Chapter V: All Puerto Ricans Online! Expanding Broadband Adoption
Stimulating broadband adoption across all segments of society is imperative to ensure a vibrant economy and to promote continued investment in broadband capacity.

A. Introduction

Promoting adoption of broadband service across all segments of society and in all areas across Puerto Rico, whether urban or rural, is a key goal of this Strategic Plan for two core reasons. First, in a market economy, demand drives supply – investment in access or infrastructure build-out – and, hence, demand stimulation becomes a core strategy in promoting investment in capital infrastructures and addressing the infrastructure gap described in the previous chapter. Private Puerto Rico entities competing for government, business, and residential customers determine their infrastructure build-out based on the expected revenue stream stemming from those investments. As demand for broadband services grows, the economics of network build-out and capacity expansion are improved, leading to more and better networks. Broadband and information technology are “sticky” – once used, citizens, businesses, and government agencies alike become dependent upon the economic and welfare benefits of online activities and rarely revert back. Hence, demand stimulation is a core strategy for sustainability of this Strategic Plan.

Second, adoption of broadband service – and not access – is the true objective of this Strategic Plan. The goal is not to have universal access per se, but rather to have citizens adopting and using this network and information technology for ever-more empowering and productive activities. The success of the digital age does not rest in more or better broadband “pipes” and should not be measured in terms of access bits, but rather in terms of number of adopters and scope and quality of usage of the technology.

Some might question what should be the role of government to address barriers to broadband adoption across vulnerable populations. While market forces are effectively driving market growth in the sector across a large segment of the society, that growth does not reach all segments and regions. Broadband technology is today a key enabler of economic opportunity, social interaction, and is critical in supporting first responders during a disaster situation. Increasingly, communities and citizens that are left behind this empowering technology have to overcome ever-greater challenges to obtain economic independence and fully participate in the social discourse of our nation. Hence, it is in the interest of both private and public leaders to work together to overcome the barriers to IT and broadband technology among the most vulnerable.
In assessing this position, it is important to understand that there is a big difference between traditional voice telecommunications services and the adoption of IT and broadband technology. In traditional voice telecommunications, demand and adoption of the service has not been a primary concern of policy makers. Voice telecommunications policy frameworks have been primarily focused on supply-side concerns. Where lack of access to voice telephony networks has been a core concern, telecommunications policy has been focused first and foremost on promoting universal access to the service, and, secondarily, to promote and monitor competition where it exists, or regulate the voice service monopoly where competition is not deemed possible. Traditional voice telecommunications policy has not been focused on demand-side issues because, for voice services, the old adage of “build it and they will come” works. Appreciating the value of voice communications and understanding how they work requires only a try. Importantly, the entry cost of acquiring a customer access device – in this case a phone – is limited and rarely constitutes a significant barrier to entry even across low-income segments of the population.

By contrast, the cost of a computer or personal device necessary to use broadband service and access the Internet can be prohibitive to lower-income demographics, and across the region can be an important barrier to the full expansion and leverage of broadband technology. In order to close the digital gap, it is imperative that we address this adoption challenge and examine computer or device cost entry challenges through policies that may include fiscal incentives for the purchase or lease of the equipment, direct subsidies of equipment aimed to certain segments of the population or key professionals (such as educators, healthcare providers, first responders, or others), or the promotion of public computing centers serving vulnerable populations.

Furthermore, failing to understand the value of online resources and how to use a computer, tablet, or mobile device to access the benefits of broadband is a barrier to adoption of broadband technology for many. Historically, adopting voice communications devices was a self-taught discovery process that may have required several minutes. By contrast, data communications devices are much more complex and usually require external training and guidance. Addressing these barriers to broadband expansion through policies to promote digital literacy and campaigns to build awareness of the benefits of online interaction for both personal use and small business enterprises need to be incorporated into the tool kit of effective broadband policy.
By 2013, residential home broadband adoption across Puerto Rico should be at least 50% and by 2015 at least 70%.

The vision and recommendations presented in this Chapter builds upon previous work conducted by Puerto Rico partners, as outlined in Section B of this Chapter, and federal resources including:

- FCC’s National Broadband Plan – Adoption Chapter
- FCC’s NPRM and Order on the USF Low Income Program reform (Lifeline)
- FCC Chairman’s vision for a connected America through the Connect to Compete program
- The U.S. Department of Commerce’s report, Exploring the Digital Nation: Computer and Internet Use at Home.

With this vision of the importance of universal adoption and the role of public-private partnership to achieve this goal, the Puerto Rico Broadband Taskforce sets the following goals:

**Strategic Goals for Puerto Rico - Adoption**

All Puerto Ricans, regardless of income, race, gender, age or location, should have access and the willingness to partake and benefit from the online opportunities available through broadband.

**Adoption Goals:**

- By 2013, residential home broadband adoption across Puerto Rico should be at least 50% and by 2015 at least 70%.
- By 2015, adoption of broadband by all business with more than 4 employees.
- By 2015, 90% of the Puerto Rico population should have access to a broadband enabled computer or other mobile devices, either at home, work or via personal connection.

This chapter builds upon Chapter III, and examines the broadband adoption gap across Puerto Rico in detail, focusing attention on at-risk demographic groups and the barriers to broadband and related technologies adoption. It then presents an inventory of existing programs across Puerto Rico working to overcome barriers to broadband and IT. Building upon this information the final section outlines a series of aspirational goals for broadband adoption across Puerto Rico and strategic recommendations to achieve these goals.
An estimated 69% of all Puerto Rico households do not subscribe to broadband. Of those that have broadband available, 55% choose not to subscribe.

B. The Puerto Rico Technology Adoption Gap

This section analyzes the technology adoption gap across Puerto Rico’s residential sector. The analysis is based on the 2010 Connect Puerto Rico Residential Assessment, a consumer survey implemented by Connect Puerto Rico in 2010 aimed at understanding demand-side trends and barriers in the Puerto Rico broadband market. The survey was conducted by Connect Puerto Rico on behalf of the Office of the Chief Information Officer as part of the State Broadband Initiative (SBI) federal grant program, and funded through the American Recovery and Reinvestment Act. Data were collected by Estudios Técnicos in Puerto Rico and weighting and research consultation were provided by Lucidity Research, LLC.

