A SMARTER BALTIMORE:
HARNESSING TECHNOLOGY TO BUILD A STRONGER CITY

Smarter City Task Force Report | **AUGUST 2015**

STEPHANIE
RAWLINGS-BLAKE
MAYOR

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SMARTER CITY TASK FORCE

Members

Colin Tarbert, *Co-Chair*	Mayor's Office
Jason Hardebeck, *Co-Chair*	DreamIt Ventures Baltimore
Honorable Brandon Scott	Baltimore City Council, 2nd District
Jessica Varsa	Baltimore City Department of Planning
Kenneth Thompson	Baltimore City Public Schools
William H. Cole	Baltimore Development Corporation
Mark Wagner	Bay-Tek Consulting
Donna Rattley-Washington	Comcast
Peter Kilpe	CyberPoint International
Kirby Fowler	Downtown Partnership of Baltimore, Inc.
Tom Sadowski	Economic Alliance of Greater Baltimore
Deb Tillett	Emerging Technology Centers
Don Fry	Greater Baltimore Committee
Christy Wyskiel	Johns Hopkins University
Mary Sloat	Mayor's Office of Employment Development
Jerome Mullen	Mayor's Office of Information Technology
Reginald Mack	Mayor's Office of Minority & Women-Owned Business Development
Anthony Robinson	Minority Business Enterprise Legal Defense and Education Fund
Omar Muhammad	Morgan State University
Hugh Bethell	Port Networks
Guy Filippelli	Red Owl Analytics
Ira Levy	Torrential Systems
Peter Murray	University of Maryland, Baltimore
David Smith	Verizon Business
Jennifer Rous	Whiteford Taylor Preston

Staff

Liz Pettengill	Greater Baltimore Committee
Joseph Carella	Mayor's Office of Information Technology

STEPHANIE RAWLINGS-BLAKE
Mayor
250 City Hall, 100 North Holliday Street
Baltimore, Maryland 21202

A MESSAGE FROM MAYOR STEPHANIE RAWLINGS-BLAKE:

Every day, our administration works to achieve our vision of a Baltimore City that is a vibrant and growing place with safer streets, stronger neighborhoods, better schools, a resilient economy and a cleaner, healthier environment. A key priority is attracting 10,000 new families and retaining current residents to maintain the city's ongoing population growth. To meet this goal, we are focused on innovative solutions to address Baltimore's persistent challenges, and we are making significant progress in improving public education, reducing crime, eliminating blight and rebuilding attractive, affordable neighborhoods.

We are also focused on making Baltimore a smarter city, and we are embracing innovative ways of harnessing technology to do that. Tapping into the potential of cutting-edge technology can improve the quality of everyday life, attract new companies and industries and fuel the city's growth. And Baltimore City government can improve how it serves the public by using technology more efficiently and effectively.

Baltimore must continue to make strategic investments in technology and broadband infrastructure. To ensure that Baltimore is benefiting to the maximum extent possible from innovation in the public, private and nonprofit sectors, I formed a task force whose members come from diverse fields and backgrounds to develop a strategic plan for Baltimore City's digital future. This plan, A Smarter Baltimore, identifies key goals and includes specific strategies that must be implemented to reach Baltimore's maximum potential. The plan also highlights best practices, both local and around the globe, that demonstrate what is possible when we use technology to improve our communities.

Baltimore City is in many ways a leader in using technology to become smarter. This plan builds on current initiatives with new ideas to move us forward. I hope you find A Smarter Baltimore provides a compelling roadmap for using technology to continue Baltimore's enormous progress.

I welcome your feedback. Please visit smarterbaltimore.org or send email to smarterbaltimore@baltimorecity.gov.

Sincerely,

Stephanie Rawlings-Blake
Mayor
City of Baltimore

INTRODUCTION

Throughout its history, Baltimore City has embraced innovation. The Port of Baltimore, established in 1871, is equipped today with the latest technology and is one of only two East Coast ports able to handle the new super-cargo ships coming through the expanded Panama Canal. Baltimore's highway and industrial rail system is one of the nation's best. And the world-renowned Inner Harbor is a model for urban design and redevelopment, a reimagining that transformed abandoned industrial wharves into a vibrant new center for the city attracting millions of tourists annually.

Today, Baltimore City continues to innovate and grow. Reversing years of population decline, the city is an increasingly attractive destination for entrepreneurs, academics, medical professionals, artists and musicians, and provides a welcoming home to a steady influx of millennials, empty nesters and young families.

To maintain that momentum and fuel new growth, the city must continue to innovate by taking greater advantage of technology. Whether it is a state-of-the-art citywide broadband network, leveraging existing networks and private investment, providing ready access to the Internet in our public schools or easy-to-use online city services, improved technology will play a major role in shaping Baltimore's future.

This plan identifies key steps that will integrate technology and innovative thinking into the city's DNA – to ensure a brighter digital future for the city, its economy and its people.

The Smarter City Task Force

In May 2014, Mayor Stephanie Rawlings-Blake named a task force of 27 individuals from the government, business and nonprofit sectors to create a strategic plan for making Baltimore a Smarter City. The mayor charged the task force with outlining goals and strategies to guide the city in developing specific programs, initiatives and projects to enhance Baltimore City's use of broadband connectivity and the latest technology. While the city has been a national leader in some aspects of adopting and leveraging technologies, it's clear that Baltimore can do more.

The task force created work groups to focus on four areas: infrastructure, economic development, digital divide and civic engagement.

KEY ISSUES

DIGITAL INFRASTRUCTURE

There is a need to further invest in infrastructure that allows for smart technology with a focus on expanding broadband capacity, both public and private, throughout Baltimore City. Broadband refers to technology that provides users with access to high-speed Internet.

Such access is increasingly critical in many realms. Businesses use it to offer products and services, while government agencies increasingly offer on-line licensing, registration and bill payment services. More and more employers require job-seekers to submit job applications and resumes electronically, and schools use broadband to provide digital support for education through electronic testing, video streams and access to educational resources. As jobs become increasingly dependent on technology, individuals need training to acquire basic proficiency in taking advantage of broadband Internet access. Electronic delivery of training programs and resources make skills acquisition more efficient for both the learner and the provider. With email and social media now part of the daily lives of most Americans, broadband is increasingly necessary to connect people with friends, relatives, employers, agencies and institutions. Increasingly, more of the tools and machines we use every day will rely on high-speed Internet connectivity.

Having access to broadband helps small and developing firms compete in new markets, which boosts economic activity and job creation. This increases competition and tends to lower the costs of goods and services.

