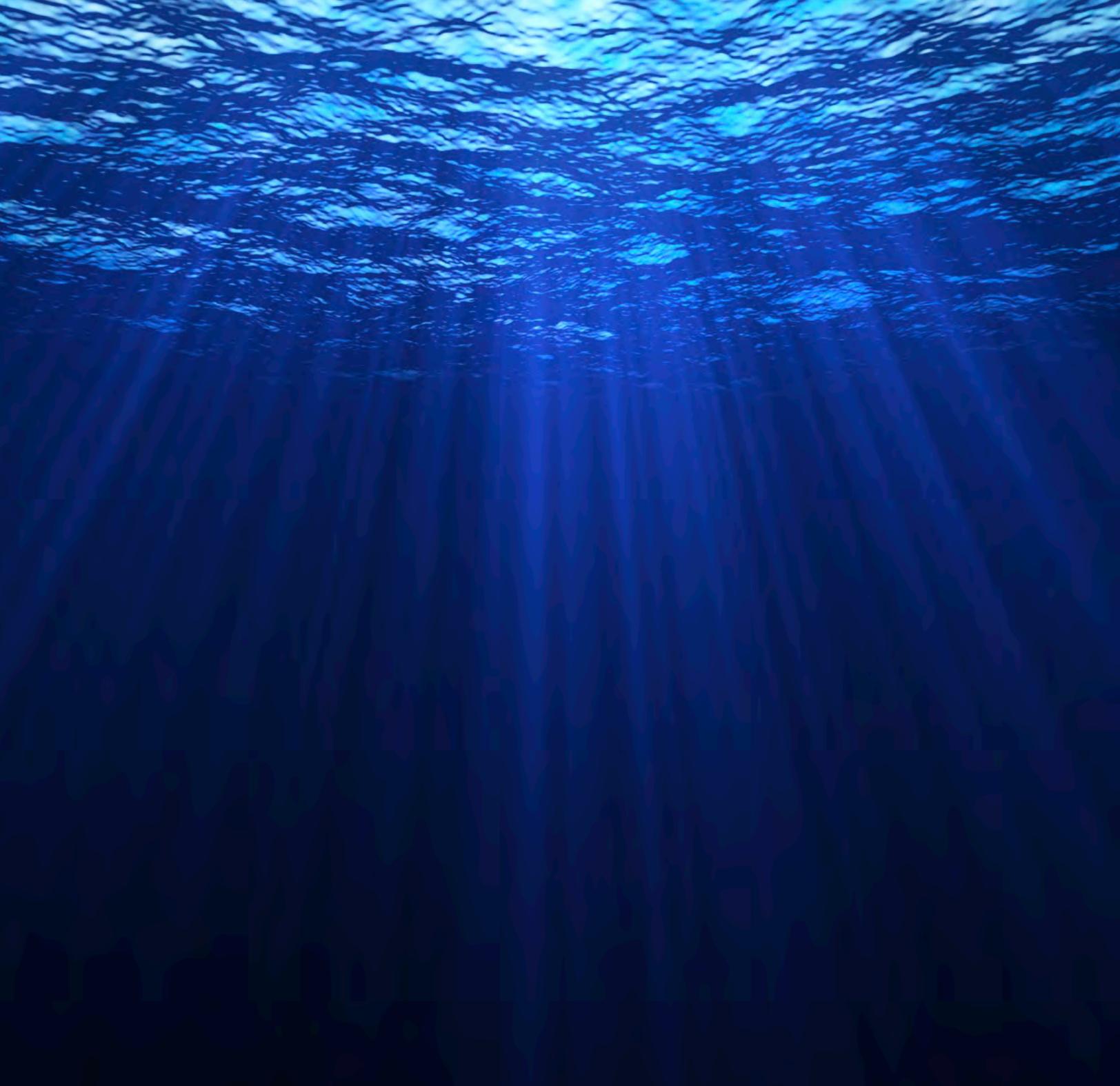


# Puerto Rico Broadband Strategic Plan



May 2012





Prepared by the Puerto Rico Broadband Taskforce with support from Connect Puerto Rico,  
a subsidiary of Connected Nation, Inc.

Funded in part by the National Telecommunications & Information Administration,  
U.S. Department of Commerce, with support from the American Recovery and Reinvestment Act. 



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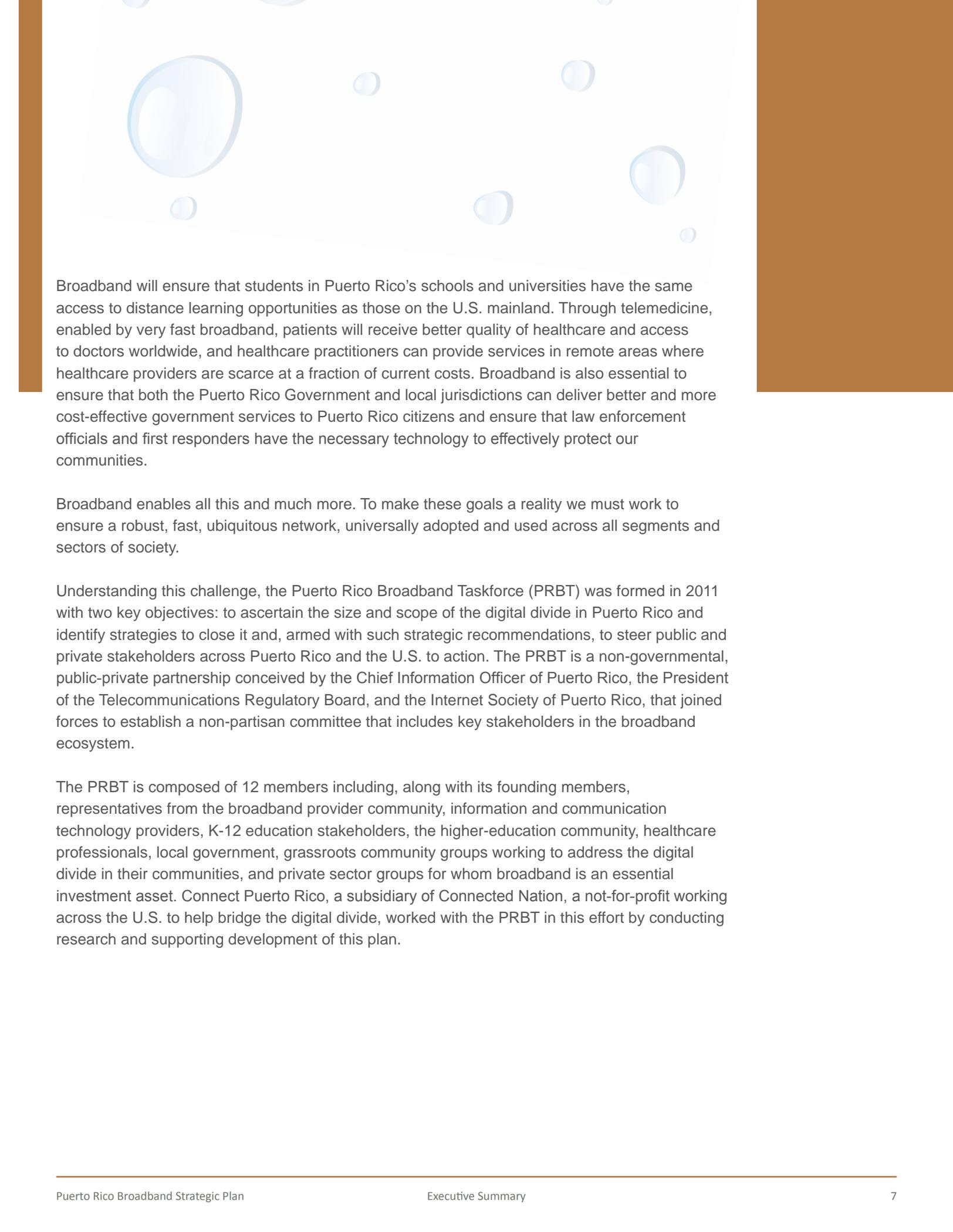




# Executive Summary

In today's global economy, broadband, or high-speed Internet, is an essential infrastructure asset for social inclusion, economic competitiveness, and sustainability. Policy makers around the world have recognized this and are working to close the digital divide by promoting access to high-speed broadband infrastructure, universal adoption of the technology across all segments of society, and increased utilization across key strategic sectors, such as education, healthcare, and the provision of government services. Broadband is the great infrastructure challenge of our time, and ensuring universal access, adoption, and utilization is essential to maintain a vibrant and competitive economy and society.

The impact of broadband technology is perhaps nowhere more acute than in an island economy such as Puerto Rico. As Puerto Rico makes gradual recovery from the current economic downturn, a robust, ubiquitous, fast broadband infrastructure is essential to attract foreign direct investment that will generate the jobs and opportunities needed to sustain Puerto Rico's competitiveness; it is essential for companies to efficiently interact with their business peers and reach existing customers and new markets; it is essential to ensure that professionals have access to remote jobs and training opportunities previously beyond their reach; and it is essential to ensure that students can access educational resources beyond the confines of their schools, universities, or neighborhoods.



Broadband will ensure that students in Puerto Rico's schools and universities have the same access to distance learning opportunities as those on the U.S. mainland. Through telemedicine, enabled by very fast broadband, patients will receive better quality of healthcare and access to doctors worldwide, and healthcare practitioners can provide services in remote areas where healthcare providers are scarce at a fraction of current costs. Broadband is also essential to ensure that both the Puerto Rico Government and local jurisdictions can deliver better and more cost-effective government services to Puerto Rico citizens and ensure that law enforcement officials and first responders have the necessary technology to effectively protect our communities.

Broadband enables all this and much more. To make these goals a reality we must work to ensure a robust, fast, ubiquitous network, universally adopted and used across all segments and sectors of society.

Understanding this challenge, the Puerto Rico Broadband Taskforce (PRBT) was formed in 2011 with two key objectives: to ascertain the size and scope of the digital divide in Puerto Rico and identify strategies to close it and, armed with such strategic recommendations, to steer public and private stakeholders across Puerto Rico and the U.S. to action. The PRBT is a non-governmental, public-private partnership conceived by the Chief Information Officer of Puerto Rico, the President of the Telecommunications Regulatory Board, and the Internet Society of Puerto Rico, that joined forces to establish a non-partisan committee that includes key stakeholders in the broadband ecosystem.