1. Fixed Broadband Adoption

According to the broadband landscape outlined in Chapter III of this Plan, residential survey research conducted by Connect Puerto Rico in 2010 indicates that 31% of Puerto Ricans have a broadband connection in the home. The most recent comprehensive broadband network inventory conducted by Connect Puerto Rico estimates that 86% of all Puerto Rico households have broadband available at the basic speeds of 768 Kbps download/200 Kbps upload. This implies an adoption gap in Puerto Rico of 55% of households; in other words, more than one-half of Puerto Ricans have basic broadband service available but, for various reasons, are choosing not to subscribe to the service in their home (Figure V.1).
In 2010, 50% of Puerto Rico adults reported having a home Internet subscription. Of these 1.5 million adults, 31% reported subscribing to home broadband, 10% reported subscribing to dial-up Internet service, and 9% report home Internet subscriptions, but could not recall the connection type (Figure V.2). Another 14% reported only accessing the Internet outside of their home. Combined, 64% of Puerto Rico adults accessed the Internet either at home or outside of the home in 2010, but only 31% report accessing the Internet from a home broadband connection.

In comparison, 71% of U.S. households report subscribing to the Internet in 2010, and more than two-thirds (68%) reported subscribing to broadband. Indeed, a shrinking share of home Internet users – about 3% of households in 2010 – used dial-up to access the Internet, down from 5% in 2009. Another 9% of households had Internet users who only access the Internet outside the home. Together, these figures indicate that 80% of American households in 2010 had at least one resident who accessed the Internet from home or elsewhere.

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2. Mobile Broadband Adoption

Advances in mobile technologies are making Internet access more available and affordable than ever before, highlighting the critical role that mobile broadband deployment plays in bridging the digital divide. According to Connect Puerto Rico’s June 2011 broadband inventory, 99.6% of Puerto Rico households have access to mobile broadband from at least one mobile provider. However, while over one-third of Puerto Rico residents (37%) own a laptop computer, and more than three out of five residents (62%) report owning a cellphone, only 27% of Puerto Rico residents report accessing mobile broadband service (Figure V.3). In comparison, according to Pew Internet’s Mobile Access 2010 report, 59% of U.S. adults reported accessing mobile broadband.
Among Puerto Rico adults, 19% own a laptop and access the Internet either via a paid subscription to mobile wireless service or through Wi-Fi zones. In comparison, Pew Internet’s research indicates that 47% of U.S. adults go online with a laptop using a Wi-Fi connection or mobile broadband card. Additionally, Connect Puerto Rico’s research indicates that only 17% of Puerto Rican adults access the Internet via cell phones; which is significantly lower than the U.S. average, reported as 40% of the population by Pew Internet.

During the first decade of the twenty-first century, U.S. household technology adoption grew dramatically. Figure V.4 provides a measure of the time lag in technology adoption across Puerto Rico relative to the U.S. Despite this technology becoming an ingrained feature of everyday life for most Americans, Puerto Rico’s overall home computer and Internet adoption in 2010 is comparable to the September 2001 U.S. average. Furthermore, mobile broadband usage in Puerto Rico is equal to about one-half of the U.S. average. Finally, at 31%, Puerto Rico’s broadband adoption is less than one-half of the U.S. average, meaning approximately 2.1 million Puerto Rico residents do not have home broadband access.
Puerto Rico’s overall home computer and Internet adoption in 2010 is comparable to the U.S. average in 2001.

3. Broadband Adopters and Non-Adopters

In the United States, the U.S. Census Bureau, in collaboration with the National Telecommunications and Information Administration, found that broadband non-adopters are generally people of low-income, senior citizens, members of ethnic minorities, rural dwellers, people with disabilities, and/or people with less education. According to the 2010 Connect Puerto Rico Residential Technology Assessment, these trends are in line with non-adoption rates reported by similar demographic groups in Puerto Rico; however, the adoption gap in Puerto Rico for each of these demographic groups is more acute. Figure V.5 contrasts Puerto Rico and U.S. adoption gaps among selected demographic groups. While across Puerto Rico broadband adoption is 31%; senior citizens, low-income residents, adults with disabilities, and adults with lower educational levels disproportionately find themselves on the wrong side of the digital divide. The broadband adoption rate is 5% among adults 65 and older; 7% among residents without a high school diploma; 15% among households with annual incomes below $15,000; 21% among adults with disabilities; and 34% among rural households.
4. Main Drivers of the Adoption Gap

The 2010 Connect Puerto Rico Residential Technology Assessment indicates that the main demographic drivers of broadband adoption are income, education attainment, and age; the first two being highly correlated (Figure V.6).

- **Income**: Income appears to be the biggest dividing line of broadband adoption. More than one-half of Puerto Rico residents reporting an annual median household income of more than $15,000 (52%) report having home broadband subscriptions. Among those reporting an income of less than $15,000, only 15% report having home broadband subscriptions.

- **Education**: Among those who have some college experience, 45% have broadband at home, compared with 18% of those whose highest level of education attainment is a high school diploma.

- **Age**: While older residents tend to have lower broadband adoption rates, in Puerto Rico adoption is very low. Only 5% of residents age 65 or older report subscribing to home broadband.

* U.S. low-income = households reporting annual income less than $25,000. Puerto Rico low-income = households reporting annual income less than $15,000.
a. Affordability

While income appears to be the main driver of the broadband adoption gap in Puerto Rico, Connect Puerto Rico’s 2010 Residential Technology Assessment confirms that affordability is indeed a key reason why Puerto Rico’s residents do not adopt.