In addition, businesses are relying on more-advanced digital-based processes. Analog fax transmission is being replaced by high-resolution scanned images delivered by email. Mailed or hand-delivered medical documents are being replaced by electronic medical records, and large images such as MRIs are being reviewed remotely. Web marketing and news is becoming more video-centric, while cloud hosting of documents, pictures and video requires ever-expanding bandwidth. And big data initiatives – from finance to scientific research -- require much larger bandwidth.

Basic infrastructure in this broadband category mainly consists of conduit and fiber that bring high-speed broadband Internet access to homes, businesses and other institutions. Baltimore-area institutions are taking good advantage of this technology. A few examples are noted here:

- Baltimore City and the surrounding counties comprise the Inter-County Broadband Network (ICBN) in Central Maryland. In the past three years, the network has added more than 1,000 miles of new fiber to an existing network of 2,400 miles, directly connecting thousands of entities onto a single statewide network. While much fiber is installed and available, additional investment is required to build out the network to connect more businesses and homes.
- All 21 Enoch Pratt Free Library branches are now connected with fiber, as part of a major capital investment program. In fiscal 2013, library patrons logged more than 1.7 million job search sessions at library branches.
- In July 2014, Johns Hopkins Medicine announced collaboration with Kaiser Permanente (Mid-Atlantic Permanente Medical Group, Rockville, MD) to improve health care delivery by using electronic medical records to permit quick and efficient access to clinical information. These large files are exchanged via high-speed broadband networks and will facilitate access to 21st Century diagnostic and assessment options.[1]

In the development world, a number of projects have incorporated broadband into their plans, including:

- Remington Row, a planned-unit development with retail, office and apartments that will include state-of-the-art access to broadband.
- Harbor Point, a major mixed-use development that will offer broadband access to tenants and companies.
- Stadium Square, a $250 million project designed to attract technology firms that will make high-speed Internet available to all tenants; infrastructure will be built beyond capacity so that high-speed Internet will also be available to nearby businesses.

The Baltimore Broadband Coalition is leading a multi-community campaign around the city to improve broadband services in Baltimore. This campaign was developed in response to a survey and community meeting that indicated residents throughout North Baltimore want to explore opportunities for more broadband options.

Despite such progress, much still needs to be done to increase deployment of broadband infrastructure, increase the use of technology, and provide residents access to broadband service. Understanding the city's current infrastructure assets, limitations and future needs is a fundamental next step in moving towards a comprehensive 21st Century digital infrastructure plan.

To complement the work of this task force, the Mayor's Office of Information Technology (MOIT) contracted with Magellan Advisors, a broadband consultant, to evaluate the city's existing broadband infrastructure, forecast future broadband need, recommend ways to expand the city's infrastructure and identify potential frameworks to leverage the city's broadband and conduit assets. That report will provide critically important information about expanding the city's high-speed network. The report's preliminary recommendations are listed in Appendix 5.

BROADBAND BASICS

Broadband refers to technologies that provide high-speed Internet access to connect businesses, households, governments and community anchor institutions such as schools, libraries, hospitals, public safety facilities and senior centers. Broadband infrastructure consists of conduit and fiber connecting physical locations where broadband equipment such as web servers and wireless access points can provide Internet access for individuals. Broadband delivers higher speeds, giving users the ability to transfer greater amounts of information in shorter amounts of time; those speeds are measured in megabits per second (Mbps) or gigabits per second (Gbps); a gigabit is 1000 megabits. As recently as January 2015, the Federal Communications Commission upgraded the formal definition of broadband to provide minimum download speeds of 25 Mbps and minimum upload speeds of 3 Mbps. Some institutions, particularly schools, require greater bandwidth. The State Educational Technology Directors Association calculates that schools should have broadband with a download speed of1 Gbps for every 1,000 students in the school.

Broadband requires high-speed access to the Internet to connect any end user with web sites offered by businesses, governments, email providers, schools, libraries and social media providers. An individual with access to laptops, tablets, desktops or smart phones can access the Internet through an Internet service provider (ISP). These ISPs offer direct connection either hardwired through an Ethernet cable or via a wireless access point. These devices can be at home; in offices, schools, libraries and senior centers; or any community institution. Hardwired connections rely on either cable or fiber-optic connections. Wireless access allows users to connect to the Internet without a hardwired connection and is becoming increasingly prevalent at libraries, schools, senior centers, workplaces and other locations.

[1] http://share.kaiserpermanente.org/article/kaiser-permanente-johns-hopkins-medicine-announce-enhanced-strategic-collaboration/

Expanding Broadband Access in Other Communities

State, cities and communities across the nation are taking a range of steps to expand access to broadband. A few examples are noted here:

- The Minnesota legislature set a goal in 2010 that all state residents and businesses should have Internet access with a download speed of at least 20 Mbps by 2015. By 2013, more than 70 percent of the state had access to providers offering those speeds. The state established a sub-cabinet of agencies to work on broadband issues, and Minnesota recently established a $20 million grant program to fund infrastructure upgrades in underserved areas.
- Boston installed 638 computers in public housing developments, libraries and community centers to provide access to those who cannot afford Internet access at home.
- Chicago installed more than 3,000 computers at more than 150 locations, including public housing, senior centers, libraries and workforce centers.
- Washington, D.C., used federal funding to install 211 miles of fiber, connect 223 anchors, add 103 new wireless access points at locations downtown, on the National Mall and elsewhere, and create partnerships with four entities providing internet services to residents.
- Cleveland's One Community was founded in 2003 as a nonprofit organization to chart a digital infrastructure plan for Northeast Ohio for the 21st Century. OneCommunity spent a decade building and expanding a state-of-the-art fiber optic network for the benefit of Northeast Ohio's schools, hospitals and government organizations.

FRANCHISE AGREEMENTS

In the simplest terms, a franchise is the government's permission with a private entity to use public streets and rights-of-way for private profit. In practice this means that any person or corporation seeking to use city rights-of-way must first obtain a franchise from the city before that use can occur. Under the Baltimore City Charter, the Board of Estimates must "fix in said ordinance the said compensation at the largest amount it may be able to obtain…." The city grants franchises for the use of city property above and below our streets, lanes and parks.

Among many others, Comcast and Verizon are examples of companies that have obtained franchises to use city rights-of-way for their businesses. The City granted Comcast a franchise for an annual fee of a percentage of the gross profits derived from City business; the City charges Comcast 5 percent, which is the maximum rate permitted by FCC rules. Under the terms of the franchise, the company was required to use the city conduit system for which Comcast pays an additional conduit access fee.

Verizon's franchise, granted to its corporate predecessor, C&P Telephone in 1889, allows it to use the city's rights of way for constructing conduit to use in its "telephone exchange system." The franchise was granted for a fee proportional to linear feet of use.