The PRBT is composed of 12 members including, along with its founding members, representatives from the broadband provider community, information and communication technology providers, K-12 education stakeholders, the higher-education community, healthcare professionals, local government, grassroots community groups working to address the digital divide in their communities, and private sector groups for whom broadband is an essential investment asset. Connect Puerto Rico, a subsidiary of Connected Nation, a not-for-profit working across the U.S. to help bridge the digital divide, worked with the PRBT in this effort by conducting research and supporting development of this plan.

The first goal of the PRBT was the completion of a Broadband Strategic Plan. The PRBT adopted a holistic approach in this Strategic Plan, addressing both demand- and supply-side challenges with three inter-related policy goals:

- **Access** - Ensuring subsequent waves of investment in infrastructure deployment to meet the increasing demand for broadband capacity by all citizens, businesses, government, and community anchor institutions.
- **Adoption** – Ensuring universal adoption and penetration of broadband services – either mobile or fixed - by all citizens, and businesses.
- **Utilization** – Ensuring that all communities – particularly community anchor institutions such as schools, hospitals, and clinics – are increasingly using broadband technology to pursue economic opportunity and sustainability, improve government services, and leverage educational and e-Health resources.

The Strategic Plan adopts a series of goals for each of these areas and recommendations for actionable strategies designed to achieve them. A comprehensive list of these goals and recommendations can be found following this Executive Summary.

The first step in this process was a thorough assessment of the size and scope of the digital divide across Puerto Rico. To accomplish this, the Office of the CIO of Puerto Rico, armed with American Recovery and Reinvestment Act funding obtained through the Department of Commerce for this purpose, commissioned an ongoing mapping initiative to develop an inventory of available broadband infrastructure across the island, as well as research to survey and analyze adoption and usage trends across the residential and business sectors in Puerto Rico. By focusing on both the supply, or infrastructure gap, and demand, or adoption and usage gap, this research has revealed the scope and nature of the digital divide across Puerto Rico.

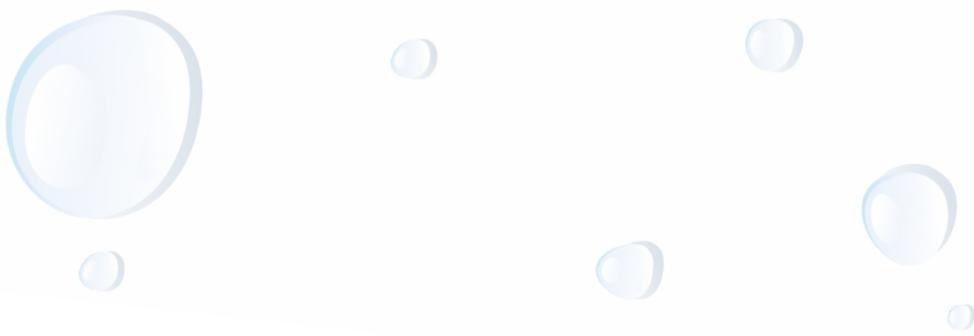


## ACCESS

According to Connect Puerto Rico's broadband inventory, by June 2011, 86% of households across Puerto Rico had access to broadband from at least one fixed broadband provider at speeds of at least 768 Kbps download (DL)/200 Kbps upload (UL). This implies that approximately 14% of households, typically located in more rural parts of the island, remain without any form of fixed broadband service. In contrast, the Department of Commerce's National Broadband Map indicates that, in total, 95% of U.S. households are served by broadband at these speeds. This dire lag of broadband infrastructure investment remains a critical barrier to advancing Puerto Rico's economic competitiveness.

The broadband gap in Puerto Rico at higher capacity speeds is even more acute. By June 2011, only 57% of Puerto Rico households had access to broadband at speeds of 3 Mbps DL/768 Kbps UL, and only 32% of households had access to broadband at speeds of 10 Mbps DL/768 Kbps UL. Such speeds and more are necessary to sustain many services increasingly demanded by business and residential customers, such as two-way video conferencing. This capacity lag is an acute danger for the economic and social future of Puerto Rico. This investment lag is driven by lagging demand for the service, resulting in lower expected revenues, high cost of build-out, and high cost of operation maintenance. All of these factors affect business plans and slow investment. To help overcome this gap, this Strategic Plan set a series of infrastructure and capacity goals across both urban and rural areas of Puerto Rico. At the most basic level, the Strategic Plan sets a goal of 98% of all households served by broadband at actual speeds of at least 4 Mbps DL/1 Mbps UL by 2015. A comprehensive list of all capacity goals follows this Executive Summary.

For these capacity goals to be reached, we must promote competition and continued investment in infrastructure. Thus, this Strategic Plan also assesses the key barriers to investment and recommends a series of strategies to improve profitability and encourage build-out. Recommendations fall into three categories: i) stimulate lagging demand to improve the business case for broadband deployment; ii) lower unnecessarily high costs associated with broadband build-out and maintenance, including streamlining construction permitting or pole attachment processes; iii) streamline the regulatory process and continue promoting fair competition and market entry. The Strategic Plan also assesses the role of Federal programs impacting the Puerto Rico broadband market and recommends close collaboration of Puerto Rico stakeholders with the Federal Communications Commission to jointly work to address the acute digital divide on the island.

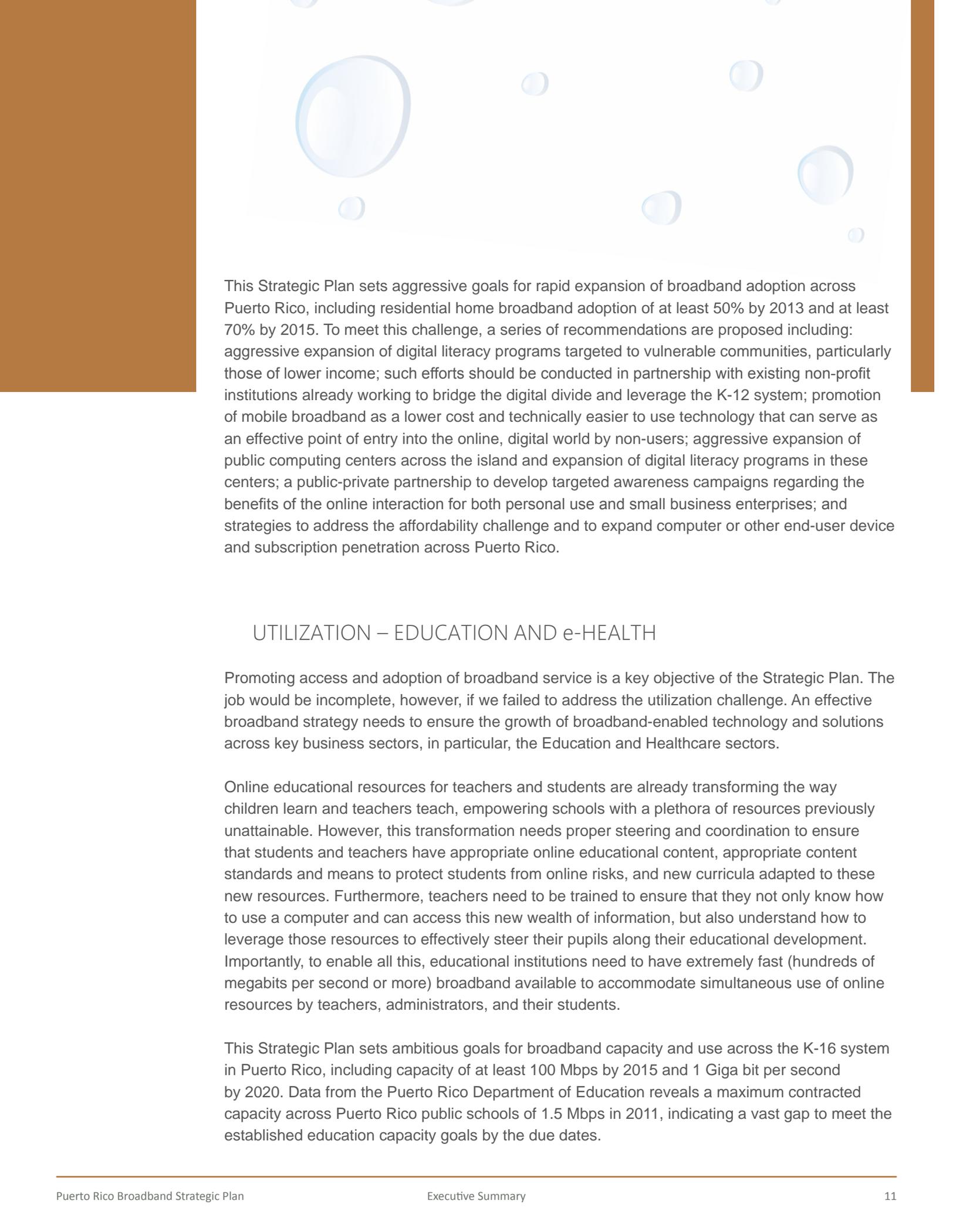


## ADOPTION

Residential survey research conducted by Connect Puerto Rico reveals an acute lag in broadband adoption across the island. Although 86% of Puerto Rican households have access to broadband, in 2010, only 31% subscribed, implying an adoption gap in Puerto Rico of 55%; in other words, more than one-half of Puerto Ricans have basic broadband service available but are choosing not to subscribe. In comparison, data collected in 2010 by the National Telecommunications and Information Administration indicated that 68% of U.S. households subscribed to broadband service. The mobile broadband adoption gap is also acute, as only 27% of Puerto Rico residents reported accessing mobile broadband service in 2010; which is significantly lower than the 59% U.S. average.

Across Puerto Rico, broadband non-adopters are generally people of low-income, senior citizens, and/or people with less education. These trends mirror demographic patterns across the U.S., however, the adoption gap in Puerto Rico for each of these groups is more acute. While across Puerto Rico broadband adoption is 31%, the broadband adoption rate is 5% among adults 65 and older; 7% among residents without a high school diploma; and 15% among households with annual incomes below \$15,000. The top barriers to broadband adoption in Puerto Rico include: relevance of the online experience to non-adopters (a lack of value proposition); affordability of the broadband service and access technology; and lack of computer ownership and digital literacy (or knowledge of how to use the technology).

The PRBT believes that it is imperative to address barriers to broadband adoption. Failure to do so would increase the gap between the haves and have-nots across Puerto Rico, creating an Internet underclass at risk of being left behind, resulting in a longstanding, significant, and detrimental social impact. Furthermore, for our collective economy, a broadband adoption gap would limit Puerto Rico's ability to develop sustainable economic models that fully leverage our unique position as an insular bridge between the U.S. and the Caribbean and Latin America and beyond. Moreover, because of the economies of scale and density of broadband networks, particularly high-capacity fiber optic networks, low levels of broadband adoption and use increases the cost per-subscriber for providers, weakening the business case for continued deployment in broadband capacity and infrastructure.