In 2010, Puerto Rico residents surveyed reported paying an average of $42.37 per month for their home broadband service. In comparison, a 2010 Pew Internet study found that the average American broadband subscriber paid $41.18 per month for service. Furthermore, although Puerto Rico households are, on average, paying more for their broadband, despite having a considerably lower average household income, they’re receiving significantly slower speeds. Puerto Rico broadband subscribers who know their broadband speed report an average download speed of 3.3 Mbps, compared to the average of 6.0 Mbps reported across various U.S. states similarly surveyed by Connected Nation. When Puerto Rico broadband subscribers were asked about their satisfaction with their home broadband subscriptions, 64% responded that they were very satisfied, followed by 34% who were somewhat satisfied, and 2% who reported being dissatisfied with their current broadband service. Among unsatisfied subscribers, the majority reported that frequent service outages were an issue.
Affordability of the service is a key factor for many non-adopters across Puerto Rico. An estimated 16% of Puerto Rico’s non-adopters (approximately 322,000 Puerto Rico residents without a home broadband subscription) report that expense is a barrier to their broadband adoption. In addition, 27%, or approximately 362,000 Puerto Ricans, report that expense is a barrier to home computer ownership, a prerequisite for a home broadband subscription. Unfortunately, vulnerable population segments feel the impact of expense more than others (Figure V.7). Low-income households and households with children – two population segments that could stand to benefit most from broadband – have particularly low adoption levels. Approximately 433,000 children across Puerto Rico cannot enjoy the benefits of broadband in the home, largely due to the inability to purchase a computer or to pay the monthly subscription fee.¹⁷

![Figure V.7 - Expense as a Barrier to Technology Adoption](image)

To put the affordability challenge in perspective, it is estimated that approximately 42% of Puerto Rico households have an annual income of less than $15,000.¹⁸ For these residents, the cost of broadband represents approximately 3.4% of their annual income, which, according to the International Telecommunications Union, is considered unaffordable (Figure V.8).¹⁹ According to this standard, more than two-fifths of Puerto Rico residents do not have access to “affordable broadband.”
The cost of broadband for Puerto Rico households with annual income below $15,000 represents approximately 3.4% of their annual income.

b. Relevance and Computer Ownership

While making broadband and related technologies affordable is fundamental to bridging the digital divide, cost alone is not a sufficient factor to explain, nor an adequate lever to address, the gap in home broadband adoption. Communities with a large percentage of non-adopters face multiple overlapping challenges to broadband use, from skill and language barriers, to provider access as well as public access points. For instance, Figure V.9 presents a comparison of broadband adoption among Puerto Rico and the average of jurisdictions surveyed by Connected Nation in 2010. While adoption levels among higher income categories are comparable, broadband adoption among Puerto Rico households making less than $15,000 are nearly one-half of the Connected Nation average.
What else is driving non-adoption? Among low-income Puerto Rico households, the lack of a home computer is the main barrier reported. However, overall, the largest barrier to broadband reported among Puerto Rico non-adopters is the lack of relevance that broadband has in their lives, cited by nearly one-third of non-adopters. In other words, their perceived benefits of broadband do not justify the monthly expense. In fact, regardless of household income, relevance as a barrier remains fairly consistent (Figure V.10).

Thus, addressing the adoption gap will include affordability solutions, as well as addressing computer ownership and relevancy issues. However, despite these barriers, the ways that Puerto Rico residents use other forms of technology bodes well for the future of broadband adoption. Most residents have a positive view of the benefits of new technology; they buy and use such technology, even though they have not purchased broadband. For example, according to the Puerto Rico Telecommunications Regulatory Board, approximately 48% of households have paid TV subscriptions and 97% have a color television set. Additionally, research conducted by Connect Puerto Rico indicates that 62% of Puerto Rican adults own a cell phone.
C. Broadband Digital Inclusion Projects Underway Across Puerto Rico

There are many initiatives across Puerto Rico working to promote ICT adoption and close the digital divide. Some of the efforts bring people closer to computer technology, train how to use computer technology and navigate the Internet and encourage leveraging the network’s power. Others focus on broadband accessibility, either by increasing penetration and/or making it more affordable. These initiatives are sponsored through public and private partnerships that include non-profit entities working to promote economic development across various regions of the island, private corporations in the IT sector, broadband providers, and national and local government agencies. In this section we highlight several examples of some of the more comprehensive and effective initiatives promoting digital inclusion across Puerto Rico. We also include a list of institutions providing digital resources and training across Puerto Rico communities.

1. Government-Sponsored Free Wi-Fi and Internet Access Centers

Puerto Rico Law 101, enacted July 28, 2010, mandates the Puerto Rico Telecommunications Regulatory Board (PRTRB) establish a Free Internet Access Center (FIAC) in each of the 78 municipalities of Puerto Rico in coordination with central government agencies, the municipalities themselves, and other private, educational, and community entities as deemed necessary. These Internet Access Centers will serve as public computer centers, making broadband access available to all citizens. These centers are specifically designed to provide “lifeline” access to the Internet for citizens who may not have access to the Internet through home, mobile or work connections.

The law also dictates that the PRTRB implements free wireless Internet access (fWi-Fi) in all public “plazas” of Puerto Rico. This free Wi-Fi access will allow all citizens to access the Internet at these central community locations, and generally promote Internet use across the community. The law authorizes the PRTRB to receive and administer funds from legislative appropriations, transfers, delegations, contributions and donations of any kind received from agencies, municipal governments, and the Government of the United States, as well as from individuals, NGOs, and other private entities for the design and implementation of projects, programs or services to be performed or offered in the FIACs. As of December 31, 2011, there were 33 fWi-Fi installation projects for public “plazas” and 46 FIACs.
Connect Puerto Rico’s 2010 Residential Technology Assessment confirms the value of these Internet access centers. While 15% of Puerto Rican laptop owners (or 5% of Puerto Rican residents) subscribe to a mobile wireless service that allows them to access the Internet on their laptop computer via a cellular network, nearly one-half of laptop owners (47%) utilize Wi-Fi “hot spot” zones to access the Internet; which is on par with laptop owners similarly surveyed by Connected Nation. Fifty percent of laptop owners surveyed by Connected Nation reported using wireless hotspots to access the Internet (Figure V.11).

When hot spot users were asked about the most popular places to access Wi-Fi, the results revealed an interesting landscape. Nineteen percent of wireless hotspot users living in the 13 jurisdictions surveyed by Connected Nation use outdoor public space for Internet access; across Puerto Rico, more than one-third (34%) of laptop computer owners visit an outdoor public space for Internet access. This suggests that Puerto Ricans seeking hot spots rely heavily on public spaces for Internet access. Furthermore, 70% of Puerto Rico laptop owners go to a restaurant or coffee shop for Internet access, compared to 60% across all jurisdictions surveyed by Connected Nation. In comparison to usage patterns in other U.S. jurisdictions surveyed by Connected Nation, Puerto Rico laptop owners are significantly less likely to go to a library, their employer, a hotel, or an airport for access to the Internet. Less than one-quarter (23%) of Puerto Rico laptop owners report going to the library for Internet access, 19% access hot spots at their place of employment, and 8% access hot spots at hotels or airports.