2 TECHNOLOGY-DRIVEN ECONOMIC GROWTH

Forecasts show that the American economy will be increasingly knowledge-based and reliant on technology and innovation. In some minds, the high-tech economy is embodied in the latest Internet start-up, but in reality, new technology will be ever-more important to all sectors of the economy, from manufacturing to logistics.

Baltimore is well-positioned to thrive in this emerging economy and the city should recognize and celebrate its assets and trends, including:

- The city's population is stable and growing after years of decline.
- Strong anchor institutions in education and health care are economic engines.
- Key industries project to continue their growth – health care, bioscience, information technology, cyber-technology, finance and banking and maritime services.
- Baltimore has a robust tourist economy as well as a world-class port, road and railway infrastructure and airport.
- More than $20 billion in new commercial and residential development is in progress or ready to start soon.
- Strong base of diverse small businesses.

Baltimore is garnering positive national attention as well. National publications have recognized Baltimore as one of the best in the nation for technology jobs or for people with college degrees, and Baltimore is considered a top 10 location for launching a small business. Public and private incubators and accelerators are fostering a strong entrepreneurial ecosystem in Baltimore across diverse sectors including software development, life sciences, the arts, manufacturing and social enterprises.

Smart cities are defined by their innovation and ability to solve problems and their use of information communication technology. Cities that are doing that include:

Kansas City, which was designated as a "Smart City" by Cisco, a partnership that enabled Kansas City to improve efficiency and reduce the consumption of resources, time and money. The Smart City model uses a variety of sensors and other devices that supply information about transportation, safety, parking and infrastructure. With help from Cisco, Kansas City will become one of the few cities in the world to fully integrate its public utilities using a smart system to monitor the use of public utilities. City leaders see all these improvements as ways to attract new companies and new residents. Kansas City was also selected to benefit from the Google Fiber effort, which provides fiber-based broadband to individual businesses and homes. (Google Fiber invests only when sufficient demand exists in a community. Baltimore applied to be part of Google Fiber but did not meet its criteria, which prompted the city to create the Smarter City Task Force to guide fiber planning.) Other cities where Google is seeking to offer Google Fiber in the next few years include Raleigh-Durham, NC; Charlotte, NC; Atlanta, GA; and Nashville, TN. Other cities under consideration for future implementations include Phoenix, AZ; Portland, OR; San Antonio TX; San Jose, CA; and Salt Lake City, UT.

Chicago, where the Smart Chicago Collaborative works to use technology to improve lives across the city. Smart Chicago, a nonprofit, focuses on expanding access to the Internet and technology, building technology skills and using data more effectively. Smart Chicago has created a range of tools, such as Foodborne Chicago, which connects people who complain about food poisoning on Twitter to local health officials. Its Chicago Early Learning website is used by parents

to look up available programs, and Connect Chicago serves a similar purpose for public computer centers.

Baltimore's economic development strategy seeks to build on six key sectors of the economy – financial and professional services; health and bioscience technology; arts, culture and tourism; information and creative services; logistics; and advanced manufacturing. Part of that strategy should be to take advantage of new technology and provide the best possible access to broadband for residents, businesses, academia, and the public sector. To spur technological and economic advancement, the city should do more to take advantage of its unique assets, including its fiber network, expanding business sectors and growing population of educated workers.

The Comprehensive Economic Development Strategy report recently completed by the Baltimore Development Corporation (BDC) calls for improved resources for Baltimore's small businesses and entrepreneurs. For example, BDC's Emerging Technology Centers receive far more applications from companies than it can assist, suggesting Baltimore must create new ways to help incubate new-technology companies. Providing seed money either through foundation grants or other means will help cultivate the next generation of innovative entrepreneurs, create an active pipeline for emerging tech companies that want to launch, relocate, or expand. Additionally, more and more jobs – from the high-tech sector to administrative positions – information technology skills are increasingly in demand.

A key focus will be Baltimore's educational and research anchors, including major universities and medical institutions, which can take the lead in translating academic research into new enterprises. It should also be a priority for Baltimore institutions to continue to attract and retain a tech-ready workforce. The city is already being recognized as an attractive home for young people, as noted recently by the Christian Science Monitor.[2] From 2000 to 2010, the population of millennials (ages 25-34) living within a three-mile radius of downtown grew 92 percent, the fourth fastest growth rate in the nation during that period.[3]

Overall, the city should ensure that new technology is working to accomplish these economic development goals:

- Encourage the growth of current businesses;
- Attract new business to generate more jobs;
- Encourage collaboration among key industry sectors; and
- Provide the best environment for start-ups.

Baltimore has clusters of innovative, technology-reliant companies in such areas as the Central Avenue corridor, along Light Street and in Canton. It is important for both the city government and private sector to find ways to coordinate activities and interaction among them so that they work collaboratively when possible and build synergy that fuels new economic activity.

Finally, the city should capitalize on the "Smalltimore" dynamic. The city's intense interconnection primes Baltimore to tap into its collective brainpower. The city should work to establish a culture of collaboration to take advantage of our already closely connected realms of business, academia and nonprofits.

[2] http://m.csmonitor.com/USA/Society/2015/0201/The-new-cool-cities-for-Millennials
[3] http://cityobservatory.org/ynr/

3 SMARTER NEIGHBORHOODS

Baltimore is a city of neighborhoods with more than 200 unique communities – diversity that gives the city its strength and character. As technology expands into more aspects of everyday life, one key to growing Baltimore is ensuring that new innovations are being used to improve communities and the lives of residents. This means fostering the use of technology in housing, transportation, public safety, workforce development, arts and culture, public health and the environment. And strengthening neighborhoods and fostering inclusive growth will depend on providing Internet connectivity equitably to all.

A number of efforts underway in Baltimore or in other areas provide a sense of how broadband and other technology can help improve communities.[4]