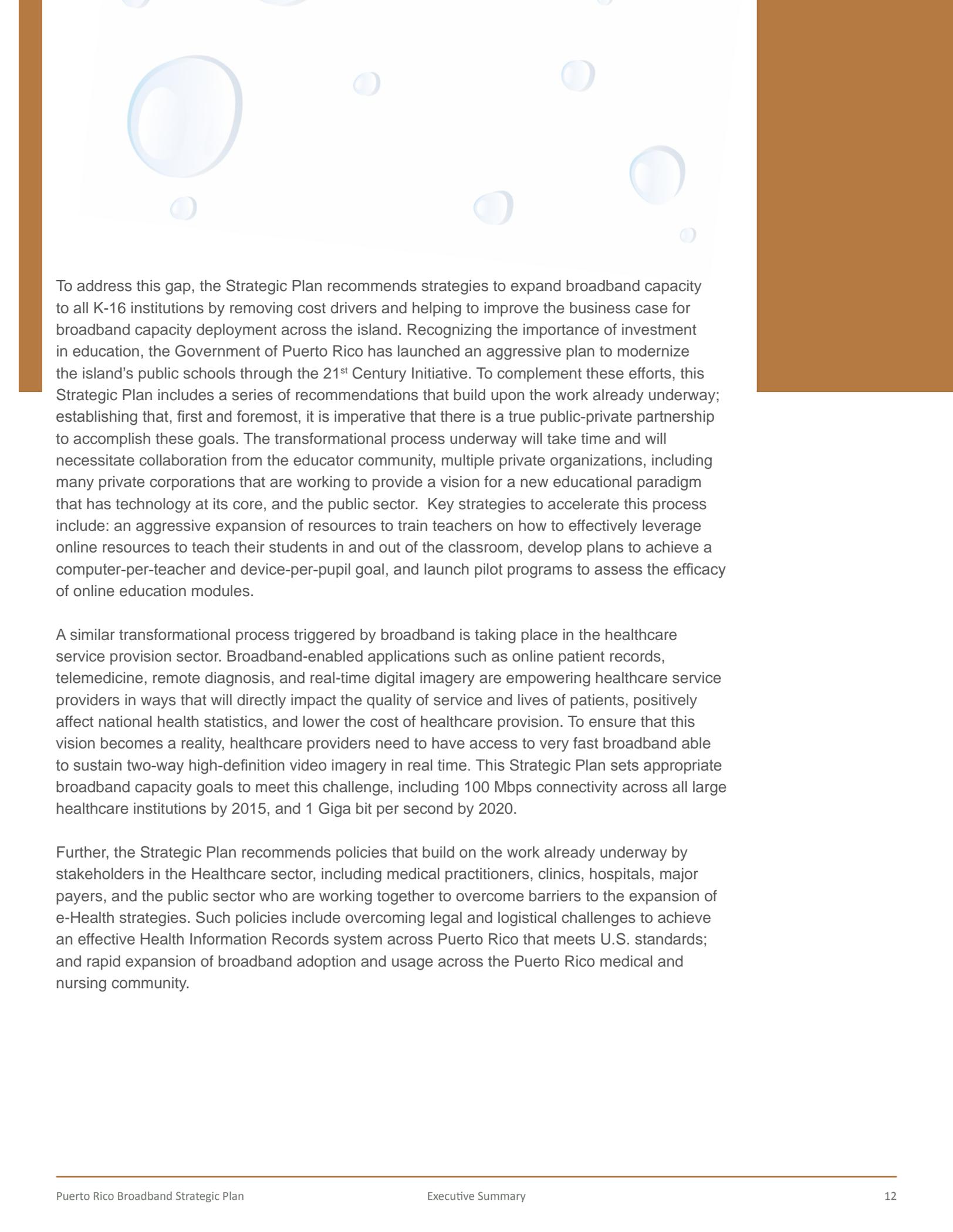
This Strategic Plan sets aggressive goals for rapid expansion of broadband adoption across Puerto Rico, including residential home broadband adoption of at least 50% by 2013 and at least 70% by 2015. To meet this challenge, a series of recommendations are proposed including: aggressive expansion of digital literacy programs targeted to vulnerable communities, particularly those of lower income; such efforts should be conducted in partnership with existing non-profit institutions already working to bridge the digital divide and leverage the K-12 system; promotion of mobile broadband as a lower cost and technically easier to use technology that can serve as an effective point of entry into the online, digital world by non-users; aggressive expansion of public computing centers across the island and expansion of digital literacy programs in these centers; a public-private partnership to develop targeted awareness campaigns regarding the benefits of the online interaction for both personal use and small business enterprises; and strategies to address the affordability challenge and to expand computer or other end-user device and subscription penetration across Puerto Rico.

## UTILIZATION – EDUCATION AND e-HEALTH

Promoting access and adoption of broadband service is a key objective of the Strategic Plan. The job would be incomplete, however, if we failed to address the utilization challenge. An effective broadband strategy needs to ensure the growth of broadband-enabled technology and solutions across key business sectors, in particular, the Education and Healthcare sectors.

Online educational resources for teachers and students are already transforming the way children learn and teachers teach, empowering schools with a plethora of resources previously unattainable. However, this transformation needs proper steering and coordination to ensure that students and teachers have appropriate online educational content, appropriate content standards and means to protect students from online risks, and new curricula adapted to these new resources. Furthermore, teachers need to be trained to ensure that they not only know how to use a computer and can access this new wealth of information, but also understand how to leverage those resources to effectively steer their pupils along their educational development. Importantly, to enable all this, educational institutions need to have extremely fast (hundreds of megabits per second or more) broadband available to accommodate simultaneous use of online resources by teachers, administrators, and their students.

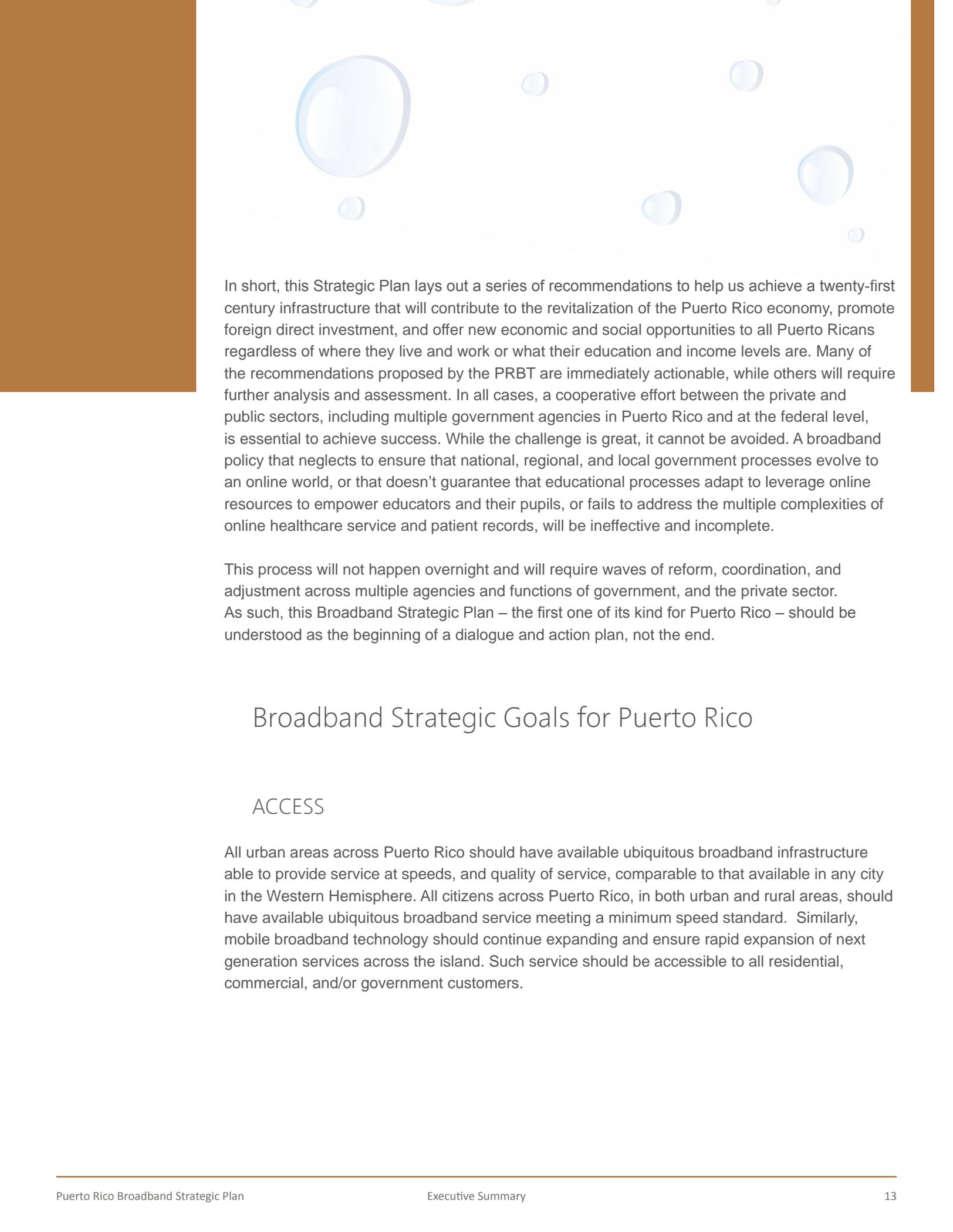
This Strategic Plan sets ambitious goals for broadband capacity and use across the K-16 system in Puerto Rico, including capacity of at least 100 Mbps by 2015 and 1 Giga bit per second by 2020. Data from the Puerto Rico Department of Education reveals a maximum contracted capacity across Puerto Rico public schools of 1.5 Mbps in 2011, indicating a vast gap to meet the established education capacity goals by the due dates.



To address this gap, the Strategic Plan recommends strategies to expand broadband capacity to all K-16 institutions by removing cost drivers and helping to improve the business case for broadband capacity deployment across the island. Recognizing the importance of investment in education, the Government of Puerto Rico has launched an aggressive plan to modernize the island's public schools through the 21<sup>st</sup> Century Initiative. To complement these efforts, this Strategic Plan includes a series of recommendations that build upon the work already underway; establishing that, first and foremost, it is imperative that there is a true public-private partnership to accomplish these goals. The transformational process underway will take time and will necessitate collaboration from the educator community, multiple private organizations, including many private corporations that are working to provide a vision for a new educational paradigm that has technology at its core, and the public sector. Key strategies to accelerate this process include: an aggressive expansion of resources to train teachers on how to effectively leverage online resources to teach their students in and out of the classroom, develop plans to achieve a computer-per-teacher and device-per-pupil goal, and launch pilot programs to assess the efficacy of online education modules.