A convenient tool to promote hot spot usage would be an online map of all publicly available hot spots across Puerto Rico. Such a map could include available resources both for free and for a fee. Useful data to ascertain the efficacy of these hot spots would include statistics on usage of the networks, number of patrons, and broadband capacity used.
Relative to their U.S. mainland counterparts, Puerto Rico laptop owners are significantly less likely to go to a library, their employer, a hotel, or an airport for access to the Internet.

2. Regional Economic Development Public-Private Partnership Promoting Broadband Infrastructure and Technology Use

Across Puerto Rico there are regional economic development initiatives that have embraced broadband and information technology as a key engine for economic growth. One example of such an initiative is INTECO (Iniciativa Tecnológica Centro Oriental), a nonprofit organization that promotes the economic development of the East-Central Region of Puerto Rico comprising the following municipalities: Cayey, Caguas, Gurabo, San Lorenzo, Juncos, Las Piedras, Naguabo, and Humacao. INTECO was created in 2003 and brings together local elected officials, higher education institutions present in the region, and corporate partners such as Microsoft.21
INTECO sponsors a series of initiatives aimed to promote technology expansion in the region. Key among these are its Centros de Innovación Tecnológica (CIT), or Center for Technology Innovation, which aims to promote innovation and growth through youth-oriented educational programs that focus on science, engineering, technology, and mathematics. The CITs were founded in 2004 with the expressed goal of promoting a culture for innovation and entrepreneurship and to bring ICT closer to the region’s youth. There are currently three such centers located in the communities of Caguas, Cayey, and Juncos where ongoing training is offered in ICT and computer software skills, and entrepreneurship. Since its foundation, more than 60,000 citizens have benefited from these resources. In partnership with the municipality of Caguas, INTECO also founded CIMATEC, a magnet high school specialized in sciences, mathematics, and technology. The CITs aim to expand the outreach of this educational initiative to youth beyond the municipality of Caguas.

In 2010, INTECO was awarded a $12.9 million grant from the U.S. Department of Commerce’s National Telecommunications and Information Administration, and complemented by local investment totaling $3.4 million, to build a wireless backhaul broadband network in its focus region. To do so, it formed an alliance with the Puerto Rico Bridge Initiative to obtain Internet access at a reduced cost. This will enable INTECO to offer affordable broadband services on a wholesale basis to retail broadband providers across the region, significantly expanding the broadband capacity in the area and contributing to the competitive dynamics in the broadband sector. This broadband capacity expansion will serve to support the broadband needs of the CITs, among others. This project is currently underway with a Phase I go-live date of June, 2012.

More recently, in early 2012, the Puerto Rico Industrial Development Company (PRIDCO) approved the allocation of $1.6 million to INTECO for the purpose of matching federal funds from the U.S. NTIA. The goal of this funding is to expand Internet access in economically disadvantaged communities in the East Central region of the island and is expected to enable direct connection to 250 institutions; including schools, universities, hospitals, municipal buildings, and police stations. Additionally, INTECO expects this funding to facilitate broadband access to local customers, including 136,000 residents and 600 business and industrial sites. The project also includes Wi-Fi zones free of cost to promote Internet use among youth and economically disadvantaged adults.

Investments such as these, involving private and federal and local public resources, are the key to overcoming the digital lag across Puerto Rico’s remote areas and spurring investment in outreach and training resources targeting vulnerable populations.
3. Promoting ICT Use Across Public Libraries

Recognizing the important, new role of the public library as an Internet and technology hub for the community it serves, local leadership across Puerto Rico is taking action. One such example is the Vega-Alta municipality, which has funded a project to create a public computing center in the local library. The goal of the initiative is to help close the digital divide in that community by creating a public computing center, offering broadband connectivity and specialized information resources to the community. The initiative brings together public and private partners including local public government, local schools, and community advocacy groups, and private citizens working together to create this new public resource. The public computing center was inaugurated in 2008 and since then has developed outreach and training programs targeting demographics with high risk of exclusion, such as single mothers, drug addicts, homeless, HIV+ patients, the elderly, people with physical disabilities, and school dropouts. Digital literacy training is provided to help citizens understand the relevance and use of broadband and related technology.

4. Leveraging Information Technology in the Classroom

Intel Corporation and the Government of Puerto Rico have formed a public-private partnership to expand the scope of “Intel Teach” program to Puerto Rico, helping to bridge the digital gap by fully leveraging Information Technology in the classroom. The program is geared to improve teacher effectiveness through professional development, helping teachers integrate technology into their lessons, and promoting students’ problem-solving, critical thinking, and collaboration skills. The main goal of the program is to increase access to technology in an effort to improve formative opportunities for the public school system, positioning them on more competitive footing in the shifting labor market. This public-private partnership was consolidated in January 2012 and is scheduled to provide training to approximately 21,000 public school teachers across Puerto Rico.

Puerto Rico’s “Schools for the 21st Century” is a school modernization program that strives to improve the teaching and learning environments through addressing key design elements in each school. One key element is integrating relevant education technology into the curriculum. School modernization would include ensuring high bandwidth broadband access, wireless access, increasing computer access in the library, providing two desktop computers in every room, integrating the use of electronic whiteboards, and providing access to other equipment such as digital cameras, video cameras, printers, and scanners as needed.
5. Other Programs Working to Bridge the Adoption Gap

Across Puerto Rico there exists 168 Centros Tecnologicos Comunitarios (CTC), or Community Technology Centers that were initially established via funding under a law for the integral development of the Special Communities of Puerto Rico, otherwise known as la Law Num. 1 of 2001 for “Comunidades Especiales.” The objective for each CTC is to provide public computer access and training to all residents of disadvantaged communities throughout Puerto Rico. These disadvantaged communities were essentially defined by factors such as high unemployment rate, high percentage of population below the poverty level, and high percentage of school dropouts. Over time, the CTCs have been handed over for administration by the municipality, Department of Education, a public-private partnership or other entity and serve as a community resource.

