuomo presented the “Smart Schools” bond referendum (The Office of the Governor of New York State, 2014). This \$2 billion referendum will enable students have access to high-technology classrooms, and enable communities to access broadband Internet. If approved by voters, school districts will be able to invest in desktop and laptop computers, tablets, servers, interactive whiteboards, high-speed broadband connectivity for schools and communities, and wireless classrooms (The Office of the Governor of New York State, 2014).

New York State is forming PPPs to increase broadband Internet accessibility and availability, as well as increase digital literacy in targeted populations. PPPs have been regarded as a key component in addressing the issues of broadband Internet accessibility and availability (Davidson & Santorelli, 2012). These partnerships pair public resources with private expertise (Davidson & Santorelli, 2012). They have proven to be successful in delivering broadband Internet access and training programs in a timely and cost-efficient manner (Davidson & Santorelli, 2012). Successful PPPs leverage public resources and entice private companies and non-profit organizations to facilitate discussion and deployment of new networks in underserved and unserved areas (Davidson & Santorelli, 2012). Additionally, in regard to increasing broadband Internet adoption and digital literacy, PPPs use social infrastructures to

raise awareness regarding the benefits of having access to broadband Internet (Davidson & Santorelli, 2012).

PPPs have created opportunities for innovative public services. A public-private partnership is a contractual arrangement between a public agency and a private sector entity. The assets of each sector are shared in delivering a service or facility for the use of the general public. In most PPPs, the private sector entity procures public infrastructure. The private sector entity assumes a major share of the risks in terms of financing, construction and evaluating performance of the infrastructure, from design and planning, to long-term maintenance (The National Council for Public-Private Partnerships, 2014). The NYC Connected Communities Project seeks to increase broadband Internet adoption low-income and limited-English households in New York City (National Telecommunications and Information Administration, 2013). The NYC Connected Communities Project expands the availability of public computer centers and classes in libraries and community centers in high poverty neighborhoods. Additionally, the program offers resources for digital literacy, employment support, and other technological services. The program's 100 centers, with 1,738 computer workstations, have provided more than 3 million user sessions to date (National Telecommunications and Information Administration, 2013). Recently, EveryoneOn NY launched as another initiative that seeks to increase broadband accessibility and availability, as well as increase digital literacy. This is a PPP that will provide Internet access to low-income families. The partnership was launched on August 28, 2013 at MS 258 in Harlem. Further expansion of this program will provide broadband access to poorer families and families living in rural communities (The Epoch Times, 2013).

The Involvement of Municipalities

The Role of Municipalities and Public Service Commissions

Early municipal broadband projects in 2004 used wireless service as the method for supplying broadband Internet access. In Philadelphia, Chicago, St. Louis, San Francisco, and Houston these projects were deemed unsuccessful (Aaron, 2008). In 2004, Earthlink, a dial-up ISP, promised to build state-of-the-art wireless systems without city funding. Three years later, the broadband project was abandoned due to results that were not desirable (Aaron, 2008). Poor wireless broadband Internet quality, higher than expected costs, and a low number of subscribers using the municipality's wireless Internet system plagued the project.

In 2008, more than 400 cities and towns launched or developed municipal broadband systems using fiber networks. Experts believe that using municipal wireless service as the method for supplying broadband Internet access was the reason for previous, undesirable results. Currently, fiber-optic networks provide faster broadband Internet, with more capacity, than wireless broadband Internet. Compared to fiber-optic networks, wireless networks are inadequate when trying to supply a large municipality broadband Internet access. This is due to inherent limitations of the technology. Wireless networks offer greater mobility, but fiber-optic networks provide faster, dedicated connections to homes. Popular belief is that fiber-optic networks are too expensive, but many experts believe that municipalities can afford fiber-optic network for their areas of service (Aaron, 2008).

In 2012, 150 municipalities have built their own cable or fiber-optic broadband Internet networks (Mitchell, 2012). A characteristic of nearly every municipality-owned community fiber-optic network in America is that the local public power utility played a pivotal role in

creating the network (Mitchell, 2012). Municipality-owned networks have additional rules not applied to private networks because they are public entities. Nineteen states have created legislation to discourage publicly owned networks. It is arguable to say that state legislation is inconsistent with the 1996 Telecommunications Act and the recommendations of the FCC's National Broadband Plan (Mitchell, 2012).

In 2009, North Saint Paul, Minnesota, a major metropolitan community, experienced difficulty when attempting to implement a city-owned fiber-optic network. The network would have provided residents with cable television, broadband Internet access, and telephone services (Hopfensperger, 2009). The project was never completed due to heavy opposition by the MSOs who did not want this to move forward because they would lose revenue. In 2006, New Orleans, Louisiana faced similar challenges when the city tried to implement a municipality-owned broadband network (Bode, 2006). BellSouth lobbied to shut the network down and threatened to use legal action (Malik, 2005). Eventually, the city of New Orleans sold the municipality-owned broadband network to a third-party broadband Internet vendor.