A similar transformational process triggered by broadband is taking place in the healthcare service provision sector. Broadband-enabled applications such as online patient records, telemedicine, remote diagnosis, and real-time digital imagery are empowering healthcare service providers in ways that will directly impact the quality of service and lives of patients, positively affect national health statistics, and lower the cost of healthcare provision. To ensure that this vision becomes a reality, healthcare providers need to have access to very fast broadband able to sustain two-way high-definition video imagery in real time. This Strategic Plan sets appropriate broadband capacity goals to meet this challenge, including 100 Mbps connectivity across all large healthcare institutions by 2015, and 1 Giga bit per second by 2020.

Further, the Strategic Plan recommends policies that build on the work already underway by stakeholders in the Healthcare sector, including medical practitioners, clinics, hospitals, major payers, and the public sector who are working together to overcome barriers to the expansion of e-Health strategies. Such policies include overcoming legal and logistical challenges to achieve an effective Health Information Records system across Puerto Rico that meets U.S. standards; and rapid expansion of broadband adoption and usage across the Puerto Rico medical and nursing community.



In short, this Strategic Plan lays out a series of recommendations to help us achieve a twenty-first century infrastructure that will contribute to the revitalization of the Puerto Rico economy, promote foreign direct investment, and offer new economic and social opportunities to all Puerto Ricans regardless of where they live and work or what their education and income levels are. Many of the recommendations proposed by the PRBT are immediately actionable, while others will require further analysis and assessment. In all cases, a cooperative effort between the private and public sectors, including multiple government agencies in Puerto Rico and at the federal level, is essential to achieve success. While the challenge is great, it cannot be avoided. A broadband policy that neglects to ensure that national, regional, and local government processes evolve to an online world, or that doesn't guarantee that educational processes adapt to leverage online resources to empower educators and their pupils, or fails to address the multiple complexities of online healthcare service and patient records, will be ineffective and incomplete.

This process will not happen overnight and will require waves of reform, coordination, and adjustment across multiple agencies and functions of government, and the private sector. As such, this Broadband Strategic Plan – the first one of its kind for Puerto Rico – should be understood as the beginning of a dialogue and action plan, not the end.

## Broadband Strategic Goals for Puerto Rico

### ACCESS

All urban areas across Puerto Rico should have available ubiquitous broadband infrastructure able to provide service at speeds, and quality of service, comparable to that available in any city in the Western Hemisphere. All citizens across Puerto Rico, in both urban and rural areas, should have available ubiquitous broadband service meeting a minimum speed standard. Similarly, mobile broadband technology should continue expanding and ensure rapid expansion of next generation services across the island. Such service should be accessible to all residential, commercial, and/or government customers.

### **Fixed Broadband Capacity Goals:**

- By 2015, 98% of all households should have broadband available at actual minimum speeds of 4 Mbps download (DL)/1 Mbps upload (UL) at affordable prices to allow for at-home web 2.0 service offerings such as one-way video streaming applications and two-way video conference and collaboration applications.
- By 2015, all urban locations and 50% of all rural and remote areas should have access to broadband actual speeds of at least 10 Mbps DL/3 Mbps UL at affordable prices; 70% of urban locations should have access to at least 25 Mbps DL/10 Mbps UL, and 50% of urban locations should have access to at least 50 Mbps DL/10 Mbps UL.
- By 2015, across the island the average capacity available across all fixed broadband service offerings, provided through wireline or fixed-wireless networks, should be no less than 6 Mbps download speeds.
- By 2020, at least 85% of all customers should have access to at least 100 Mbps DL/50 Mbps UL.
- By 2015, average latency for IP traffic which originates and terminates in Puerto Rico should be no greater than 20 milliseconds; average latency for IP traffic which originates in Puerto Rico and terminates in the southeast coast of the U.S. mainland should be no greater than 90 milliseconds.

### **Mobile Broadband Capacity Goals:**

- Mobile broadband offerings at next generation speeds will be available across at least 98% of the island's geography where the population resides by 2015. Expansion of smart phone penetration and tablet end-user devices will be promoted.

### **Connectivity Across Community Anchor Institutions:**

- By 2015, higher education, K-12 schools, and healthcare institutions across all urban and rural areas should have access to 100 Mbps DL/25 Mbps UL speeds to sustain virtual community learning and telemedicine.
- By 2020, higher education, K-12 schools, and healthcare institutions across all urban and rural areas should have access to 1 Gbps speeds to sustain virtual community learning and telemedicine.



### **Broadband Submarine and Backhaul Network Security:**

- Puerto Rico broadband providers and local and national government officials will work together to derive a plan to improve the security, robustness, and redundancy of the backhaul broadband infrastructure across the island. Particular emphasis will focus on the security standards of alternative submarine cables, and strategies to encourage the underground construction of backhaul infrastructure across the island.
- A more robust backhaul and underwater cable infrastructure will support the expansion of Puerto Rico as a telecommunications and data hub for the Hemisphere.

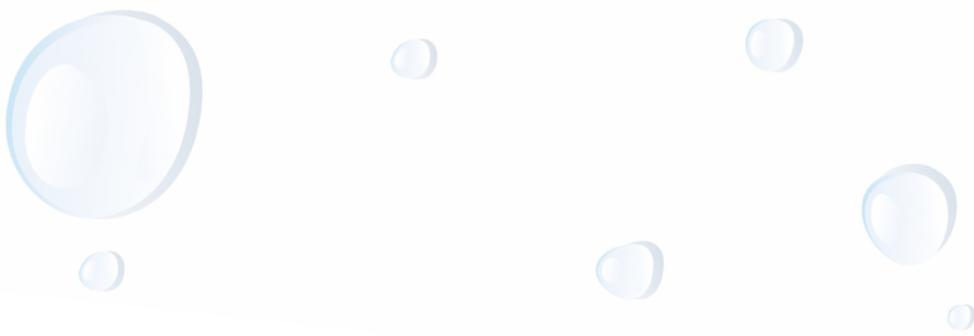
### **Competition across the Broadband Service Market:**

- By 2015, 98% of Puerto Ricans will have at least three competitive broadband offerings available.

## 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.

- 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.



## EDUCATION

- All K-16 institutions will have sufficient broadband capacity available to sustain always-on learning opportunities in every school, teacher's and administrator's office, classroom, and on each student's desk and backpack.
  - To enable this vision, every K-16 institution should have access to 100 Mbps speed by 2015 and 1 Gbps speed by 2020.
- All students will have the means to access always-on online learning opportunities in and outside of the classroom. To enable this vision, all students will need to have wireless devices that are fast, robust, and safe and that can support the student's learning experience beyond the classroom.
- A technology curriculum will be developed for every stage of the K-16 learning experience that is adjusted to the changing technology environment and ensures students are developing the necessary IT-literacy skills to fully leverage online resources in a safe environment.
- Continued development of a teaching work force that has the necessary skills to fully leverage broadband and IT technology in and outside of the classroom.

## e-HEALTH

All Puerto Rican healthcare providers and patients should have access to broadband that meets the capacity, latency, and quality of service specifications necessary to utilize healthcare information technology and provide telemedicine services effectively.

- By 2015, create a nationwide e-care network that will ensure interconnectivity between all stakeholders, including patients, healthcare providers, and payers – public and private.
- By 2015, ensure broadband network capacity available to healthcare providers:
  - 4 Mbps to all healthcare providers
  - 10 Mbps to nursing homes and rural healthcare providers
  - 25 Mbps to clinics and large physician practices (5-25 physicians)
  - 100 Mbps to hospitals
- By 2020, ensure 1 Gbps to academic and large medical centers



## STRATEGIC RECOMMENDATIONS TO EXPAND BROADBAND ACROSS PUERTO RICO

### ACCESS

- Puerto Rico should continue to collect and analyze data on broadband infrastructure availability, capacity, and competition over the next decade to assess progress in meeting the Strategic Plan's goals.
- Puerto Rico's public and private broadband stakeholders should work collaboratively with the FCC to ensure fair and effective allocation of subsidies to unserved areas in Puerto Rico. In particular, models determining the size of subsidies needed to achieve sustainable broadband business plans across Puerto Rico should be based on the economic realities of Puerto Rico, including levels of broadband demand half those expected elsewhere across the U.S.
- All broadband providers should collaborate with Connect Puerto Rico to ensure that broadband inventory data collected under the SBI grant program and used by the FCC to determine the Connect America Fund transition is comprehensive and accurate.
- Public and private broadband stakeholders in Puerto Rico should work collaboratively to reform the Puerto Rico Service Fund (PRUSF) to support the deployment of broadband in unserved areas and ensure that the PRUSF complements the FCC's new Connect America Fund program.
- To encourage sustainable investment in network build-out, Puerto Rico must aggressively implement strategies to promote broadband adoption across vulnerable populations, whether residing in rural or urban areas.
- Streamline the regulatory process to promote network investment and increase competition in the broadband sector.
- The legislative and executive branches, as well as the Junta Reglamentadora de Telecomunicaciones, should work to ensure that government assets critical to the broadband market are effectively contributing to the expansion of the market in a fair and competitively neutral way. The Government and regulatory agency should be vigilant of anti-competitive activity blocking market expansion and increased capital investment in broadband capacity across Puerto Rico.
- Promote island-wide and municipal planning and coordination of construction projects.
- Continue streamlining the construction permit process and Right of Way (RoW) approvals process in order to ensure lower costs of infrastructure build-out and processing timeframes.
- Institute legislation that will encourage "Dig Once" policies for all future transportation and civil engineering construction projects.

- Institute legislation that ensures competitively neutral access to colocation infrastructure in public buildings.
- Reduce uncertainty of future costs by encouraging implementation of tax and fee policies by state and municipal government aimed to attract investment and encourage broadband network build-out.
- Establish low and uniform pole attachment rental rates and efficient processes.
- To achieve this goal, establish the formation of a taskforce to evaluate pole attachment costs across the island and work to improve efficiency of pole attachment processes.
- Promote local network interconnection and peering to lower the cost of backhaul traffic in Puerto Rico.
- Create minimum service level requirements for broadband providers serving local government agencies and entities.
- Institute Legislation to amend Act No. 73 of May 28, 2008, to include companies which operate and deploy broadband networks in Puerto Rico.
- Institute legislation for the establishment of public-private partnerships (PPP) for the exclusive purpose of designing, building, and operating a fully-passive fiber optic network to the premise in currently unserved areas for wholesale use by any *bona fide* telecommunications or broadband provider.
- Continue implementing policies aimed to stabilize the price of energy across the island.
- Improve law enforcement efforts to reduce the theft of broadband network infrastructure and reduce service theft.
- Incentivize deployment of fiber networks, thereby reducing reliance on copper networks targeted by thieves.
- Improve the enforcement of existing excavation laws to reduce damages to infrastructure assets and end-user service interruptions.