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<th>Target Population (average ages)</th>
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<td>10-55</td>
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<td>Municipal Library</td>
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<td>Center Type</td>
<td>Training Focus</td>
<td>Support Organization</td>
<td>Target Population (average ages)</td>
<td>Community Impact (average #people / day)</td>
</tr>
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<td>Starting at 12</td>
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</tr>
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<td>Municipal Government</td>
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<td>San Juan</td>
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<td>School Facility</td>
<td>Non-traditional Education</td>
<td>Municipal Government</td>
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<td>Not Available</td>
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<td>Public/Private Partnership</td>
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<td>Municipal Library</td>
<td>General computer/Internet utilization</td>
<td>Municipal Government</td>
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<td>Center Type</td>
<td>Training Focus</td>
<td>Support Organization</td>
<td>Target Population (average ages)</td>
<td>Community Impact (average #people / day)</td>
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<tr>
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<td>Community Center</td>
<td>General computer/Internet use</td>
<td>Public/Private Partnership</td>
<td>12-40</td>
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<td>Community Center</td>
<td>General computer/Internet use</td>
<td>Oficina del Coordinador General para el Financiamiento Socioeconómico y la Autogestión</td>
<td>11-50</td>
<td>15</td>
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<tr>
<td></td>
<td>Centro Tecnología Informática El Semil</td>
<td>Community Center</td>
<td>General computer/Internet use</td>
<td>Oficina del Coordinador General para el Financiamiento Socioeconómico y la Autogestión</td>
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<td>Community Center</td>
<td>General computer/Internet use</td>
<td>Oficina del Coordinador General para el Financiamiento Socioeconómico y la Autogestión</td>
<td>11-45</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Centro Tecnología Informática Tierra Santa</td>
<td>Community Center</td>
<td>General computer/Internet use</td>
<td>Municipal Government</td>
<td>13-29</td>
<td>30</td>
</tr>
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<td></td>
<td>Centro Tecnología Informática Cerro Gordo</td>
<td>Community Center</td>
<td>General computer/Internet use</td>
<td>Oficina del Coordinador General para el Financiamiento Socioeconómico y la Autogestión</td>
<td>10-20</td>
<td>7</td>
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</tbody>
</table>
D. Policy Recommendations to Promote Broadband Adoption

An examination of the broadband adoption and technology use across Puerto Rico reveals that there is a significant lag in the adoption and usage of broadband and IT across Puerto Rico. This lag is particularly acute across three demographic groups including: low-income residents, citizens with low levels of educational attainment, and senior citizens. Across these three groups, the core barriers to adoption are relevance of the benefits of the technology, affordability of the service and associated equipment, and sufficient digital literacy skills to be able to understand and use the technology.

Following the research and best practices of the federal government and other entities, including the Federal Communications Commission, and the Department of Commerce’s BTOP Sustainable Adoption Grants, this Broadband Strategic Plan recommends the following normative recommendations for how to address these barriers across the most vulnerable populations in Puerto Rico.

1. Public Computing Capacity, Digital Literacy, and Workforce Development Programs

Puerto Rico private and public stakeholders should work together to leverage and expand public computing capacity across low-income communities. While the ultimate goal set in this Strategic Plan is to achieve universal adoption of broadband service across all households, establishing public computer centers in community centers, libraries, schools, churches or other community anchor institutions is an effective interim means to provide online access with limited resources and in short order to the maximum number of citizens.

In order for Puerto Rico non-adopters to find broadband valuable enough to subscribe, they need a basic knowledge of how to find and use substantive content. Digital literacy is an evolving concept. Though there is no standard definition, digital literacy generally refers to a variety of skills associated with using ICT to find, evaluate, create, and communicate information. According to the U.S. National Broadband Plan, it is the sum of the technical skills and cognitive skills people employ to use computers to retrieve information, interpret what they find, and judge the quality of that information.27
Researchers from the Social Science Research Council have found that community based organizations, such as libraries and non-profits, are key institutions in underserved and non-adopting communities – often providing Internet access, training, and support services even when those activities fall outside their traditional missions. These organizations offer more than just free access to the Internet, they provide supportive environments for reluctant and new users to begin to explore the Internet, become comfortable using it, and develop the skills needed to find, utilize, and create content. While the challenges and opportunities they face vary, these libraries and other community partners are critical to improving the digital proficiency in communities.

Table V.2 presents Puerto Rico’s challenge. While Internet access at school and public community centers are comparable, only 3% of the Puerto Rico adults report accessing the Internet at the library, compared to 14% of all residents living in jurisdictions surveyed by Connected Nation.

Where else do Puerto Rican residents access the Internet? Eleven percent report accessing the Internet at someone else’s home; which is significantly higher than the Connected Nation average. In fact, more Puerto Rico Internet users report accessing the Internet at a friend or family member’s house than they do anywhere else besides their own home. This statistic appears to affirm conclusions drawn by a study by the Social Science Research Council. Using qualitative research techniques to examine broadband adoption and use in context, particularly in low-income communities, their research examined the role that community plays in supporting digital literacy: non-adopters and new users often rely on the assistance of others to get online or get one-on-one support when they use the Internet.
This important social dimension to broadband adoption cannot be overlooked. The primary incentive for broadband adoption is communication – two-way communication through e-mail, social networking platforms, instant messaging, or video-chatting. People find broadband relevant when the communities they care about are online, exchanging information and creating content. Once online, individuals will stay online if they continue to find information and broadband applications that are useful and relevant to their lives and when the people around them do the same.

The 2010 Connect Puerto Rico Residential Technology Assessment indicates that one-third of all Puerto Rico broadband adopters first subscribed to broadband within twelve months of being interviewed for the assessment (compared to the 15% Connected Nation average). Furthermore, nearly one-half of low-income Puerto Rico broadband adopters began subscribing within twelve months of being interviewed (Figure V.12). To ensure sustainable adoption among these new-adopters, greater efforts will be needed to expand digital literacy training and learning opportunities across vulnerable communities. New adopters may be behind in learning how to generate and share content, use social networking sites, and find resources aimed at their own interests.