- **Arts and Culture:** A group of both public and private sector partners is pursuing "CultureBlocks," which uses a web tool to present data to the public on artists and arts organizations in a creative way.
- **Housing:** The District of Columbia's Office of the Chief Technology Officer is working with the Department of Housing to bring high-speed broadband to low-income housing managed by the District. Residents receive access to broadband Internet at less than the market cost.
- **Public Health:** Run by the Baltimore City Health Department, the Baltimarket Virtual Supermarket program allows Baltimoreans to order groceries – including healthy fruits and vegetables – online and pick them up at designated locations. The program is geared to help residents of areas that are inadequately served by grocery stores. In another initiative, the Baltimore Farmers Market and Bazaar accepts electronic payments for participants in SNAP (Supplemental Nutrition Assistance Program, formerly food stamps), which gives low-income residents greater access to fresh foods.
- **Public Safety I:** Police, fire and emergency medical agencies are using broadband to reduce response times and improve the quality of services. This includes improved geo-locating of emergency locations, transmission of building floor plans to fire personnel on route to a fire scene and transmitting and recording high-definition video from cameras used for security and traffic enforcement.
- **Public Safety II:** In February 2015, Mayor Rawlings-Blake publicly released the report from the "Mayor's Working Group on the Use and Implementation of Body-Worn Cameras." This report collected data from many jurisdictions and examined legal, operational, cost, privacy and community issues. It provides a set of recommendations for implementing body-worn cameras for Baltimore police officers and having the cameras be effective in fighting crime and fostering trust with residents.[5]
- **Transportation:** The Charm City Circulator bus line offers a smartphone app that allows riders to track the location of buses, and the Maryland Transit Administration has installed tracking devices on its busses.
- **Workforce and Economic Development:** Projects in Baltimore and elsewhere have shown how broadband helps individuals gain jobs and start or grow businesses. For example, the Delaware Division of Libraries tracked how people took advantage of the libraries' access to computers and broadband Internet to search for and secure jobs. In a two-year period ending in 2013, individuals reported receiving more than 260 job offers. In Baltimore, Community Job Hubs, operated by the Mayor's Office of Employment Development in partnership with community groups , supplement services offered at the city's three one-stop career centers by offering no-cost digital literacy classes, taught by professional technology trainers, that prepare residents for 21st Century jobs.

[4] "Final Report: Social and Economic Impacts of the Broadband Technology Opportunities Program (BTOP)," published in January 2015.) http://www.ntia.doc.gov/files/ntia/publications/asr_final_report.pdf

[5] http://mayor.baltimorecity.gov/sites/default/files/20150218BWCWorkingGroupRecommendations.pdf

4 BRIDGING THE TECHNOLOGY DIVIDE

Baltimore, like many others communities, is divided digitally between those who have – and those who lack – affordable access to communication technologies and the information they deliver. Those without that access face both economic and social disparities. Historically this divide referred solely to those who lacked access to the Internet. Today, that divide persists, and even worsens, despite advances which have made it far easier to gain access to the Internet and the information it offers – via smart phones, tablets and more traditional computers.

Many of us take for granted that we can use computers and the Internet to locate and apply for job opportunities, complete schoolwork, watch movies, access healthcare information, search for and use government services and learn new things for personal enrichment.[6] But many people, particularly among certain demographic groups, lack that access. Finding new ways to close this digital divide is a key goal of the Task Force.

According to a 2013 Pew Research Center Study, *56 percent of American adults own a smartphone while 70 percent have broadband at home*.[7] The nationwide survey administered to adults ages 18 and older also found that *46 percent of Americans have both a home broadband connection and a smartphone, while about 20 percent of Americans have neither a broadband connection nor smartphone* (Pew Research Center, Home Broadband 2013 Study).

There are no precise estimates of how many people in Baltimore lack access to broadband Internet. While national surveys suggest that about 20 percent of Americans do not have broadband at home or a smartphone, it's reasonable to conclude that the percentage of Baltimoreans who lack broadband is higher. Baltimore has a large population of African Americans and people who have low incomes or low educational attainment – three demographic and socio-economic groups that nationally are significantly more likely to lack home broadband access.[8]

The Federal Communications Commission, supported by the funding efforts of the State Broadband Initiative program of the U.S. Department of Commerce's National Telecommunications and Information Administration, publishes a current map of available broadband services. This map can be searched by address to provide a set of providers offering service and ranges of available bandwidth.[9]

With the web becoming more video-centric and increasingly data-dependent, those without affordable and adequate access will be increasingly at a disadvantage. They will find it harder to handle critical tasks such as finding out about job opportunities, going to school, getting health information or using government services.

Depending on mobile phones and devices for Internet access is inherently problematic, however. Mobile data plans for internet access are more expensive per gigabyte than home plans. Because mobile plans also tend to carry higher fees for such things as using too much data and can result in much slower download speeds they are not a sustainable solution to giving more Baltimoreans affordable broadband access.

An April 2015 Pew Research report on "smartphone dependents" (that is, those who rely exclusively on smart phones for Internet access), found that 15 percent of Americans have limited options for online access other than a cell phone. Ten percent have no broadband service at home other than a smartphone data plan. Seven percent of respondents are in both

groups and are considered smartphone dependent, with Internet access inherently constrained, due to costly, limited data plans.[10]

It is critical that for Baltimore to thrive, all residents must be equipped to succeed, with access to new technology and the ability to take advantage of it. This includes three specific goals: ensuring digital access for all residents, providing digital literacy and training for all residents and teaching digital responsibility for Baltimore's young people. A number of efforts are underway to fulfill those ambitions.

For example, the Mayor's Office of Employment Development has Digital Learning Labs where novice and more experienced users can benefit from self-paced computer training labs offering a full menu of instruction, including lessons on Basic Computer Literacy Skills, Microsoft Office applications and keyboarding skills. Training leads to a certificate, which includes successfully fulfilling coursework in "Living Online" focused on such topics as email and the social impact of the Internet.

[6] Thom File, U.S. Census Bureau, "*Computer and Internet Use in the United States*." Issued May 2013, based on the July 2011 Current Population Survey. https://www.census.gov/prod/2013pubs/p20-569.pdf pp 11-13.
[7, 8] *Home Broadband 2013.* Pew Research Center's Internet & American Life Project. August 26, 2013.
[9] *U.S. Broadband Map, F.C.C. and National Telecommunications and Information Administration*, June 30, 2014. http://broadbandmap.gov/
[10] http://www.pewinternet.org/files/2015/03/PI_Smartphones_0401151.pdf

5 CIVIC ENGAGEMENT AND EFFICIENT GOVERNMENT

Technology encourages efficiency, transparency and accountability in many institutions, including in city government. Baltimore has an opportunity to streamline online access to government services and to offer new digital portals providing more efficient service. Expanded broadband and better public access to the Internet can improve a host of city functions, from paying taxes, bills and fees to ordering services for trash collection and maintenance to applying online for licenses and permits.

In 2011, for example, the Baltimore Department of Housing and Community Development (DHCD) developed an electronic plans review system (e-Plans) to expedite and improve the review of full-size construction documents and plans associated with building permit applications. DHCD recognized that electronic collaboration and review tools could dramatically improve the efficiency and accuracy of plan review by reducing the volume of paper involved, redwucing the cost and time required for plan submittal and storage and improving the communications between the applicant and the city.

Looking ahead, using government services should be as easy as on-line transactions such as checking weather reports or handling banking chores. Using government portals to apply and renew for licenses and permits, pay government fees, bid for work and find information should all be easy to accomplish through a broadband network.