Municipalities that have not faced legal barriers have found their broadband Internet network to be an economic asset (Mitchell, 2012). Residents of these municipalities have access to some of the most affordable connections in the nation (Mitchell, 2012). Currently, these networks are also delivering some of the highest-quality connections and speeds in the nation. Municipalities with fiber-optic broadband Internet networks are seeing local businesses expand and new businesses relocate to their city (Mitchell, 2012).

Historically, local governments have had a significant degree of regulatory control over cable systems through their franchise agreements with cable companies (Bolema, 2008). Often

local governments control the utility poles and other infrastructure components in their municipality. Cable operators must negotiate franchise arrangements with local governments for access in exchange for paying franchise fees to the local government and meeting other conditions in the franchise arrangement (Bolema, 2008). Due to franchise fees and quality requirements, the federal government has not placed as much emphasis on regulating cable operators (Bolema, 2008). Over time, the role of state and the federal government in regulating local franchise agreements has increased (Bolema, 2008). In 1992, the United States Congress prohibited local governments from engaging in exclusive franchise agreements (Bolema, 2008). Local governments cannot, in exchange for exclusive access, leverage MSOs to set aside a portion of the service to be available either free or at substantially reduced cost to certain demographic populations as a public service.

All 50 states have created either a commission, task force, or broadband project (National Conference of State Legislatures, 2012) that seeks to address lack of broadband Internet access and adoption. Some states have established task forces or commissions that provide input on the development of a statewide broadband framework, and promote PPPs. Other states have created programs that identify underserved and unserved areas through online public mapping websites. At least 14 states have enacted these commissions, task forces, or broadband projects through legislation (National Conference of State Legislatures, 2012). In most of these states, the entities either work under, or work closely with their respective public service commissions. However, it varies from state to state as to whether the public service commissions have direct jurisdiction over these broadband entities. In the State of New York, the New York State Broadband Program Office seeks to increase economic and social

opportunities through universal broadband deployment. The Public Service Commission does not have direct jurisdiction over the New York State Broadband Program Office. However, the New York State Broadband Program Office does possess a relationship with the New York State Public Service Commission and the chair of the New York State Public Service Commission sits on the Broadband Availability Task Force for the state of New York (New York State Broadband Program Office, 2014).

The New York State Public Service Commission has jurisdiction over broadband Internet services offered by MSOs, which use a cable lines, copper wires (DSL) or fiber-optic lines to deliver services (New York State Broadband Program Office, 2007). The Public Service Commission also has jurisdiction over municipal utilities' rates (American Public Power Association, 2012). A municipality-owned public broadband network would classify as a municipal utility, if a municipality were to build a network. However, there is no restrictive legislation preventing municipalities from creating their own public broadband network (Institute for Self-Reliance Community Network Map, 2014). Therefore, the Public Service Commission does not have jurisdiction concerning the operation of a municipal public broadband network. Furthermore, no municipality in the state of New York has created their own residential public broadband network (Institute for Self-Reliance Community Network Map, 2014). There is no empirical research stating why a municipality in the state of New York has not developed their own public broadband network that is available to residents.

Axcess Ontario is a non-profit entity serving as a telecommunications infrastructure provider in New York State (Axcess Ontario, 2014). It is not a municipal public broadband Internet network, but the infrastructure used for delivering broadband Internet is publicly

owned. Access Ontario is a PPP that directly serves private telecommunications carriers and business-to-business users who provide broadband Internet access using Access Ontario's fiber-optic telecommunications infrastructure, which is a public utility (Access Ontario, 2014). Access Ontario builds the fiber-optic telecommunications infrastructure to supply and lease telecommunications technology with mid-mile fiber-to-the-x (FTTX) capacity, to enable carriers to provide service to their customers (Access Ontario, 2014). Since public infrastructure is being used by the private telecommunications carriers, this reduces the cost to the end user. Access Ontario is only able to supply broadband Internet access to private telecommunications carriers and businesses (Access Ontario, 2014). Residential services are not currently offered by Access Ontario; however, Access Ontario possesses the necessary infrastructure for a municipality to either build a public network, or provide subsidies to its population using a private telecommunications carrier.