## ADOPTION

- Expand public computing capacity, digital literacy, and workforce development programs leveraging existing community resources, support from national non-profit organizations, and public institutions such as the University of Puerto Rico campuses.
- 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.
- Leverage existing online digital literacy curricula.
- Launch targeted public-private awareness campaign promoting the benefits of online resources across vulnerable populations.
- 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.

- 
- Leverage the presence and value of eGovernment services.
  - Accelerate ICT access and use in the K-12 classroom.
  - 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.
  - Work collaboratively with federal agencies to promote broadband adoption among low income populations.

## EDUCATION

- Promote a collaborative effort across government agencies and private stakeholders.
- Leverage the demand for broadband across education institutions to promote competition and investment in broadband services.
- Develop plans to achieve a computer-per-teacher and device-per-pupil goal.
- Ensure K-16 institutions have appropriate legal and procedural frameworks to perform effective network management.
- Expand resources to train the teacher to ensure they are able to fully leverage ICT solutions in the classroom.
- Launch pilot programs to assess the efficacy of online education modules.

## e-HEALTH

- Continue to promote build-out of very high-speed Internet to all healthcare institutions and practitioner's offices.
- Continue ongoing efforts to document information regarding broadband service capacity used by healthcare providers across Puerto Rico.
- Reinforce public-private partnerships to overcome governmental barriers to Health IT expansion



# Chapter I: Puerto Rico Broadband Taskforce



The Puerto Rico Broadband Taskforce (PRBT) was formed with the conviction that broadband is a key driver of economic growth, competitiveness, and sustainability, as well as the general improvement of the quality of life of the people of Puerto Rico. The PRBT was also formed with the sobering acknowledgement that broadband adoption in Puerto Rico is lagging behind the U.S. and other similar jurisdictions and that lag will remain a tremendous hindrance to effectively competing in the twenty-first century economy unless a comprehensive plan and deliberate intervention is aggressively pursued. The PRBT was formed with the understanding that overcoming these challenges will require the direct, cooperative engagement of the private, public, and not-for-profit sectors.

The primary goal of the PRBT has been to design and facilitate the implementation of a pragmatic and actionable Broadband Strategic Plan that effectively minimizes the digital divide in Puerto Rico by promoting adoption of broadband and Information Technology (IT) and stimulating investment opportunities in ever-increasing broadband capacity infrastructure across the island.

The PRBT efforts are focused in attaining the following six general goals:

1. Based on data collected by Connect Puerto Rico, identify critical priority areas across the island's geography and demographic communities where broadband is lagging.
2. To define, design, and develop an **integrated development plan** for Puerto Rico to secure the necessary funding sources to meet the plan's goals. This may include, among others: grants, donations (cash or in-kind), fundraising activities, and other sustainability strategies.
3. To increase citizen **awareness on the benefits and utility of broadband access** for Puerto Rico through volunteerism and outreach activities aimed at maximizing broadband adoption.
4. To **increase digital literacy through training and technical assistance** in order to attain the skill set that allows successful implementation of the development plan and increased adoption of broadband in Puerto Rico.
5. To develop **support systems** to attain the plan's objectives and enable strategies to instill broadband adoption and use as an island-wide, high-priority endeavor.
6. To identify **barriers to broadband build-out and long term investment** across the island and build consensus to address them.



## The primary goal of the Puerto Rico Broadband Taskforce is to close the digital divide in Puerto Rico.

The goal of the PRBT is to identify and implement actionable strategies to promote investment in broadband infrastructure and capacity where it is lacking, and to expand broadband adoption and usage amongst digitally disconnected communities across Puerto Rico. To achieve all these goals, the PRBT has actively engaged support from public and private sector stakeholders. There is an important group of overlapping stakeholders in Puerto Rico as it relates to broadband access and adoption, from both demand and supply sides. These groups have worthy, recognizable, and visible achievements; however, they have been largely scattered. Harnessing the diversity of interests presented by each group requires PRBT to be composed of key stakeholders that represent the interests of all stakeholder groups within the Puerto Rico broadband ecosystem. The PRBT is composed of 12 members representing various sectors of the broadband ecosystem in Puerto Rico including the Office of Chief Information Officer, the Telecommunication Regulatory Board, the Internet Society of Puerto Rico, broadband providers, information and communication technology providers, K-12 and higher education, healthcare, local government, grassroots community groups, and private sector groups.

Connect Puerto Rico has supported the Puerto Rico Broadband Taskforce in the preparation of this Strategic Plan by providing research and analysis consulting services. Connect Puerto Rico is a subsidiary of Connected Nation, Inc., a non-profit corporation working with the Office of the Chief Information Officer of Puerto Rico to conduct comprehensive research and analysis of the broadband landscape in Puerto Rico as part of the State Broadband Initiative (SBI) federal grant program managed by the Department of Commerce under the National Telecommunications and Information Administration, and funded through the American Recovery and Reinvestment Act. The Puerto Rico Broadband Strategic Plan is a body of work that represents the core consensus held by PRBT members listed as follows and their participating stakeholder groups:

The PRBT is a public-private partnership comprised of government representatives and multiple private and not-for-profit stakeholders.

## Members of the Puerto Rico Broadband Taskforce

Chairman of the PRBT

**Juan E. Rodríguez de Hostos**

Chief Information Officer  
Government of Puerto Rico

Secretary of the PRBT

**Eduardo Díaz**

President  
The Internet Society of Puerto Rico

Representative of Local Community Institutions  
and NGOs Committee

**Beatriz Arroyo**

Coordinadora / Voluntaria

Representative of the  
Broadband Provider Committee

**Karen Larson**

Senior Vice President  
Critical Hub Networks, Inc.

Representative of the  
Private Sector Committee

**Rodolfo F. Mangual Ramos**

Executive Director  
Professional College of Engineers and Land  
Surveyors of Puerto Rico

Representative of the  
Municipal Consortia Committee

**Nelson Perea**

Executive Director  
Puerto Rico Technoeconomic Corridor

Vicechair of the PRBT

**Lcda. Sandra Torres**

President  
Junta Reglamentadora de  
Telecomunicaciones de Puerto Rico

Representative of Higher Education Committee

**Luis Acosta Benítez**

President  
Automeca Technical College

Representative of the  
Healthcare Stakeholder Committee

**Arthur Fernández del Valle**

Director Planificación y Análisis Financiero  
Centro Cardiovascular de Puerto Rico y del  
Caribe (CCPRC)

Representative of the  
Content Provider Committee

**James Lynn**

Graphic Designer / Multimedia Artist

Representative of the  
IT Stakeholder Committee

**Paul Maldonado**

Account Manager  
Cisco Systems, Inc.

Representative of K-16 Stakeholder Committee

**Dr. Juan N. Varona Echendía**

Rector  
Universidad de Puerto Rico en Cayey

## Members of the Puerto Rico Broadband Taskforce Working Committees

### **BROADBAND PROVIDERS**

Aeronet Wireless Broadband Corp.  
Atenas Internet  
AT&T Mobility Puerto Rico, Inc.  
AWV Communications, Inc.  
Ayustar Corporation  
Choice Cable TV – Puerto Rico  
Cibuconet Inc.  
Claro – Puerto Rico Telephone Company, Inc.  
Columbus Networks Puerto Rico, Inc.  
Caribe.Net – Critical Hub Networks, Inc.  
Culebra Wireless Net  
INTECO – Iniciativa Tecnológica Centro Oriental, Inc.  
IP Solutions, Inc.  
Liberty Cablevision of Puerto Rico, Ltd.  
Neptuno Networks, Inc.  
Nustream Communications  
Onelink Communications – San Juan Cable, LLC  
Open Mobile – PR Wireless, Inc.  
Optivon, Inc.  
Orizon Wireless, Corp.  
OSNet Wireless  
PREPA Networks, LLC  
Puerto Rico Webmasters  
Sprint Nextel Corporation  
Telefónica Empresas – Telefónica Larga Distancia de Puerto Rico, Inc.  
T-Mobile USA, Inc.  
VPNet, Inc.  
Wi-Fi Services Caribbean, Inc.  
WinPR, Inc.  
Worldnet Telecommunications, Inc.  
Xairnet Corp.

Xecure Communications, Corp.  
Zellilus Telecommunications

### **CONTENT PROVIDERS**

TNet Networks, Inc.  
The iOS Post  
infografica.net  
dgtallikä  
mrtechpr.com – Mr.Tech  
envivoyonline.com  
lachicagamer.com  
Qiibo  
esmandau.com  
Fundación Nacional para la Cultura Popular  
Red EducaPR  
EnVivoPR  
El Nuevo Dia  
Primera Hora  
WAPA TV and WAPA America in the U.S.  
Mi Puerto Rico Verde  
dianeris.com  
CaribeNews.net  
YoSoyMami.com  
jameslynn.com  
Radio Isla 1320  
NotiCel.com  
agrochic.com  
turelacionista.com  
Consultaconjcb.com  
mipodcast.tv  
Orcheed  
GTA Internet Marketing  
Oficina para el Financiamiento Socioeconómico y Autogestión (OFSA)



## **EDUCATION**

Department of Education of Puerto Rico  
University of Puerto Rico  
Automeca Technical College  
National University College  
Flamboyán Foundation

## **HEALTHCARE**

Puerto Rico Health Information Network (PRHIN)

## **INFORMATION TECHNOLOGY STAKEHOLDERS**

Cisco Systems, Inc.  
IBM Corporation  
Intel Corporation  
Microsoft Corporation  
Hewlett-Packard Company  
Building Industry Consulting Service International (BICSI)  
Chamber of Commerce – IT & Technology Commission

## **MUNICIPAL CONSORTIA**

Iniciativa Tecnológica Del Norte (INTENOR), Inc.  
Desarrollo Integral del Sur (DISUR), Inc.  
Iniciativa Tecnológica Del Noreste (INTENE), Inc.  
Iniciativa Tecnológica Centro Oriental (INTECO)  
Puerto Rico TechnoEconomic Corridor (PRTEC)