MOIT and other city agencies should continue to improve or adopt new technology to make it easier for the public to do business with the city. To reach its goal of generating public involvement, MOIT has contracted with a vendor to perform four "hackathons." These hackathons permit the public to test city services in development – with direct access to city data – and to provide feedback on how services might best evolve.

Baltimore can create an open and more transparent government by using social media to expand civic engagement. City government can use technology to encourage residents to provide new ideas, feedback and solutions to the city's challenges. The city should also provide easier access to public data and documents.

Baltimore City is already making progress toward that goal. Open Baltimore, for example, allows citizen access to data about Baltimore operations and employees, including raw data about operational activities in the Departments of General Services, Recreation and Parks, Public Works, Police and Fire.

CitiStat is an open discussion of the city's critical operations that brings transparency and increased accountability to city government operations. The mobile app that links to the city's 311 reporting line, along with govdelivery email notifications, provide additional transparency to city operations and improved communications with citizens. Additionally, city agencies can use a range of digital tools to seek public input that go beyond traditional methods such as newsletters, public meetings and social media.

GOALS

Building on the themes identified, the task force developed six goals to guide the city's activities to create a technologically smarter Baltimore:

1. Expand upon existing assets to build a leading-edge digital infrastructure – to include citywide broadband capacity and access – in an effective, efficient and inclusive manner.

2. Generate business growth by encouraging the development and commercialization of new technology and identifying business opportunities in the city's emerging high-growth industries. Where possible, these should support Baltimore's minority- and women-owned businesses.

3. Develop public-private partnerships to use technology to improve outcomes in workforce development, education, transportation, sustainability, public safety and health.

4. Leverage public (and private) investments – including school construction, recreation centers, public libraries, street reconstruction and other public infrastructure projects – to improve community access to digital resources.

5. Assist in preparing a workforce that meets the technology needs of growing businesses.

6. Make city government a leader in innovation by providing technology-driven services that reduce costs, increase transparency and provide accountability to city residents.

STRATEGIES

The Task Force brought together a diverse group of people with deep knowledge of the city's technology infrastructure, as well as opportunities and needs for making Baltimore a smarter city. Tapping into that expertise and knowledge, the Task Force developed the following strategies to meet the goals outlined above.

Many of the strategies listed here will play a role in achieving more than one goal, and each strategy lists the goals it applies to. While each strategy is important, the task force recommends giving higher priority to strategies that support multiple goals. Appendix 1 identifies which entities have proposed responsibility for each recommendation.

Baltimore's Infrastructure

- ***Support community efforts to expand broadband options in Baltimore City. (Goals #1, #3)***
    - Appoint a coordinator to help define the roles of the city, public, private, nonprofit and community organizations in expanding affordable broadband services throughout the city. Once defined, create an outreach and partnership strategy for the city, public, private, nonprofit and community organizations to work collaboratively in identifying and prioritizing broadband infrastructure improvements. An example could be to create a site map for free public Wi-Fi hotspots throughout the city and develop a plan and funding to implement.

- ***Create a comprehensive map of public, private and institutional fiber in Baltimore City. Identify gaps, opportunities and prioritize future projects. (Goal #1)***
    - Leverage the inventory of digital assets constructed by Magellan. Identify current and future assets and availability timelines. Determine access privileges. Construct work plan for implementation of public views.
    - The city should complete its study of how best to manage city-owned fiber and conduit assets (public, public-private and private) to best provide digital infrastructure to support the city, communities and business. (Goals #1, #5)

- ***Determine appropriate rate structures for access to city conduit. Balance needs of supporting additional investment, especially in underserved or undeveloped areas, with rates required to support operations and maintenance. (Goals #1, #2)***
    - Review rates structures, conduit maintenance responsibility.

- ***Consider adding broadband review to the city's site plan review process and master plan studies to ensure broadband capacity for the future. (Goals #1, #3)***
    - Convene discussions with Office of Planning and departments of Transportation and Public Works about coordinating planning efforts.

- ***Include additional spare conduit as part of major public works projects for future broadband needs – to leverage construction dollars and help implement a "dig once" policy. (Goals #1, #3, #6)***
    - Define policy and formalize agreements via Memoranda of Understanding between MOIT and Department of Public Works, and between MOIT and Department of Transportation to ensure new conduit installed on large projects.

- *Create a city-led broadband committee to review all city projects related to fiber to ensure coordination and consistent practices. Expand the committee as needed to share progress with key stakeholders such as state and federal partners and anchor institutions. (Goals #1, #3, #4)*
    - Identify core representation on broadband committee, including city representatives (from MOIT, DPW, DOT, mayor's office and others), non-government entities and minority- and women-owned businesses. Draft charter and scope of responsibilities. Enlist named representatives and create regular meeting schedule.

Technology-Driven Economic Development

- *Develop outreach plans and identify development sites on or near the Inter-County Broadband Network (ICBN) and other city infrastructure to attract data centers or other businesses to take advantage of city assets. (Goal #2)*
    - Define outreach program for commercial and development organizations for linking to ICBN. Identify partners in outreach, including Baltimore Development Corp., Office of Planning and MOIT.

- *Leverage Baltimore's unique economic assets to attract companies developing new technologies in key growth sectors. Replicate the success of the Emerging Technology Centers and other incubators. (Goal #2)*
    - Create plan for outreach and coordination of efforts with Baltimore Development Corporation, Department of Planning and mayor's office.

- *Provide information and resources to small businesses through the Small Business Resource center – using web tutorials, a digital library and other digital resources. (Goals #2, #6)*
    - Develop cyber-business workshops and content to enable small businesses, and minority- and women-owned businesses, to learn to utilize the capabilities of the Internet and to establish and grow their businesses.

Bridging the Technology Divide

- *Ensure that all city public facilities are connected to city fiber. (Goals #1, #3, #4)*
    - Enumerate all city public facilities and perform gap analysis on sites with no city fiber connection. Develop cost estimates for those sites not currently connected. Secure funding and obtain approvals for plan.

- *Leverage the construction and major renovation of schools, recreation centers, libraries and other public assets to create technology hubs that can serve the surrounding community's residents by directly providing Internet services at their home via Wi-Fi or at the facility at low or no cost. (Goals #1, #4)*
    - Coordinate plans for the Baltimore City Public Schools capital improvements with MOIT fiber overbuild schedule. Incorporate other capital improvement plans, e.g. those of the Enoch Pratt Free Library and of the Baltimore Development Corp.
    - Create master plan for developing technology hubs.

- *Enhance and develop the city's relationships with existing and future Internet Service Providers to improve broadband adoption. Integrate the city's current and future Internet provider contracts into a long-term strategy for better partnerships with providers to ensure inclusive broadband access at the lowest possible cost. (Goal #1)*
    - Review franchise agreements with commercial broadband providers. Incorporate incentives for them to offer better value (higher speed at lower costs) deals to residents and commercial customers in Baltimore.