What is Happening in Other States

MSOs Coverage

There are 25 MSOs documented as having high numbers of subscribers, with Comcast identified as having the highest number of subscribers. The top five MSOs with the highest number of subscribers are (National Cable and Telecommunications Association, 2012):

- Verizon Communications with 4.7 million subscribers
- Time Warner Cable, whose fate is in the hands of the government due to Comcast's \$45 billion bid to buy the company, with 12.2 million subscribers
- Dish Network with 14.1 million subscribers

- DirecTV with 20.1 million subscribers
- Comcast with 21.9 million subscribers

The MSOs previously referenced are also noted as providing the most broadband coverage nationally. Nationally Comcast, Cox Communications, and Time Warner Cable provide the most broadband coverage (Federal Communications Commission, 2010). According to the FCC's broadband coverage map, MSOs not listed on the top 25 MSOs subscribers list also provide substantial coverage to states as well (Federal Communications Commission, 2010). The top MSOs (beginning with the largest presence in the state) that provide broadband coverage to the following states are:

- California: Comcast, Time Warner Cable, Charter, Cox, Bright House, Mediacom
- Illinois: Comcast, Mediacom, Charter
- Massachusetts: Comcast, Charter, Time Warner Cable, Cox Communications
- Florida: Bright House, Comcast, Cox

Although broadband coverage is provided by the previously referenced MSOs, there are two MSOs who have successfully demonstrated efforts in providing affordable broadband Internet to underprivileged families. Comcast Internet Essentials and Cox Communications' partnership with Connect2Compete address lack of broadband access to families.

Comcast Internet Essentials

Seeking to close the digital divide, several MSOs offer broadband Internet through low-cost Internet programs. Comcast Internet Essentials program and Cox Communications' partnership with the Connect2Compete program provides low-cost Internet to families who

have at least one child in the National School Lunch program. Although both share identical missions, their programs and delivery differ.

Comcast Internet Essentials is the nation's largest and most comprehensive broadband adoption program (Comcast, 2013). Since its inception in 2011, the program has made affordable broadband Internet and a discounted refurbished computer accessible to low-income families. Families also receive comprehensive digital literacy training (Comcast, 2013). Families eligible for Internet Essentials (Comcast, 2013) must fit the following criteria:

- located where Comcast offers Internet Services
- has at least one child in the National School Lunch Program
- has not subscribed to Comcast Internet service within the last 90 days
- does not have an overdue Comcast bill or unreturned equipment

With the set eligibility criteria, it has been recorded that nearly 2.6 million Americans are eligible for Comcast Internet Essentials. As long as there continues to be at least one child enrolled in the National School Lunch Program living in the household, Comcast Internet Essentials provides offered services to eligible families for at least three years.

For \$9.95 a month, eligible families receive Comcast's XFINITY Economy Internet Service, are offered Internet ready netbooks for \$149.99, and digital literacy training for free (Comcast, 2013). Comcast XFINITY provides speeds up to 2Mbps downstream and up to 768Kbps upstream. Comcast Learning Center, the free digital literacy training, is an online feature that provides training modules focused on topics, which include, online safety, browsing, and email. The in-person training includes training sessions, which comprise of similar topics available in the Learning Center, structured to develop digital literacy skills and offer support for families in

the program (Comcast, 2013).

Comcast Internet Essentials has made several changes that have increased the abilities of families to fully engage in the digital age. By the end of 2013, the program announced that it would expand technological devices from netbooks to laptops and desktop computers (Comcast, 2013). Other changes include expanding the criteria for eligible students in the National School Lunch program from public schools to students in parochial, private, charter, virtual school and homeschool. The expansion increased the number of families eligible for the Comcast Internet Essentials program. To date, over 4,000 school districts in 39 states, including the District of Columbia, have families enrolled in Comcast Internet Essentials (Comcast, 2013). In February 2014, Comcast announced its \$45 billion bid to buy Time Warner Cable (Stelter, 2014). Once approved by the government, the merger will be solidified by the end of the year. Comcast expanding its company also means that areas in states that only received broadband services from Time Warner Cable will now be provided services through Comcast. Moreover, if the merger happens, the number of families who qualify for Comcast Internet Essentials and enrollment of the program will increase throughout states and the country (Stelter, 2014). Currently, there are five states with the highest number of families enrolled in Comcast Internet Essentials. These states are California, Florida, Illinois, Massachusetts, and Texas. Some of these states have also partnered with Comcast Internet Essentials to address issues in access in their communities.

In 2012, there were over 3,000 families in California enrolled in Comcast Internet Essentials. Counties in California that had the highest numbers of families enrolled were Alameda, with 438 families enrolled, Fresno, with 650 enrolled, and Sacramento, with 654

families enrolled (Comcast, 2013). In the state of California, enrollment is calculated by county. Massachusetts had numbers of enrollment between 1,000 and 1,999. Comcast provided Internet Essentials to all Boston Public School students, due to the number of students enrolled in the National School Lunch program (Comcast, 2013). Comcast also partnered with Northeastern University to provide additional training opportunities to help families with installation, cyber safety lessons, and basic computing skills (Berrents-Weeramuni, 2013). Comcast Internet Essentials is well known for its partnership with the “Tech Goes Home” program in Boston, Massachusetts. Students in the “Tech Goes Home” program are provided affordable Internet through the Comcast Internet Essentials program. Illinois has also partnered with Internet Essentials to ensure broadband access to families (Wong, 2013). Illinois has the highest number of families enrolled in Internet Essentials with 5,109 of families in Cook County enrolled. In Chicago, Comcast partnered with United Way for its pilot program, Internet Essentials Learning Zones (Wong, 2013). The Internet Essentials Learning Zones program seeks to increase broadband Internet access and digital literacy resources in areas surrounding five Chicago Public Schools that have 70% or more students in the National School Lunch Program (Wong, 2013). The five learning zones provide technology programs and events, enhanced Internet access in the schools, and public Wi-Fi service at neighboring community organizations. Comcast’s ability to partner with communities, organizations, and schools to decrease the existing gap in the digital divide demonstrates that the Comcast Internet Essentials program or other programs like it can play an active role in expanding its resources beyond the confines of schools. Although it is not as largely deployed in states, Connect2Compete has also impacted families in several communities and states in the United States.