Ultimately, broadband adoption and utilization are not about owning a specific piece of technology or subscribing to a service but about providing individuals and communities with the tools to build assets, to participate in their communities, and to increase their education and healthcare opportunities. Getting Puerto Rico’s residents online is a crucial first step, but the goal must be to keep people online through sustainable efforts that promote utilization and help each user derive value from the Internet in their own way.

**Figure V.12 - When Puerto Rico Residents First Subscribe to Broadband**

<table>
<thead>
<tr>
<th></th>
<th>All Puerto Rico broadband adopters</th>
<th>Low-income Puerto Rico broadband adopters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within the last year</td>
<td>46%</td>
<td>33%</td>
</tr>
<tr>
<td>1 to 2 years ago</td>
<td>30%</td>
<td>22%</td>
</tr>
<tr>
<td>2 to 3 years ago</td>
<td>13% 11%</td>
<td>13% 11%</td>
</tr>
<tr>
<td>3 to 5 years ago</td>
<td>5% 5%</td>
<td>5% 5%</td>
</tr>
<tr>
<td>5 to 7 years ago</td>
<td></td>
<td>5% 5%</td>
</tr>
<tr>
<td>More than 7 years ago</td>
<td>11%</td>
<td>11%</td>
</tr>
</tbody>
</table>
Across Puerto Rico, this can be accomplished by leveraging existing private and public community assets, including those identified previously in this chapter. There is already a network of public computing centers that are serving the general public by providing free access to computers and the Internet. This capacity should be expanded and supported to ensure greater computing capacity, longer hours of operation, and fully leveraging those resources by providing digital literacy training, technology training, and workforce development training.

The University of Puerto Rico (UPR) can also be an important resource to leverage. The eleven campuses of the UPR are distributed across the island and have the necessary facilities to support public computing centers of this kind. Unlike K-12 schools, which have financial limitations that curtail their hours of operation, facilities across the UPR campuses have the necessary electric, workforce, and safety infrastructure to support a public computing center serving the general population on a 24 hour basis. Furthermore, the student body could be leveraged to provide outreach and digital literacy. These volunteer activities could be incentivized by instituting participatory credit time for students willing to teach technology oriented courses to members of their community outside of the University system. Outreach to communities surrounding the campuses can be accomplished by tapping into some of the community centers identified in the previous section as well as tapping in to other NGOs such as Boys and Girls Clubs, Aspira, and Centro para Puerto Rico, among others. The existing UPR broadband capacity can be leveraged to maximize teaching resources by simultaneously streaming the course to other areas of the island.

To ensure the most effective use of these resources and adjust programs and curricula to ensure greater impact across the community, all of these institutions should track their progress. Data should be collected on an ongoing basis measuring the number of citizens impacted, the hours of computer and capacity used, and student participation in training programs. Students who attend training courses should be tested for general technical knowledge before and after each course. After course completion and submission of tests and survey information, a certification will be awarded. Graduates of various training courses could then be eligible for programs that promote broadband and IT adoption by providing discounted offers to computers, consumer devices, and/or broadband service. A key metric that will need to be assessed is to what extent the training provided is encouraging broadband adoption in the home or via a personal mobile connection.
Leveraging ARRA funds, the U.S. Department of Commerce was able to fund a series of programs expanding Public Computing Centers and offering Digital Literacy plans at the local level under the Broadband Technology Opportunities Program (BTOP). One successful example of such programs is Every Citizen Online, a program managed by the non-profit Connect Ohio. The program brings together over 245 locations throughout the state, where BTOP resources were used to expand public computing capacity and facilitate a new and broader curriculum for digital training. The program is complemented with a traditional media outreach campaign targeting all citizens who have yet to adopt broadband usage. For more information on this program see http://connectohio.org/every-citizen-online

2. Mobile Broadband Usage

While the ultimate goal set by this Strategic Plan is to ensure that all Puerto Ricans have multiple access points to the Internet – in their schools, community institutions, places of work, homes, and in their pockets – so that they can fully leverage the power of online resources, promoting mobile broadband across low income segments of the population is an effective and more affordable way to encourage participation in the Internet economy.

Today, mobile smartphone devices and mobile tablets tend to cost less than desktop or laptop computers, especially if commercial offerings include financing for the customer device. Further, digital skills necessary to explore online resources are relatively easier to overcome through mobile devices than using more traditional computer technologies; and mobile broadband bundles that complement voice offers are generally less costly than home broadband options, making mobile broadband more affordable. In short, with lower barriers to adoption, mobile broadband solutions are fast becoming a key anchor to bring the disconnected online.
Mobile broadband service is often utilized as a complementary tool to access the Internet, rather than a substitute for fixed broadband access through a desktop or laptop computer. For the most part, broadband-connected individuals view mobile devices as an extension of their home broadband subscription; providing an additional, convenient, and portable access method. Thus, while mobile broadband empowers a low-cost alternative to online access, substituting mobile for fixed access can offer limitations – at least given today’s technology. For example, they are not necessarily the appropriate means to research and write a term paper, or prepare and present a job application. Nonetheless, mobile broadband devices do offer a plethora of applications and usages that empower the user to take advantage of the online world. Further, mobile broadband service can be an effective conduit for previously disconnected citizens to start learning how to leverage online resources and become a bridge technology that may eventually be complemented with other forms of access to the Internet economy. Hence, promoting mobile broadband adoption to all citizens, particularly low income Puerto Ricans, can be the fastest means to overcome some of the key barriers to broadband adoption; including affordability of devices and service, relevance of the technology, and digital literacy limitations. Puerto Rico’s private and public stakeholders should work together to ensure that these opportunities are appropriately targeted across the more vulnerable populations.

The mobile broadband market in Puerto Rico is characterized by a healthy degree of competition, which has resulted in high mobile coverage penetration. As mobile providers roll out their 4G service, it is important that low-income neighborhoods are not forgotten. The establishment of a public-private partnership to ensure that low-income communities are targeted by 4G build-out should be encouraged.

Further, efforts should be considered that would help reduce the cost of the service for low-income households. Pre-paid pricing packages for mobile voice services have proven to be a very effective marketing strategy to encourage low income citizens to adopt this technology. Mobile broadband providers should explore similar marketing strategies and other a la cart mobile broadband packages offering price-sensitive customers greater flexibility.