Civic Engagement and Efficient Government

- ***Benchmark Baltimore City services with other cities to compare delivery costs, effectiveness and quality based on technological solutions. (Goal #6)***
    - Commission benchmarking study for the city's current and planned technical offerings.

- ***Baltimore City should join the Next Century Cities coalition to learn from other cities and share Baltimore's successes. (Goals #1,#3,#6)***
    - Identify city representative to join the coalition.

- ***Baltimore City should join Global City Teams Challenge (Goals #4, #6)***
    - The U.S. Department of Commerce's National Institute of Standards and Technology is working with several partners on a year-long Global City Teams Challenge to create "smart cities." The goal is to help communities work together to address issues ranging from air quality to traffic management and emergency services coordination.

Education

- ***Ensure that schools instruct students in digital responsibility in addition to how to use the Internet and new technologies. (Goal #5)***
    - Work with Baltimore City Public Schools, Enoch Pratt Free Library and MOIT to develop cyber-responsibility programs. Develop supporting materials, including digital training programs.

- ***Create Plan to Connect Baltimore City Public Schools to City Broadband (Goals #1, #4, #5)***
    - MOIT should work with Baltimore City Public Schools to develop a plan for serial deployment of fiber at city schools, to take advantage of the ongoing city-state effort to build new or refurbished schools – taking into account the schools' proximity to the existing fiber infrastructure. Financial model should be created to estimate capital costs for fiber connectivity and to estimate electronics required at school sites.
    - Take full advantage of Federal E-rate Funds – an up to 85 percent federal subsidy that could be provided to Baltimore City Public Schools for broadband network connections, servers and subsidized operating costs. The Federal Communications Commission's Universal Services Fund is being refocused to increase federal E-rate funding for broadband as part of a new program, while continuing to provide funding for capital and operating expenses for schools and libraries
    - Develop a technology blueprint for a gigabit-wired school to allow for current and future technology needs; identity funding to build required infrastructure. Work with Baltimore City Public Schools to determine plan for improving Internet access and offering higher-speed bandwidth to schools. Estimate costs, prioritize and develop schedule.

CONCLUSION

This report lays out a range of strategies and recommendations for making Baltimore a smarter, more technologically savvy city. The Task Force urges city leaders – private, public and nonprofit – to use these recommendations to guide investments and decision-making.

This is an ambitious plan. Fulfilling the goals identified here will require the work of many – including city agencies, the tech community and broader business sector, nonprofits, community leaders and residents. Our recommendations identify entities that should take the lead on implementation of specific strategies. However, it is clear that there must be a defined and coordinated initiative to implement this overall vision.

The Task Force highly recommends that the Mayor designate a "Coordinator" to lead a collaborative effort with community stakeholders to implement a broadband plan for Baltimore City using the strategies recommended in this report. The coordinator should be tasked to work closely with the city, community stakeholders, non-profits, for-profits and institutions to: 1) help define clear roles and responsibilities of stakeholders, including the city's role; 2) collaborate with the city to determine the best model for leveraging public assets to increase broadband access in Baltimore City; and 3) prioritize and coordinate public investment in broadband infrastructure projects.

The Task Force recommends that the Coordinator chair a committee of stakeholders who are assigned to the group on a rotating basis for fixed terms. The committee should provide governance on priorities and oversight of implementation of important recommendations.

The Task Force recommends that a city-wide "report card" be developed, with the input of all stakeholders, which is updated annually to quantify progress of strategies and provide a benchmark to measure Baltimore progress vs. other cities. The annual report card summary should be provided to the Mayor.

The Task Force also urges the development a timeline and plan for implementing the report's recommendations and for MOIT to work closely with partner agencies and outside groups to ensure the city continues to make progress.

The Task Force is confident that such progress can make Baltimore a place where all people, regardless of their income, location or age, will have the tools they need to harness technology to lead better lives; a cutting-edge city that attracts and cultivates a new wave of high-tech businesses; and a community where vocal residents find value in engaging with their civic and government institutions.

ABOUT THIS REPORT

This report was produced by the Smarter City Task Force, with support from the Baltimore City Department of Planning, Baltimore Development Corporation and the Mayor's Office of Information Technology. Editing and design by The Hatcher Group.

For more information, contact: smarterbaltimore@baltimorecity.gov or visit smarterbaltimore.org.

APPENDICES

Appendix 1: Summary of Smarter City Recommendations

Strategy	Execution Horizon	Estimates	Leading-Edge Digital Infrastructure	Business Growth	Public-Private Partnerships	Leverage Public Investments	Skilled Workforce	Leader in Innovation	Proposed Responsibility
Baltimore's Infrastructure									
Support Community Efforts to Expand Broadband Options	ST - Short	$$$	X		X				Community Stakeholders; Mayor's Office of Information Technology (MOIT); Dept of Law (Law); businesses and non-profit orgs
Create Comprehensive Map of Baltimore Fiber	MT - Medium	$$$	X						MOIT; businesses and institutions
Complete Analysis of How to Manage City-Owned Fiber, Conduit	ST - Short	$$	X				X		MOIT; Dept of Transportation (DOT); Dept of Public Works (DPW)
Determine Appropriate Conduit Rate Structures	MT - Medium	$$	X	X					MOIT; DOT
Consider Broadband Effects to City's Site Plan Review Process	MT - Medium	$	X		X				Dept of Planning (Planning); MOIT
Include Additional Spare Conduit for Major Public Works Projects	MT - Medium	$$	X		X			X	MOIT; DOT; DPW
Create City-led Broadband Committee to Review all City Projects	MT - Medium	$	X		X	X			MOIT; other relevant City Agencies
Technology-Driven Economic Development									
Develop Outreach Plans and Identify Development Sites near ICBN	ST - Short	$		X					Baltimore Development Corp (BDC); MOIT; Minority- and Women-Owned Business Development (MWBD)
Leverage Unique Economic Assets to Attract Companies in Growth Sectors	MT - Medium	$$$		X					BDC; MWBD
Provide Information and Resources via Small Business Resource Center	MT - Medium	$$$		X				X	BDC; MWBD
Bridging the Technology Divide									
Ensure All Public Facilities Connected to City Fiber	LT - Long	$$$$$	X		X	X			Dept of General Services (DGS); MOIT; Planning
Leverage Construction and Major Renovation Efforts	MT - Medium	$$$	X			X			Baltimore City Public Schools (BCPS); MOIT; DGS; Planning
Enhance and Develop Relationships with Existing and Future ISPs	MT - Medium	$$	X						MOIT; Law
Civic and Cultural Engagement, Efficient Government									
Benchmark City Services with Other Cities	MT - Medium	$$						X	MOIT; other City Agencies
Baltimore Should Join Next Century Cities	ST - Short	$	X		X			X	MOIT
Baltimore Should Join Global City Teams Challenge	MT - Medium	$				X		X	MOIT
Education									
Enhance School Curricula to Instruct in Digital Responsibility, Internet Use, etc.	MT - Medium	$					X		BCPS; MOIT
Create Plan to Connect Baltimore City Public Schools to City Broadband	LT - Long	$$$$$	X			X	X		MOIT; BCPS; Maryland Stadium Authority