Cox Communications Partnership with Connect2Compete

Connect2Compete was initially established as a pilot program in San Diego, California in May of 2012 (Connect2Compete, 2012). The focus of the program was to deliver families, with children enrolled in the National School Lunch Program, low-cost Internet and discounted computers in the San Diego metropolitan area. Moreover, the purpose of the program was to test the effectiveness of various marketing strategies and partnership operations to make the program efficient and successful (Connect2Compete, 2012). Essential partners in the process included Cox Communications, Good PC, and Solix Inc. The most significant partner in Connect2Compete's pilot program was the San Diego County Office of Education, which contains 24 public elementary schools, 6 high school districts, 12 unified school districts, and 5 community college districts (San Diego County Office of Education, 2014). Connect2Compete established relationships with 56 local schools in San Diego County Office of Education. The local schools also provided assistance in the application and purchase process for eligible families (Connect2Compete, 2012). Connect2Compete's (2012) eligibility criteria for families were the following:

- at least one child eligible for the National School Lunch Program
- has not subscribed to Cox Internet service within the last 90 days
- has no outstanding bills or unreturned equipment with Cox

Communications

Families with approved eligibility received high speed Internet for \$9.95, which does not include installation, activation, or modem fees. The price remained the same for two years. Additionally, families were offered a laptop or desktop for \$150 and their selected device was pre-installed

with an office suite of desktop applications, servers and services for free (Connect2Compete, 2012). The computer was shipped free of charge and has a 90 day warranty with technology support.

The pilot program was deemed successful due to the large number of inquiries and applications received (Connect2Compete, 2012). Of the applications received, 82% were approved. The majority of the applications denied were due to incompleteness or erroneous information. Fortunately after resubmission, high rates of rejected applications were approved (Connect2Compete, 2012). Connect2Compete was able to build capacity in San Diego Public Schools by developing several strategies which included publicizing the program during parent conferences and “parent nights”; creating focus groups, which included parents sharing their experiences enrolling in the program and being enrolled in the program; and receiving feedback from partners (Connect2Compete, 2012). Connect2Compete’s analysis of how to effectively implement its program was found through outreach and promoting the program in a manner that speaks to the lives of parents and their families. Additionally, the program stated that in order to increase enrollment, they must tailor the program according to the demographic of families living in the communities they serve (Connect2Compete, 2012). San Diego has a large population of Latino families and tailoring the program for Spanish speaking families may increase the number of potential customers. Connect2Compete’s work has evolved in other cities in California, which include Oakland. Connect2Compete has partnered with an Oakland-based business, Oakland Technology Exchange West; an organization that provides classroom computers to Oakland Unified Schools and home computers to Oakland Unified middle and high school students (Oakland Technology Exchange West, 2014).

Recently Connect2Compete became EveryoneOn's flagship program for K-12 students; EveryoneOn is a national non-profit organization that aims to eliminate the digital divide. Connect2Compete continues to provide affordable Internet and devices to students and families that qualify for the National School Lunch program. Connect2Compete is now offered in partnership with leading cable companies, including Bright House Networks, MediaCom, and Mobile Beacon, but its largest partnership continues to be with Cox Communications (EveryoneOn, 2013).

Although Comcast Internet Essentials and Connect2Compete are two different low-cost Internet providers, they share similar conditions and provide similar services. Comcast Internet Essentials demonstrates the emerging success of the program, while Connect2Compete provides ideas to consider when implementing a program that seeks to radically change conditions for a population of families. Comcast Internet Essentials and Connect2Compete are found in many cities and states throughout the United States. Cities and states have not only utilized both programs to bridge the digital divide, but also developed and created their own programs and initiatives.

State Legislation and/or Initiatives and Programs

In 2010, the FCC established Connecting America: The National Broadband Plan to improve Internet access in the United States. The plan prompted all 50 states to adapt state broadband programs and initiatives (Federal Communications Commission, 2010). Each state's initiative is unique to its residents and their needs. While each state demonstrates an effort to ensure broadband access to all families, there are four that have successfully demonstrated

doing so. The four states that have successfully demonstrated or developed plans/initiatives to ensure broadband access are California, Illinois, Massachusetts, and Florida.