To complement such a strategy, efforts should be focused to help lower mobile broadband price points for low income populations. The FCC’s Low Income Broadband Pilot program has this objective in mind. The pilot program will provide subsidies to low-income households for their broadband service. This pilot is expected to include projects targeting low-income households that use mobile broadband platforms, as well as fixed broadband platforms. Puerto Rico mobile providers should take advantage of this opportunity and work with the FCC to test the best means to leverage such programs across Puerto Rico.
Finally, schools can have an important role to play in this context. Mobile broadband connectivity is deemed an important component of the future K-12 education paradigm. Today’s experts, working to define how technology should apply to education, are conceiving a world where each student is empowered with a wireless broadband device that will provide access to content and classroom interaction for the student in the classroom and outside of the school.

The FCC is currently implementing a pilot program to test how to best to implement this vision called Learning On-The-Go, which provides subsidies to finance a device for each student and financed the mobile broadband connection across 20 schools in the U.S. This model, currently being assessed by education experts, would have a tremendous impact on rapidly helping to close the digital divide. Students under such a model will learn early on how to leverage the opportunities available to them online. As they do so, they will be able to teach their elders how to leverage these resources to advance their education, apply for a job, or otherwise look for opportunities enabled by the Internet.

**Recommendation:**
Aggressively promote mobile broadband usage, especially among low income and vulnerable populations, as an effective lower-cost and easier to access introduction to online resources.

3. Online Digital Literacy Curricula

There are multiple public, non-profit, and corporate portals that offer digital literacy training and work force development resources associated with ICT. Puerto Rico stakeholders should leverage these online resources to bring solutions to non-adopting citizens and communities. Examples of such public and private online portals abound, including the following:
4. Awareness and Outreach Campaign Showcasing the Benefits of Broadband

The private sector and non-profit community should partner to conduct an outreach and awareness campaign across Puerto Rico, aimed to showcase the benefits of broadband and online resources to citizens across the most vulnerable segments of society. Such outreach can be achieved through targeted marketing campaigns and Public Service Announcements aimed at showcasing the many benefits of broadband and the Internet to at-risk populations. Public and private partners should prioritize efforts to increase the relevance of broadband for low-income citizens as well as people with disabilities and older Puerto Ricans. Awareness and outreach plans should be customized to the targeted population. One size fits all will not work. Rather, each target audience needs to be addressed with particular, relevant messages, through the medium that conveys that message best.

Traditional media can be used for this purpose, as well as new tools that leverage popular commercial and TV outlets in Puerto Rico. For example, a network of booths providing live video streaming services in public institutions, such as safe commercial shopping malls and other public venues, can be used to raise awareness of the power of broadband. By interconnecting these public live video streaming venues, disparate points across the island could be virtually connected providing patrons free, real time connections with people in other parts of the island. As such, Vieques could become virtually connected with the center of San Juan, Ponce and beyond, allowing friends and family, or simply passersby to experience the power of broadband. Fully leveraged, this project could become an effective media tool to carry the message of the benefits broadband affords to the average Puerto Rico citizen. This momentum can be used to send a “connect to broadband” message to everyone.

**Recommendation:**
Launch public-private targeted awareness campaigns promoting the benefits of online resources across vulnerable populations.
Teleworking is a broadband-enabled solution benefiting both workers and employers and driving broadband expansion.

5. Promote Telework Across Puerto Rico Private and Public Sectors

Teleworking is a powerful example of the way broadband can affect our lives. Yet, across Puerto Rico teleworking is not a common practice. Connect Puerto Rico Business Technology Assessment Survey estimates that in Puerto Rico only 4% of employed adults report that they telework and 43% claim they would telework if allowed. This suggests that there is great room for growth in teleworking across Puerto Rico. Important benefits can come to Puerto Rico through broadband-enabled telecommuting, including environmental benefits through reduction of the carbon footprint generated by commuting automobile traffic, reduction in commuting time and traffic congestion, or reduced need for office space and associated costs, such as electric power and water. Certain professions are natural fits for teleworking, and therefore enhanced productivity, such as statisticians, case workers, software developers, auditors, university students, and teachers.

Puerto Rico can accelerate the adoption of telecommuting practices by revising labor laws and policies that could be hindering the private and public sectors from allowing teleworking to become common practice. Further, as a key employer across the island, the Government of Puerto Rico can have an important impact on broadband usage and adoption by promoting teleworking practices throughout its workforce.

**Recommendation:**
Promote telework across Puerto Rico by revising labor laws and policies hindering its growth, and setting in motion plans to expand teleworking practices through the Puerto Rico government.

6. Leverage the Presence and Value of eGovernment Services

The government of Puerto Rico has invested heavily in developing online platforms through pr.gov supported services that provide to citizens, businesses, and other institutions access to government-related information and services. The digitalization of government-citizen transactions is important for Puerto Rico because it results in significant budgetary savings by lowering the cost of conducting business. Just as importantly, the expansion of eGovernment services across all levels of the Puerto Rico government structure will increase the value of the net to all Puerto Rico citizens and businesses, encouraging usage and access to the technology. Hence, accelerated expansion of the pr.gov portal is needed.
The power of eGovernment can also be leveraged by encouraging online citizen-government transactions in lieu of traditional means. Examples of such incentives include:

- Facilitate and eventually require that citizens apply for subsidized government services (public housing, educational, transportation, electricity, food, healthcare, etc.) electronically, via a broadband connection in their home, a public computing center, or in the government office itself.
- Encourage enrollment in local community digital literacy training centers for those citizens lacking basic IT skills.
- Offer a deduction or other benefits to citizens filing local and Puerto Rico taxes online.

**Recommendation:**
Leverage the presence and value of eGovernment services.

7. ICT Access and Use in the Classroom

As is discussed in Chapter VI of this Strategic Plan, the K-12 educational experience is a critical factor in overcoming the digital divide across Puerto Rico. It is imperative that the educational experience of Puerto Rico children today is adapted to fully leverage the IT and broadband technology of the twenty-first century in order to prepare Puerto Rico's future leaders, employment force, innovators and creators to compete and succeed in the global economy. It is imperative, therefore, that we overhaul and reinvent Puerto Rico's K-12 curriculum to ensure that broadband and online resources are fully leveraged to support student needs, and that graduates of the system have the necessary skills to succeed in the twenty-first century. We discuss in detail the goals and process of such transformation in Chapter VI. However, it is important to note that this transformation will be an essential strategy to quickly and effectively overcome the technology adoption gap across Puerto Rico.