Goals	Horizon	Estimates
1. Leading-Edge Digital Infrastructure	ST - Short	$
2. Business Growth	MT - Medium	$$
3. Public-Private Partnerships	LT - Long	$$$
4. Leverage Public Investments		$$$$
5. Skilled Workforce		$$$$$
6. Baltimore a Leader in Innovation		

Appendix 2: Broadband Infrastructure Work Group Supplemental Report

The Broadband Infrastructure Work Group identified several issues that the city must address as it works to expand its fiber network or to support offering of broadband services.

Federal Communications Commission Registration

Should the city decide to offer broadband services, the Department of Law advises that the city must register with the Federal Communications Commission as a telecommunications provider and obtain other registrations and clearances. Obtaining those approvals will be time-consuming and will likely require additional enhancements to MOIT infrastructure, operations and audit requirements. These will also lead to additional ongoing operational costs.

Partnership Authority

At present, MOIT does not have the authority to enter into partnership agreements with external entities, whether public or private. Such partnerships could be used to provide services on behalf of the city to other private entities or to citizens, to provide last-mile support to private entities or citizens or to support marketing, outreach and enrollment efforts for broadband. Without that authority for MOIT, the city (Mayor and City Council) must enter into agreements on MOIT's behalf. It would be more efficient if MOIT could be granted the authority to partner directly on such initiatives.

Revenue Authority

If the city does begin offering broadband services, the city (or MOIT) will need authority to collect revenue for such services.

Additional Price Burdens

To develop a marketing, sales and outreach strategy, MOIT must develop pricing for services. This would require MOIT to analyze the costs of development and implementation, the costs of ongoing operations and support, private and competitive service pricing and other factors.

Appendix 3: Economic Development Work Group Supplemental Report

The Economic Development Work Group identified resiliency as a key asset in the city's economic development efforts to support existing businesses, attract new businesses and nurture startups.

A resilient city is one that is recession-proof – economically diverse enough to withstand economic downturns. Resiliency means working to anticipate where the city may be in 10 to 15 years and preparing for that by providing adequate access to broadband to accommodate change and growth. Resiliency also means anticipating future workforce needs and starting now to train young people to fill them.

The Work Group recommends the following to make Baltimore more resilient:

- Align broadband goals with the economic development goals of the city. This means using broadband to accommodate the six key industry clusters identified in the Comprehensive Economic Development Strategy; it also means working constantly to diversify the city's economy.
- Baltimore should make itself more attractive to broadband providers by streamlining the city's permitting process for those providers.
- The city should identify development sites on or near the Inter-County Broadband Network (ICBN) to attract data centers or other data-reliant businesses.
- Augment CitiStat, if feasible, to include data about broadband access and the unmet broadband needs of businesses.
- Maintain the city's ongoing infrastructure upgrades to make it more resilient, which will inspire business confidence and burnish the city's image.
- Re-examine the city's rates to encourage investment in broadband throughout Baltimore.
- Develop an approach for the city to reach new and emerging companies to help meet their broadband needs.
- Examine zoning code changes to make sure they are keeping pace with the types of new companies and organizations that are moving into Baltimore.
- Set up a system – perhaps an "innovation scorecard" – to collect data that will give the city an accurate picture of what businesses, schools and institutions need to succeed. That could include tracking how long it takes to get a business permit or the number of students graduating from area colleges who stay in Baltimore. Such data will lead to better decision making.

Appendix 4: Residential and Commercial Internet Service Providers in Baltimore

Current internet service providers in Baltimore may be found at http://broadbandnow.com/Maryland/Baltimore.

Appendix 5: Magellan Report Summary of Recommendations

Working with the Mayor's Office of Information Technology, Magellan Advisors has released the Baltimore Broadband Strategies Report, examining feasible strategies for enhancing Baltimore City's broadband services. The report provides a roadmap for the city to meet its broadband needs; its recommendations work in tandem with the strategies outlined in this report.

Five of Magellan's key recommendations, and the benefits they can achieve, are summarized here.

1. Leverage the City's Fiber-Optic Network to Provide Greater Capacity and Potential Savings to Baltimore City Public Schools

The city should use its fiber-optic network to provide universal network connectivity to Baltimore City Public Schools (BCPS). The upgrade of the city's fiber-optic network will provide sufficient excess capacity to deliver speeds of 1 gigabit per second or faster to as many as 206 schools and administrative facilities throughout Baltimore.

Benefits
Adding fiber connections will help accommodate BCPS's current and future needs for additional bandwidth and support the schools' long-term expansion of classroom, teaching and administrative technologies. The report concludes that the city may be able to provide these services at a cost that is as much as 30 percent below current rates while providing more bandwidth to schools. The city will need funding to extend its current network to each school, which will require careful planning and budgeting.

2. Develop a Dark-Fiber Leasing Program to Leverage the City's New and Existing Investments in Fiber-Optic Infrastructure

The upgrade of the city's public safety fiber ring (known as the fiber overbuild) presents an opportunity to develop a dark-fiber leasing program that can expand the availability of broadband services in key corridors. The city will add 54 miles of 216-count ribbon fiber to supplement the existing network, with scheduled completion in October 2015. Excess dark fiber strands in this network provide an opportunity for the city to lease or "sell" capacity to broadband providers, generating revenue for the city.

Benefits
Providers could utilize this network to enhance their local broadband services for residents, businesses, and community anchors by:

- Providing additional direct fiber connectivity options for customers
- Creating networks for new fiber-based broadband deployments
- Increasing the capacity and redundancy of existing broadband deployments
- Providing lower costs to subscribers through a potential incentive program that establishes a discounted rate structure.

3. Leverage the Baltimore Department of Transportation's Conduit System as a Platform to Expand Broadband Availability

The Baltimore City Department of Transportation's extensive underground conduit system could be used to expand the city's broadband infrastructure. Based on an initial analysis, the report recommends that the city institute a

program to prove sections of the conduit that are suitable for broadband development – in areas prioritized for economic and community development. Eventually, the city can allocate conduit for city technology projects and in conjunction with broadband service providers.