California

Several pieces of legislation in California have been created to expand or increase broadband access. The two pieces of legislation are Bill No. SB 1191 and Bill No. SB. 1462. Bill No. SB 1191, Community Service District: Broadband Access was signed into law July of 2008.

The law authorizes:

“community services districts to construct, own, improve, maintain, and operate broadband facilities and to provide broadband services until a private person or entity can acquire and operate facilities and provide broadband service at a cost and quality of service comparable to that offered by the community services district” (National Conference of State Legislatures, 2013).

This law allows communities in California, that are underserved and do not receive broadband services from private sectors, to provide broadband services to their residents.

Bill No. SB 1462 established California's Broadband Council in 2012. The purpose of the Council is to promote broadband deployment in unserved and underserved areas and broadband adoption throughout the state of California (National Conference of State Legislatures, 2013). Some of the responsibilities of the Council include:

- reviewing the implementation of the 2008 Broadband Task Force Report recommendations

- improving coordination among state agencies to push broadband adoption and deployment
- assisting applicants in becoming more competitive for federal funds made available through the National Broadband Plan, American Recovery and Reinvestment Act, and California Advanced Services Fund grants (National Conference of State Legislatures, 2013)

The outcome of the bills, that became laws, are several programs and initiatives that address statewide issues in broadband access. The “Digital 395 Middle Mile” project by the California Broadband Cooperative, Inc. proposes to build a 553-mile, 10Gbps middle mile fiber-optic network along United States Route 395 between southern and northern California. Moreover, the project will spur affordable broadband access for local consumers and local business by enabling local ISPs to utilize the network. 36 municipalities, six Native American reservations, two military bases, and more than 230 community anchor institutions will be connected to the network to expand or enhance service to households and businesses (National Telecommunications and Information Administration, 2010). Through legislation like SB 1191, communities can confidently utilize local entities to provide broadband services if those services are not provided by private entities. The bill provides communities like the 36 municipalities in the Digital 395 Middle project the authority to provide their own local broadband services to their residents who do not have access, essentially utilizing their own resources to ensure broadband access to all households in their communities. Another project that is a product of California’s state legislation is California Public Utilities Commission’s Broadband Data and Development project.

The California Public Utilities Commission Broadband Data and Development Project received \$7.9 million in 2010 to support new members of California Broadband Council and the California Emerging Technology Fund. Both entities will work to execute recommendations of the California Broadband Task Force. Through this project, the California Broadband Council will coordinate activities of state agencies, provide outreach to local governments, and implement policies and programs to promote broadband deployment, usage, and application use throughout California (National Telecommunications and Information Administration, 2010). The project will also collect, display, and update location and service information of computer refurbishment centers across the state of California (National Telecommunications and Information Administration, 2010). The establishment of the California Broadband Council through SB 1462 allows projects like the Broadband Data and Development Project to receive guidance and assistance from the Council in pushing policies and programs to expand broadband services to the state of California. The "Digital 395 Middle Mile" and Broadband Data and Development projects are products of laws that sought to expand broadband access to residents in the state of California. Two additional programs, developed and executed by an organization and a city in California, have also sought to increase access to broadband services.

Youth Policy Institute, Inc.'s (YPI) Public Computer Centers program was given \$5.5 million in funding to provide public computer centers for low-income residents, specifically in predominantly Latino communities (National Telecommunications and Information Administration, 2010). The Public Computer Centers program offers broadband and computer access and job training services. YPI partners with Los Angeles Unified School District and other community organizations in the Los Angeles area to implement the program (National

Telecommunications and Information Administration, 2010). Courses are also provided at the computer center and they include Scholastic Assessment Test (SAT) Math Preparation, Internet Safety, Digital Storytelling, Introduction to Excel, and Typing Skills. At the end of 2013, YPI was able to successfully deploy 83 computer centers to public and charter schools, parks, public housing facilities, and community based organizations (National Telecommunication and Information Administration, 2010).

Oakland's initiative to provide equal access and equal opportunities for access to computers and Internet, regardless of economic status, was pushed through the city's "Get Connected Initiative" (Get Connected! Oakland, 2011). Get Connected! Oakland was launched in 2011 by Mayor Quan. The initiative sought to ensure equal access to the Internet and technology, provide education and training classes, and a support system for all residents (Get Connected! Oakland, 2011). Through the initiative, Oakland has improved access by upgrading library access, providing over twenty new computer centers for youth in Oakland Park and recreation centers, and a dozen free Wi-Fi hotspots. Partners that have supported the initiative include Oakland Technology Exchange West and Connect2Compete (Get Connected! Oakland, 2011).

Illinois

Another state that has had an expansive approach to closing the digital divide is Illinois. Illinois High Speed Internet Services and Information Technology Act, Bill No. 20 ILCS 661, was enacted in 2007. The act encourages Illinois to support residents, businesses, and PPPs in the continued growth of high speed Internet and information technology. Additionally, the act

expresses that local government entities should play a role in assessing the needs of their communities with respect to high speed Internet services and information technology (Illinois General Assembly, 2014). Illinois has several state initiatives that bridge the public and private sector and expands broadband access to residents of the State. Initiatives the state of Illinois has implemented are the “Digital Divide Grant Program”, “Illinois Gigabit Communities Challenge”, and “Chicago Broadband Initiative” (Broadband Illinois, 2013).