## **NGOs**

Aspira  
The Internet Society of Puerto Rico  
Boys and Girls Clubs of Puerto Rico

## **PRIVATE SECTOR**

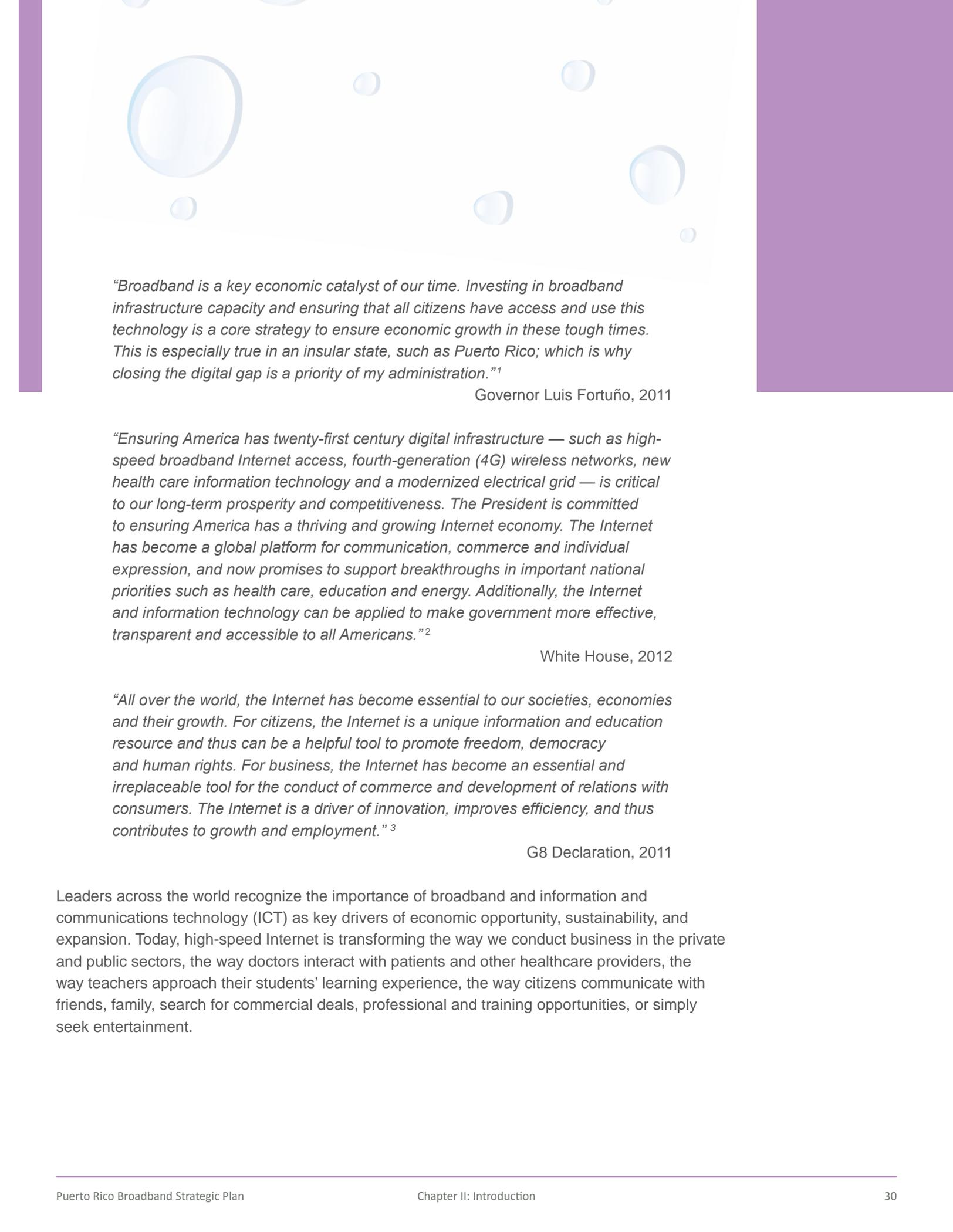
Professional Colleges of Engineers and Surveyors  
Coalición del Sector Privado, de Puerto Rico, Inc.





# Chapter II: Introduction





*“Broadband is a key economic catalyst of our time. Investing in broadband infrastructure capacity and ensuring that all citizens have access and use this technology is a core strategy to ensure economic growth in these tough times. This is especially true in an insular state, such as Puerto Rico; which is why closing the digital gap is a priority of my administration.”<sup>1</sup>*

Governor Luis Fortuño, 2011

*“Ensuring America has twenty-first century digital infrastructure — such as high-speed broadband Internet access, fourth-generation (4G) wireless networks, new health care information technology and a modernized electrical grid — is critical to our long-term prosperity and competitiveness. The President is committed to ensuring America has a thriving and growing Internet economy. The Internet has become a global platform for communication, commerce and individual expression, and now promises to support breakthroughs in important national priorities such as health care, education and energy. Additionally, the Internet and information technology can be applied to make government more effective, transparent and accessible to all Americans.”<sup>2</sup>*

White House, 2012

*“All over the world, the Internet has become essential to our societies, economies and their growth. For citizens, the Internet is a unique information and education resource and thus can be a helpful tool to promote freedom, democracy and human rights. For business, the Internet has become an essential and irreplaceable tool for the conduct of commerce and development of relations with consumers. The Internet is a driver of innovation, improves efficiency, and thus contributes to growth and employment.”<sup>3</sup>*

G8 Declaration, 2011

Leaders across the world recognize the importance of broadband and information and communications technology (ICT) as key drivers of economic opportunity, sustainability, and expansion. Today, high-speed Internet is transforming the way we conduct business in the private and public sectors, the way doctors interact with patients and other healthcare providers, the way teachers approach their students' learning experience, the way citizens communicate with friends, family, search for commercial deals, professional and training opportunities, or simply seek entertainment.

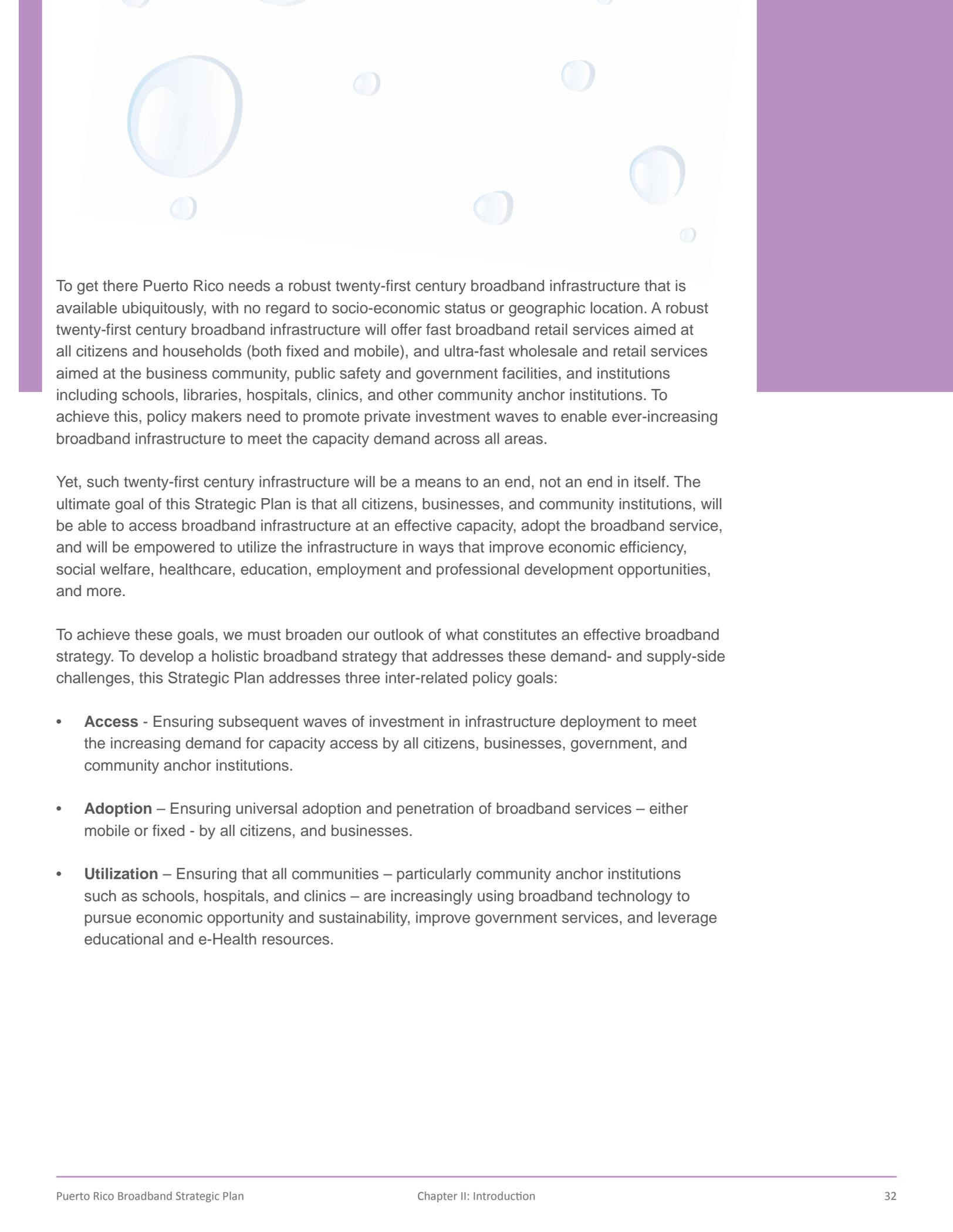
## A 10% rise in the market penetration of broadband services in the LAC region increases GDP by 3.2% on average and boosts productivity by 2.6%.

In today's global economy, high-speed Internet is an essential element for economic competitiveness and sustainability. According to a recent Inter-American Development Bank study, "a 10 percent rise in the market penetration of broadband services in the (Latin American and Caribbean) region increases the GDP by 3.2 percent on average and boosts productivity by 2.6 percent."<sup>4</sup> Where broadband is lacking and citizens and business are unable or unwilling to access online resources through a high-speed broadband network, economies will lose competitive ground in the global economy. This is why, as the Federal Communications Commission states, "broadband is the great infrastructure challenge of the early twenty-first century."<sup>5</sup>

As Puerto Rico makes gradual recovery from the economic downturn, the need for a twenty-first century broadband infrastructure is a key factor in achieving economic sustainability. A robust broadband infrastructure is essential to attract foreign direct capital that will generate the jobs and opportunities needed to sustain Puerto Rico's competitiveness. The Government of Puerto Rico recently enacted the Export Services Law that gives substantial incentives for companies to relocate offices and plants to Puerto Rico. The objective of this legislative initiative is to promote foreign investment, particularly targeting companies in industries such as aerospace, manufacturing, and other high-tech industries that will leverage the large number of well-trained, bilingual engineers and other professionals graduating from the University of Puerto Rico system. A strong broadband backbone that will allow these investors to deliver better services to clients in and out of Puerto Rico is an essential asset to ensure the success of this initiative.