**Recommendation:**
Accelerate ICT access and use in the K-12 classroom.
8. Promote Broadband Adoption Among Low Income Populations

Research shows that affordability of broadband services and associated computer or device equipment is a key barrier to broadband and technology adoption and usage, particularly across low income segments of the society. In order to overcome this barrier to adoption, efforts need to be made to lower the price point of the service and access technology to at-risk populations. This can be achieved through subsidies offered to targeted demographic groups providing discount for broadband service and/or IT equipment. These subsidies can be achieved if broadband providers and IT equipment vendors work in partnership with federal and Puerto Rico government resources. In particular, the private sector in partnership with public agencies including the Public Housing Authority, the Special Communities Administration, the Department of Labor, Economic Development, and the Department of Family Affairs should work together to establish programs geared to the most vulnerable across Puerto Rico offering basic entry broadband service at discounted prices.

An opportunity to complement these efforts exists through the FCC Low Income Broadband Pilot program, which is to be implemented in 2012. As part of the overall reform of the Low Income component of the Universal Service Fund (USF) program, the FCC is evaluating how to expand this program to include subsidies to low income households for broadband service.

The Lifeline USF program currently subsidizes voice-telephony services for households with earnings below a certain income benchmark across the entire nation. These subsidies are meant to ensure that all citizens, regardless of income, have access to the voice-telephony service. Puerto Rico low income citizens have directly benefited from this program in the past. In 2010, approximately $40 million was disbursed in Puerto Rico through this program.\(^{38}\) The National Broadband Plan released by the FCC in 2010 called for the expansion of these subsidies to include broadband.\(^{39}\) To achieve this goal, the FCC is implementing a pilot program aimed to test various policy options and obtain research information that can inform how best to structure a Low Income subsidy program for broadband service across the entire nation.\(^{40}\)

The FCC has allocated a total of $25 million to fund a series of pilot programs across the nation in 2012. These funds will finance the administrative and research expenses associated with the pilot programs and provide the subsidy necessary to achieve a discount broadband offer to the targeted population. The discounted service will be available to households with income earnings below the income benchmark that currently applies for the Low Income, Lifeline subsidy program.
Broadband providers are encouraged to apply for this program and offer innovative models for how to effectively overcome the adoption barriers to broadband usage across low income demographics. The FCC is encouraging broadband provider applicants to include as part of their offering key components that will help overcome such barriers including a local digital literacy plan that will provide digital literacy and workforce development training, online digital literacy curricula, and a discounted offer for computer, notebook, or tablet devices.

The FCC encourages broadband providers applying to the pilot program to partner with third parties succeeding in overcoming these barriers to adoption. In particular, the FCC encourages providers applying to the pilot program to partner with "successful BTOP/BIP grantees, those involved in “Connect to Compete,” existing library programs or other entities currently providing broadband adoption and education services to low-income consumers in order to develop pilot projects that integrate federal universal service support into existing or planned adoption efforts."

The Puerto Rico Broadband Taskforce strongly encourages multiple applications to this pilot program from various Puerto Rico stakeholders. To achieve this goal, the Puerto Rico Broadband Taskforce, in association with Connect Puerto Rico, is conducting educational outreach to key stakeholders regarding these pilot programs, and is working to encourage partnerships to support innovative and effective pilot applications. The expected time frame for submission of these applications will be in Q2 of 2012.

Beyond this important opportunity to help achieve discount offerings for broadband services to low-income households across Puerto Rico, the PR Broadband Taskforce will continue to research and encourage other models that will bring together private and public resources to effectively overcome the affordability challenge for broadband adoption across Puerto Rico.

**Recommendation:**

The private sector in partnership with public agencies including the Public Housing Authority, the Special Communities Administration, the Department of Labor, Economic Development, and the Department of Family Affairs should work to establish programs offering basic entry broadband service at discounted prices to the most vulnerable citizens in Puerto Rico.

**Recommendation:**

Work collaboratively with federal agencies to promote broadband adoption among low income populations.


Note: This report indicates that U.S. broadband adoption rate is 68%. According to the National Broadband Plan, 98.9% of U.S. households have broadband available at basic speeds of 768 kbps download/200 Kbps upload (http://www.broadbandmap.gov/)


8 Ibid.

9 Ibid.


Note: In this report, mobile broadband access can be defined as a subscription to a mobile wireless service via a laptop, access to Wi-Fi service via a laptop, or the ability to access to the Internet via a cellphone, or other mobile device.


Note: Pew defines mobile access who access to the Internet via Wi-Fi or a mobile broadband Internet connection through a laptop, or the use of the Internet, email, or instant messaging via a cellphone. The results in this survey are based on data from telephone interview conducted by Princeton Survey Research Associates International between April 29 and May 30, 2010, among a sample of 2,252 adults, age 18 and older. For results based on the total sample, one can say with 95% confidence that the error attributable to sampling and other random effects is ± 2.4%.


Note: U.S. computer ownership, Internet adoption, and broadband adoption data retrieved from this report.


Note: U.S mobile access data retrieved from this report.


Note: Puerto Rico data retrieved from this report.
15 Ibid.


17 Connected Nation Average data comes from similar phone surveys conducted in thirteen jurisdictions served by Connected Nation in 2010. Connected Nation conducted random digit dial (RDD) telephone surveys of 15,647 adults age 18 and older living in Alaska, Florida, Illinois, Iowa, Kansas, Michigan, Minnesota, Nevada, Ohio, Puerto Rico, South Carolina, Tennessee, and Texas. These surveys were designed to measure technology adoption, how individuals use technology, and barriers to technology adoption among adults.


Note: According to the ITU, broadband is considered “affordable” if its annual cost is no more than 3 percent of household income.


Note: Color television sets


34 Ibid.

35 See Section B (The Puerto Rico Adoption Gap in Detail) of this chapter for an overview of Puerto Rico’s mobile broadband adoption.

36 See Chapter III of this Strategic Plan for an overview of the broadband inventory across Puerto Rico, including mobile coverage.

Note: For more information on this pilot program.