The “Digital Divide Grant Program” seeks to increase access to computers, telecommunications technologies, and related training for the populations living in low-income communities. Through the program, the Illinois Department of Commerce and Economic Opportunity is authorized to make grants to plan, establish, administer, and expand Community Technology Centers to support technology access programs (Broadband Illinois, 2013). The Community Technology Centers provide computer access and educational services using information technology to individuals, communities, and populations that do not have opportunities to access computers and telecommunications technologies (Broadband Illinois, 2013). “Illinois Gigabit Communities Challenge” is a competition, launched in 2012 by Governor Pat Quinn, that will award \$4 million in funding to the most promising ultra high speed broadband deployment projects in Illinois (Broadband Illinois, 2013). The Illinois High Speed Internet Services and Information Technology Act has not only encouraged Illinois to increase broadband access but, cities like Chicago have taken the initiative to join PPPs. Moreover, assess and provide broadband service to residents and visitors of the City.

In 2009, Chicago Mayor Richard Daley developed a collaborative plan, “Chicago Broadband Initiative”, for providing greater access to technology in Chicago neighborhoods and

the city government. The plan focused on six areas: Infrastructure and Regulatory Environment, Government and Community Services, Awareness and Marketing, Economic Development, K-12 Education, and Accessibility (City of Chicago, 2009). Through the implementation of this plan new policy ideas were put in place, programs were expanded, partnerships were created with various organizations and companies, and awareness was made about the digital divide and benefits of technology. Several programs and initiatives from the plan include: “Smart Communities” program, “Connect Chicago” (Computer Centers and Hot Spots), and a partnership with Comcast (City of Chicago, 2009). The “Smart Communities” program provides households, businesses and institutions in multiple communities with access to an affordable bundle of technology resources that will enable them to increase participation in meaningful digital activities (City of Chicago, 2014). “Connect Chicago” is a service that provides residents of Chicago and visitors with locations that offer computers with Internet access, Wi-Fi, and technology training (City of Chicago, 2014). Chicago continues to impact its residents through two programs, “SmartChicago Sustainable Broadband Adoption” project and “SmartChicago Public Computer Centers”, awarded grants to increase economic development in five disadvantaged neighborhoods in the city.

“SmartChicago Sustainable Broadband Adoption” project seeks to spur economic development through a comprehensive broadband awareness and adoption program. Initially, the program established a goal of provided computers and training opportunities to more than 11,000 residents and 500 small businesses and non-profit organizations (National Telecommunications and Information Administration, 2010). The project intends to create public computer centers at six community centers for working families and expand workstation

capacity at four Business Resource Centers. “SmartChicago Sustainable Broadband Adoption” also anticipates providing 1,500 residents and small businesses who have completed a multi-session training course with laptops and netbooks (National Telecommunications and Information Administration, 2010). Through “SmartChicago Sustainable Broadband Adoption”, a citywide multilingual broadband awareness campaign will reach nearly 200,000 residents through radio ads, television, print, and city buses. Local outreach by community organizations and the creation of neighborhood-based web portals will push the campaign as well.

“SmartChicago Public Computer Centers” project upgrades and expands public computer centers in over 150 locations, which include city libraries, community colleges, public housing, workforce centers, senior centers, afterschool programs, and other community locations in Chicago. The project focuses specifically on low-income residents, at-risk youth, senior citizens, people with disabilities, and the unemployed. Hours of training, including digital literacy instruction and assistance, and courses, which include Introduction to Microsoft Office, graphic design, Internet basics, and computer security, are provided at the computer centers. As of June 2013, 2,500 workstations were provided through the project, while 150 computer centers were upgraded and 18 were created in Chicago. It has been recorded that 80,000 residents of Chicago visit the centers. The city is invested in its goal of improving the lives of its residents through computer resources and educational opportunities. At the end of 2013, Chicago’s City Council approved an expansion of fiber optic cables as part of the City’s broadband initiative (City of Chicago, 2014). Through Chicago, Illinois presents a dynamic example of how broadband access can be ensured to all. The transformative steps and initiatives created to do so have brought recognition to Illinois and other states have sought

Illinois as a guide on how to expand broadband access to their residents.

Massachusetts

Massachusetts has several bills that address broadband access, but only one is law. Governor Deval Patrick signed the Broadband Act in 2008, which provided up to \$40 million bonding authorization to close broadband gaps. The act also established and funded Massachusetts Broadband Institute, which is one of the state's initiatives to increase broadband access.