With a robust, ubiquitous, and competitive broadband infrastructure, there is nothing that prevents the establishment of Puerto Rico as the central point of innovative broadband-related services and information economy commerce for the Caribbean and the Southern Hemisphere. There is no reason why every municipality in Puerto Rico cannot be "as connected" to the Internet as any city in the Western Hemisphere. Puerto Rico businesses can overcome the distance barrier by interacting with their customers worldwide via broadband-enabled applications such as video conferencing. Students in Puerto Rico's schools and universities can have the same access to distance learning opportunities as those on the U.S. mainland. Through telemedicine, patients in Puerto Rico can receive better quality of healthcare and access to doctors worldwide.

All of this is possible.



To get there Puerto Rico needs a robust twenty-first century broadband infrastructure that is available ubiquitously, with no regard to socio-economic status or geographic location. A robust twenty-first century broadband infrastructure will offer fast broadband retail services aimed at all citizens and households (both fixed and mobile), and ultra-fast wholesale and retail services aimed at the business community, public safety and government facilities, and institutions including schools, libraries, hospitals, clinics, and other community anchor institutions. To achieve this, policy makers need to promote private investment waves to enable ever-increasing broadband infrastructure to meet the capacity demand across all areas.

Yet, such twenty-first century infrastructure will be a means to an end, not an end in itself. The ultimate goal of this Strategic Plan is that all citizens, businesses, and community institutions, will be able to access broadband infrastructure at an effective capacity, adopt the broadband service, and will be empowered to utilize the infrastructure in ways that improve economic efficiency, social welfare, healthcare, education, employment and professional development opportunities, and more.

To achieve these goals, we must broaden our outlook of what constitutes an effective broadband strategy. To develop a holistic broadband strategy that addresses these demand- and supply-side challenges, this Strategic Plan addresses three inter-related policy goals:

- **Access** - Ensuring subsequent waves of investment in infrastructure deployment to meet the increasing demand for capacity access by all citizens, businesses, government, and community anchor institutions.
- **Adoption** – Ensuring universal adoption and penetration of broadband services – either mobile or fixed - by all citizens, and businesses.
- **Utilization** – Ensuring that all communities – particularly community anchor institutions such as schools, hospitals, and clinics – are increasingly using broadband technology to pursue economic opportunity and sustainability, improve government services, and leverage educational and e-Health resources.

## Three inter-related policy goals: access to networks, adoption of broadband, and utilization of broadband solutions across key sectors.

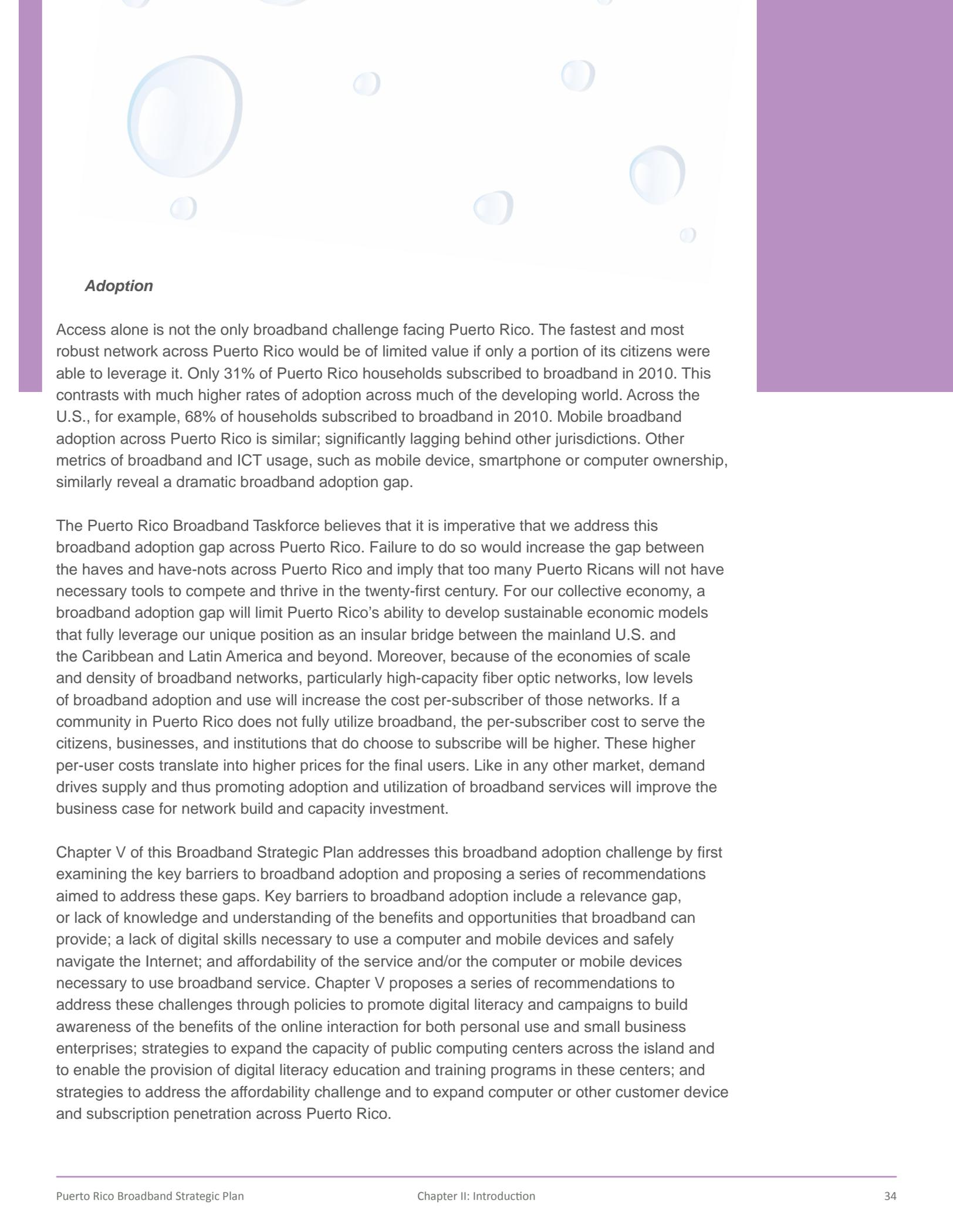
### **Access**

A core component of this broadband strategy strives to ensure a competitive market that is able to sustain subsequent waves of investment in the infrastructure build-out that is needed to provide sufficient broadband capacity access to all citizens, businesses, and community anchor institutions. Access to infrastructure – whether mobile or fixed – is still a key challenge across many areas of Puerto Rico. Further, available speed capacity across much of Puerto Rico remains insufficient to support the increasing demand for advanced online applications. Closing this access gap is a key goal of this Strategic Plan. To achieve this goal, the Puerto Rico Broadband Taskforce first endeavored to assess the extent of the access gap. The Taskforce then evaluated key factors affecting investment in broadband infrastructure and proposed multiple recommendations aimed at removing barriers to investment.

Chapter III of this Plan describes the broadband landscape across Puerto Rico and includes a detailed description of available broadband infrastructure across the island at different speed capacities. This information reveals that across Puerto Rico, approximately 14% of households – the majority of which are located in remote areas – have no access to fixed broadband networks. The mapping data also reveals that where capacity does exist, there remains a lag in speed capacity. Across much of Puerto Rico, broadband speed capacity offered by commercial retailers is markedly slow and inadequate to meet the increasing thirst for connectivity speed in the market. Further, retail broadband prices across Puerto Rico are, generally, relatively expensive.

Chapter IV of the Plan proposes broadband capacity goals across Puerto Rico across the coming decade. To ensure that we are on the right path to meet these goals, the chapter assesses key factors that affect broadband infrastructure investment decisions and proposes a series of recommendations aimed to encourage market expansion. In particular, the chapter recommends multiple reforms at the national and local levels aimed to remove barriers to entry into the market and reduce or ameliorate the cost of network build-out and operations. Importantly, Chapter IV also addresses the impact that the Federal broadband policy reform underway in Washington will have for the Puerto Rico broadband market.





## ***Adoption***

Access alone is not the only broadband challenge facing Puerto Rico. The fastest and most robust network across Puerto Rico would be of limited value if only a portion of its citizens were able to leverage it. Only 31% of Puerto Rico households subscribed to broadband in 2010. This contrasts with much higher rates of adoption across much of the developing world. Across the U.S., for example, 68% of households subscribed to broadband in 2010. Mobile broadband adoption across Puerto Rico is similar; significantly lagging behind other jurisdictions. Other metrics of broadband and ICT usage, such as mobile device, smartphone or computer ownership, similarly reveal a dramatic broadband adoption gap.

The Puerto Rico Broadband Taskforce believes that it is imperative that we address this broadband adoption gap across Puerto Rico. Failure to do so would increase the gap between the haves and have-nots across Puerto Rico and imply that too many Puerto Ricans will not have necessary tools to compete and thrive in the twenty-first century. For our collective economy, a broadband adoption gap will limit Puerto Rico's ability to develop sustainable economic models that fully leverage our unique position as an insular bridge between the mainland U.S. and the Caribbean and Latin America and beyond. Moreover, because of the economies of scale and density of broadband networks, particularly high-capacity fiber optic networks, low levels of broadband adoption and use will increase the cost per-subscriber of those networks. If a community in Puerto Rico does not fully utilize broadband, the per-subscriber cost to serve the citizens, businesses, and institutions that do choose to subscribe will be higher. These higher per-user costs translate into higher prices for the final users. Like in any other market, demand drives supply and thus promoting adoption and utilization of broadband services will improve the business case for network build and capacity investment.