Massachusetts has several state initiatives and programs to increase broadband access. These programs and initiatives are the Massachusetts Broadband Institute (MBI), Public Computer Centers, Boston's Sustainable Broadband Adoption project, and the "Tech Goes Home" program. MBI works to extend affordable high speed Internet to homes, businesses, schools, libraries, medical facilities, government offices, and other public places across the state (Massachusetts Broadband Institute, 2013). Currently, MBI is building a network known as MassBroadband123. MassBroadband123 seeks to expand broadband connectivity to over 120 communities in western and north central Massachusetts (Dumont, 2014). MBI also has a mapping initiative that provides the state of Massachusetts with information on where broadband service is lacking in efforts to increase access for those communities (Dumont, 2014). Massachusetts statewide initiatives are transforming the State, and the city of Boston has made tremendous gains in ensuring broadband access to underserved communities and households.

In 2010, Boston developed its "Public Computing Centers" and "Sustainable Broadband Adoption" projects (National Telecommunications and Information Administration, 2010).

Boston's "Public Computing Centers" project is a partnership between the city of Boston's Management and Information Services Department, Boston Public Library, Boston Centers for Youth and Family, and Boston Housing Authority. The project proposes to expand computer and Internet capacity at the City's main library and 25 branches, 16 community centers, and 11 public housing sites (National Telecommunications and Information Administration, 2010). Computer access and training will be available for students, seniors, non or limited English speaking residents, and individuals with disabilities. The majority of computer centers will be in Boston's lowest income areas and will provide before and after-school, job readiness, enrichment activities, workforce development, and alternative education programs. Boston's "Public Computing Center" project anticipates serving nearly 19,000 people per week (National Telecommunications and Information Administration, 2010).

Boston's "Sustainable Broadband Adoption" seeks to increase broadband adoption in low-income areas. The project proposes to focus on middle and high school students and their families, senior housing residents, and the unemployed by providing subsidized computer equipment and training (National Telecommunications and Information Administration, 2010). The "Sustainable Broadband Adoption" project will provide 15 hours of digital literacy training to students and their families across 52 middle and high schools; hold a computer education program specifically for seniors living in public housing developments; and an intensive 12-week 240 hour digital workforce skills training program for unemployed residents (National Telecommunications and Information Administration, 2010). A partnership that emerged from this project is with Open Air.

Boston's "Tech Goes Home" program is offered by Open Air Boston, a non-profit

organization whose mission is to bridge the digital divide for low-income underserved populations in cities across the United States (Tech Goes Home, 2013). The organization partners with schools and community centers or hubs to develop digital literacy and other technological skills of underserved and socioeconomically disadvantaged communities (Tech Goes Home, 2013). Families enrolled in the Boston's "Tech Goes Home" have a household income under \$20,000 a year and 79% of those families are run by single females. "Tech Goes Home" uses funds from federal, state, and foundation grants to provide students and families with 15 hours of training, a netbook or mobile device (which requires a \$50 co-pay), and low-cost home Internet (Tech Goes Home, 2013). Frederick Middle School, located in a low-income highly impoverished neighborhood, became one of the nation's first urban middle schools to have a one-to-one laptop program through "Tech Goes Home." The program was able to provide all middle school students with a computer and even created a wireless tower in the neighborhood due to a high proportion of students not having Internet access in their home. "Tech Goes Home" also educated students and their families on how to use a computer and developed their digital literacy skills (Tech Goes Home, 2013). Thus far the 85% of students in the "Tech Goes Home" program have used their computer to complete homework assignments and other tasks. Not only has the program increased the time students spend on their homework, but it has also assisted unemployed parents, without access to the Internet, in finding jobs. Parents have learned how to search for jobs online, how to write and send a resume, and how to prepare for a job interview (Tech Goes Home, 2013).

Florida

Before broadband services became recognized as a necessity, Florida enacted laws and established projects/initiatives that sought to increase access to broadband Internet. In 2006, Florida passed “Discounted Computers and Internet Access for Students”, a statute that created a program to offer computers and Internet access at a discounted price to public school students in grades 5 through 12, as well as students in charter schools and home education programs (Florida Legislature, 2006). Through the Florida Department of Education, negotiations with computer manufacturers and non-profit corporations were developed to provide students with discounted computers, printers, and specialized software and hardware packages. Additionally, the Florida Department of Education made negotiations with broadband Internet service providers to provide discounted broadband Internet access packages to students (Florida Legislature, 2006). With the urge to expand broadband services to all citizens, Florida has not only centralized its focus on students but the entire state. In 2012, Florida revised its statute, “The Promotion of Broadband Adoption”, to better serve the needs of residents who lacked access to broadband services (Florida Legislature, 2012). The “Promotion of Broadband Adoption” statute was revised because Florida legislature found that broadband Internet service was critical to economic and business development of the State. Not to mention beneficial to libraries, schools, universities and colleges, health care providers, and community organizations (Florida Legislature, 2012). The statute requires the Florida Department of Management Services to work collaboratively with and receive staffing support, and other resources, from Enterprise Florida, Inc., state agencies, local governments, private businesses and community organizations to (Florida Legislature, 2012):

- identify geographic gaps in broadband services, including areas unserved by any broadband provider and areas served by a single broadband provider
- identify the download and upload transmission speeds made available to businesses and individuals in the state
- provide a baseline assessment of statewide broadband deployment in terms of percentage of households with broadband availability

The statute also encourages access to broadband Internet service in rural communities. Florida has developed and implemented initiatives and programs to carry out the statutes enacted. These programs and initiatives include the Florida A&M University (FAMU) Center for Public Computing and Workforce Development, Tampa Housing Authority, a program by the School Board of Miami-Dade County, and Florida Rural Broadband Alliance.

Florida A&M University's (FAMU) Center for Public Computing and Workforce Development provides broadband access to underserved residents in northern Florida. The Center provides broadband Internet access between 7:00am and 10:00pm Monday through Friday (National Telecommunications and Information Administration, 2010).

The FAMU Center for Public Computing and Workforce Development was the site for trainings from several organizations, which include Southside Development Advisory Council, and also assisted Tallahassee Housing Authority Communities develop a plan to increase bandwidth for housing residents' engagement in virtual training (National Telecommunications and Information Administration, 2010). Tampa has also developed a plan for its housing authority similar to the work in Tallahassee.

Tampa Housing Authority's "AccessALL Tampa" is a project created to develop

“technology smart communities” within 23 public housing sites in Tampa. The purpose of the project is to increase employability and improve life circumstances of housing residents.

“AccessALL Tampa” will provide subsidized broadband service, an on-site certified computer technician, and several courses. The courses include job search, GED, and English as a Second Language (National Telecommunications and Information Administration, 2010). Any household that wishes to participate in training will be offered discount computers. Tampa Housing Authority is also partnering with the United States Department of Housing and Urban Development for a pilot program, in which touch screen computers will be installed in 200 housing site households (National Telecommunications and Information Administration, 2010). In 2011, nearly 300 individuals in Tampa Housing Sites enrolled in the “Intro to Microsoft Office” course, while 68 students enrolled in an A+ Certification program. The A+ Certification program was a course designed to teach students how to configure, troubleshoot, install, and upgrade computers (National Telecommunications and Information Administration, 2010). Through this project Tampa Housing Authority has provided broadband access and training to families to not only increase access, but for tenants to develop marketable skills that will increase their chances in securing jobs and changing their lives. The School Board of Miami-Dade County created another transformative program in Florida.

The School Board of Miami-Dade County was funded \$3.4 million, by a NTIA grant, for the “Miami-Dade County Public Schools-Get Connected-Go Global-Sustainable Broadband Adoption Program”. The program will increase broadband adoption among low-income middle school students and their families. 35 schools, identified as “high need”, will be selected for the project. The “Miami-Dade County Public Schools-Get Connected-Go Global-Sustainable

Broadband Adoption Program” provides training, discounted computers, Internet service and awareness campaigns (National Telecommunications and Information Administration, 2011). 60,000 hours of computer training will be offered to 30,000 students and their parents, 6,000 low-cost refurbished laptops will be provided to students, and 10,000 families will receive discounted Internet (National Telecommunications and Information Administration, 2011). In 2011, the School Board of Miami-Dade County launched a program, “Learn Ideas, Navigate Knowledge” (LINK), in 35 low-income elementary, middle, and schools in Miami Dade County School District (National Telecommunications and Information Administration, 2011). The program provided necessary training and equipment to students and families from economically distressed populations. The School Board of Miami-Dade County partnered with non and for profit organizations to offer computers, Internet service, and multilingual digital literacy training (National Telecommunications and Information Administration, 2011). Also offered to parents in English, Spanish, and Creole was the “Introduction to Computers” course. Parents enrolled in the “Introduction to Computer” course learned computer basics, fundamentals of the Internet, and how to use LINK program’s Parent Portal. Parent Portal allows parents to check their child’s grades and stay in contact with teachers. Once parents completed the course they were presented with a free computer and access to Parent Portal (National Telecommunications and Information Administration, 2011). The School Board of Miami-Dade County estimates that 6,000 households will be provided to computers and affordable Internet access through the LINK program. Previously referenced projects focused on urban communities and cities, but one of Florida’s projects focus specifically on rural communities.

Florida Rural Broadband Alliance's Florida Rural Middle Mile Networks proposes to deploy an 1,800 mile microwave-based middle mile network across two of Florida's regions that were deemed Rural Areas of Critical Economic Concern (RACEC) (National Telecommunications and Information Administration, 2010). The network is expected to improve healthcare, education opportunities, library services, economic development, and public safety services. Local and tribal governments, economic development agencies, and commercial partners will work collaboratively to address the lack of access to broadband services, therefore improving the disparities income and access to education and healthcare that exist in rural communities in Florida (National Telecommunications and Information Administration, 2010).

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