Chapter V of this Broadband Strategic Plan addresses this broadband adoption challenge by first examining the key barriers to broadband adoption and proposing a series of recommendations aimed to address these gaps. Key barriers to broadband adoption include a relevance gap, or lack of knowledge and understanding of the benefits and opportunities that broadband can provide; a lack of digital skills necessary to use a computer and mobile devices and safely navigate the Internet; and affordability of the service and/or the computer or mobile devices necessary to use broadband service. Chapter V proposes a series of recommendations to address these challenges through policies to promote digital literacy and campaigns to build awareness of the benefits of the online interaction for both personal use and small business enterprises; strategies to expand the capacity of public computing centers across the island and to enable the provision of digital literacy education and training programs in these centers; and strategies to address the affordability challenge and to expand computer or other customer device and subscription penetration across Puerto Rico.

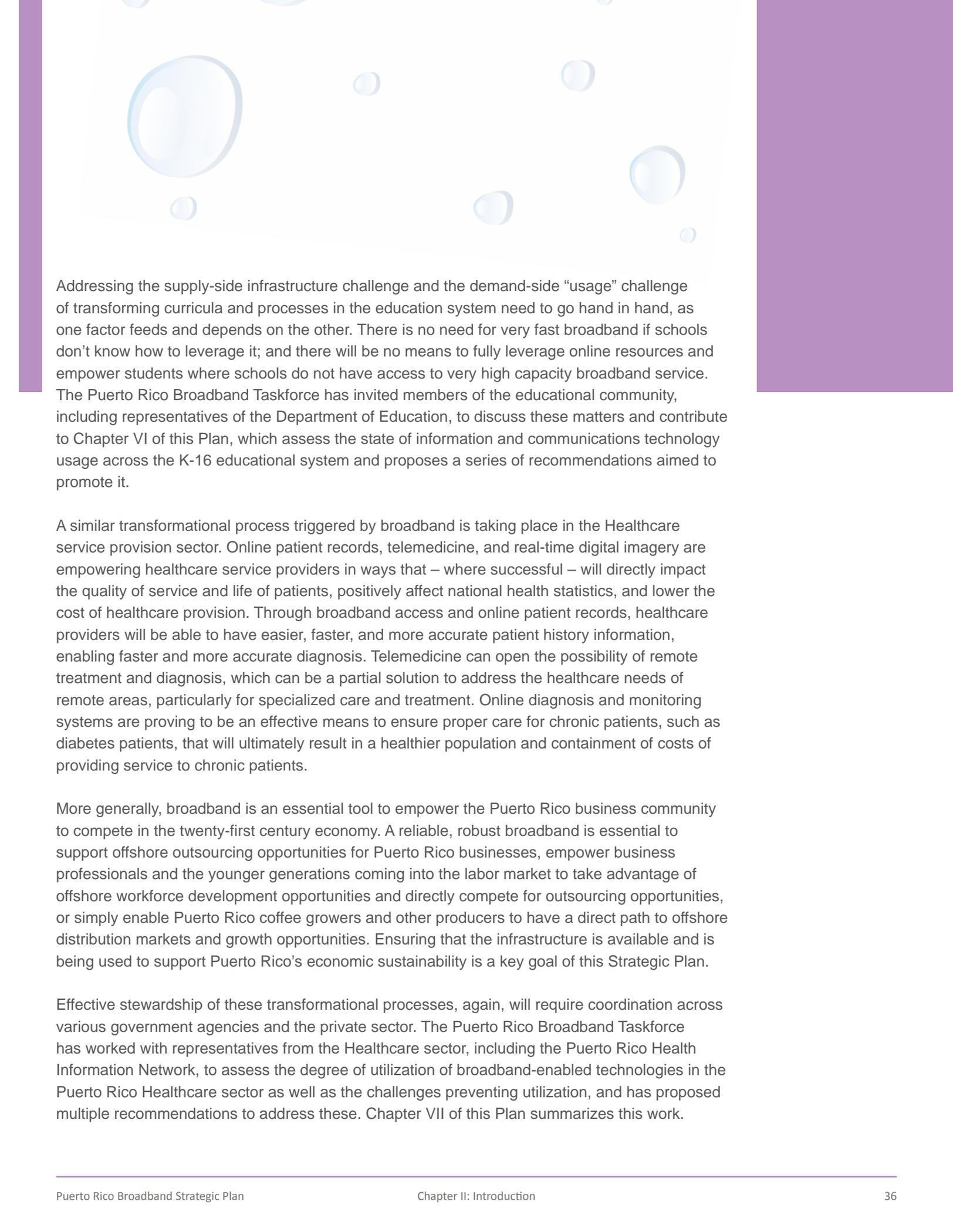


## ***Utilization***

Promoting access and adoption of broadband service is a key objective of the Strategic Plan. The job would be incomplete, however, if we failed to address the utilization challenge. An effective broadband strategy needs to ensure the growth of broadband-enabled technology and solutions across key business sectors, in particular, the Education and Healthcare sectors.

Online educational resources for teachers and students are already transforming the way children learn and teachers teach. Online curricula and resources offer students and teachers a plethora of resources previously unattainable. These resources are already transforming the way we understand educational development. However, this transformation needs proper steering and coordination to ensure that students and teachers have appropriate online educational content, appropriate content standards and means to protect students from online risks, and new curricula adapted to these new resources. Importantly, teachers need to be trained to ensure that they not only know how to use a computer and can access this new wealth of information, but also understand how to leverage those resources to effectively steer their pupils along their educational development.

While these matters might be thought of as outside the realm of broadband policy per se, they cannot be determined separately from a broadband strategy in isolation within the Education sector. This is because broadband policy will ultimately determine whether there remains digital “have” and “have not” students, schools, and communities. Across much of Puerto Rico, existing broadband availability and capacity is inadequate to meet these challenges. Schools across urban and rural areas alike will increasingly need not just broadband, but very fast broadband, perhaps hundreds of megabits or more, that will enable simultaneous access to online service for all classrooms, administrators, teachers, and – crucially – students. Furthermore, teachers and administrators will need to be steered to ensure that they are fully leveraging these resources for the benefit of their students. In short, the educational opportunities that broadband offers present a transformational challenge for the Education sectors that needs to be addressed within the national broadband policy framework.



Addressing the supply-side infrastructure challenge and the demand-side “usage” challenge of transforming curricula and processes in the education system need to go hand in hand, as one factor feeds and depends on the other. There is no need for very fast broadband if schools don’t know how to leverage it; and there will be no means to fully leverage online resources and empower students where schools do not have access to very high capacity broadband service. The Puerto Rico Broadband Taskforce has invited members of the educational community, including representatives of the Department of Education, to discuss these matters and contribute to Chapter VI of this Plan, which assess the state of information and communications technology usage across the K-16 educational system and proposes a series of recommendations aimed to promote it.

A similar transformational process triggered by broadband is taking place in the Healthcare service provision sector. Online patient records, telemedicine, and real-time digital imagery are empowering healthcare service providers in ways that – where successful – will directly impact the quality of service and life of patients, positively affect national health statistics, and lower the cost of healthcare provision. Through broadband access and online patient records, healthcare providers will be able to have easier, faster, and more accurate patient history information, enabling faster and more accurate diagnosis. Telemedicine can open the possibility of remote treatment and diagnosis, which can be a partial solution to address the healthcare needs of remote areas, particularly for specialized care and treatment. Online diagnosis and monitoring systems are proving to be an effective means to ensure proper care for chronic patients, such as diabetes patients, that will ultimately result in a healthier population and containment of costs of providing service to chronic patients.

More generally, broadband is an essential tool to empower the Puerto Rico business community to compete in the twenty-first century economy. A reliable, robust broadband is essential to support offshore outsourcing opportunities for Puerto Rico businesses, empower business professionals and the younger generations coming into the labor market to take advantage of offshore workforce development opportunities and directly compete for outsourcing opportunities, or simply enable Puerto Rico coffee growers and other producers to have a direct path to offshore distribution markets and growth opportunities. Ensuring that the infrastructure is available and is being used to support Puerto Rico’s economic sustainability is a key goal of this Strategic Plan.

Effective stewardship of these transformational processes, again, will require coordination across various government agencies and the private sector. The Puerto Rico Broadband Taskforce has worked with representatives from the Healthcare sector, including the Puerto Rico Health Information Network, to assess the degree of utilization of broadband-enabled technologies in the Puerto Rico Healthcare sector as well as the challenges preventing utilization, and has proposed multiple recommendations to address these. Chapter VII of this Plan summarizes this work.

## Public-private partnerships are essential to close the digital divide across Puerto Rico.

This Strategic Plan lays out a series of recommendations to help us achieve a twenty-first century infrastructure that will contribute to the revitalization of the Puerto Rico economy, promote foreign direct investment, and offer new economic and social opportunities to all Puerto Ricans regardless of where they live and work or what their education and income levels are. Many of the recommendations proposed by the Puerto Rico Broadband Taskforce are immediately actionable, while others will require further analysis and assessment. In all cases, the Strategic Plan calls for a cooperative effort between the private and public sectors, including multiple government agencies in Puerto Rico and at the federal level. While the challenge is great, it cannot be avoided. A broadband policy that neglects to ensure that national, regional, and local government processes evolve to an online world or that doesn't guarantee that educational processes adapt to leverage online resources to empower educators and their pupils or fails to address the multiple complexities of online healthcare service and patient records will be ineffective and incomplete.

This process will not happen overnight and will require waves of reform, coordination, and adjustment across multiple agencies and functions of government, and the private sector. As such, this Broadband Strategic Plan – the first one of its kind for Puerto Rico – should be understood as the beginning of a dialogue and action plan, not the end. This Strategic Plan will lead to action through the implementation of the multiple actionable strategic recommendations. It is also meant to trigger further dialogue across multiple levels of government and the private sector leading to subsequent review and assessment of Strategic Plans aimed to achieve the access, adoption, and utilization goals defined in this Strategic Plan.





## Endnotes

<sup>1</sup> Fortuño, L. Federal Communications Commission, (2011). *Letter to the Federal Communications Commission*. Retrieved from website: <http://apps.fcc.gov/ecfs/document/view?id=7021714838>

<sup>2</sup> *White House statement on technology policy*. (2011). Retrieved from <http://www.whitehouse.gov/issues/technology>

<sup>3</sup> G8, G8 Summit of Deauville, (2011). *Renewed commitment for freedom and democracy*. Retrieved from website: <http://www.g20-g8.com/g8-g20/g8/english/live/news/renewed-commitment-for-freedom-and-democracy.1314.html>

<sup>4</sup> Inter-American Development Bank, (2012). *Bridging gaps, building opportunity: Broadband as a catalyst for economic growth and social progress in Latin America and the Caribbean*.

<sup>5</sup> Federal Communications Commission. (2010). *National Broadband Plan*, Chapter 1. Retrieved from website: <http://download.broadband.gov/plan/national-broadband-plan-chapter-1-introduction.pdf>