Benefits
The significant cost of building underground broadband infrastructure makes the city's conduit system a resource that could incentivize broadband service providers to accelerate their deployments. The city's conduit systems can be leased to broadband service providers to serve more of Baltimore's communities, which could be particularly attractive for entities seeking to deliver fiber-based broadband technologies into residential and business areas.

4. Enable and Create Incentives for the Use of the City's Vertical Assets to Promote More Wireless Broadband Development

The city's "vertical assets" such as towers and rooftops are utilized primarily for public safety communications to support the city's wireless network. These structures may have additional capacity to support the future additional wireless infrastructure in Baltimore at rates that are more competitive than commercial tower leasing rates. These assets are generally connected to the city's fiber ring, which would enable wireless providers to gain access to high-speed fiber to support higher speed wireless data within the city.

Benefits
Leveraging Baltimore's vertical assets could accelerate wireless data and broadband deployments throughout the city. Due to high costs impede broadband deployment, wireless broadband options may provide a valuable interim option to offer enhanced broadband services to residents and businesses. Where feasible, the city's towers and rooftops can facilitate "last mile" wireless connections, allowing wireless broadband providers to reach more of the community.

5. Establish an Autonomous Baltimore Broadband Authority that Enables the City to Implement Broadband Initiatives under Appropriate Governance Structure

Broadband has become a critical 21st Century utility, akin to electricity and telephone service. Going forward, broadband planning, management and governance will play a role in a range of community activities and service-delivery platforms. Expanding and taking advantage of the city's broadband assets is critical to the future of the city's government and its economic well-being. Accomplishing that should be entrusted to a newly created Baltimore Broadband Authority. This new Authority will receive and manage broadband assets and implement programs to commercialize them, allowing the city to engage with other public organizations and broadband service providers. This structure will be dependent on a legal and regulatory analysis to determine the most appropriate organizational model. One model is a broadband "Enterprise Fund" that would enable the city to manage its broadband assets within an internal organization of the city, maintain separate accounting and records, and potentially establish a governing board composed of personnel from city departments.

Benefits
Consolidating Baltimore's broadband assets under a single entity would enable the city to better manage its infrastructure and associated programs, coordinating the work of many city departments. This recommendation does not envision a new municipal department but rather an Authority with staff from several departments who maintain responsibility for their respective areas of expertise regarding broadband assets.

Appendix 6: Glossary of Broadband Terms

Bandwidth: The bandwidth is the rate at which data can be transmitted, that is, the speed at which a user can upload and download things online.

Bitrate: The number of bits processed per second or minute; the higher the bitrate, the faster the transmission speed. Cable Broadband: This is a type of broadband using the same optic fiber technology as cable TV. It provides good service but is only available in areas that have cable service in the area.

Coaxial/coax cable: Coax cable is a type of cable that works as a transmission line for high-frequency signals and is used for both broadband and cable Internet connections.

Dialup: Users who access the Internet using telephone lines are relying on a dialup connection. This is sometimes explained as a pay-as-you-go type of online connection.

Downloading: Transferring data or information from the Internet to a computer means downloading it, as users are receiving data from a remote system.

Download Limits: A broadband package may have download limits that cap the amount of data a user can download from the Internet in a specific period of time, also known as a bandwidth cap.

DSL: A DSL is a Digital Subscriber Line and is the generic name for digital telephone lines, as opposed to copper lines, that carry data at high speeds.

Fiber Optic Broadband: This is a broadband internet connection using fiber optic cables to transfer data. It is typically faster than data transferred via a telephone modem or dialup connection.

Gb/Gigabyte: A gigabyte is a unit for measuring the amount of storage space digital information will take up. It is the equivalent of one thousand megabytes.

Gb/s/Gbps: This measures the number of gigabits transferred per second and relates to the speed of an Internet connection.

Hotspot: A hotspot is an area where a user can wirelessly connect to the Internet using a local area network. It may require a security password to connect to the internet in specific hotspots. (Also known as a "wireless hotspot.")

ISP: The companies that offer Internet access and packages are often referred to as ISPs, for Internet Service Providers.

IP Address: When it comes to broadband, an IP stands for an Internet Protocol, meaning the specific number ascribed to an Internet connection. It is similar to a phone or house number and can be seen by web pages when a user requests information from them.

IPTV: This system allows a user to watch digital TV through an IP Suite. It is like cable TV, but uses a broadband connection to deliver the programs instead of a cable.

ISDN: An Integrated Services Digital Network, or ISDN, combines voice, data and video into single cables to allow for high-speed communication.

MAC Address: A Media Access Control address is an identifier made up of letters and numbers and assigned to a network interface. It is also known as a hardware address as it makes it possible to identify a host or network.

Mb/Megabyte: A megabyte is a unit for measuring the amount of storage space digital information will take up. It is the equivalent of one million bytes and roughly equates to the same amount of information contained in a medium-sized novel.

Mb/s/Mbps: This measures the number of megabits transferred per second and relates to the speed of an Internet connection.

Mobile Broadband: When users access the Internet wirelessly from a phone or other portable device, they are using a mobile broadband connection. Most mobile phones have this technology built in.

Modem: A modem is a hardware device allowing computers to connect via telephone line. A dialup modem will allow a user to connect to the Internet, for example.

Router: An electronic device that forwards data between computer networks. A broadband connection will pass through a router so that it's channeled onto the Internet correctly.

Static IP Address: A static IP address is the same as an IP address, and it will always stay the same. This means that every time a user connects to the internet, they will use the same IP address.

Streaming: This refers to watching or listening to digital audio or video without storing it on a computer.

TCP-IP: This is another name for the Internet Protocol Suite, the different ways a computer is identified and communicates with the Internet and similar networks.

Upstream: When users upload information to the Internet they are upstreaming it. This is the opposite of downloading, or downstreaming, information from the Internet to a computer.

VoD: Standing for Video on Demand, these are systems allowing users to choose and watch or listen to video or audio files when they want to.

VoIP: Voice over Internet Protocol is a popular way for people to communicate online. Communicating over IP networks, people are able to talk online, similar to a traditional phone call, using a broadband connection.

Wide Area Network: A computer network connected over a wide geographical area, like across a city or a country.

Wireless Broadband: It is possible to use broadband connections wirelessly, provided there is a router or modem to support it and a computer or mobile device with the right technology. This allows a user to go online and work the same way as with a cabled connection, but without the need for an Ethernet connection.

Wireless Networking: When computers are networked they can communicate and share things with each other. It is possible to make use of broadband and telecommunications technology to network computers, for example a number of computers in one office, wirelessly.

Appendix 7: Summary of Public Comments

The public was invited to comment on a draft of the Smarter City Task Force report in June 2015. More than a dozen sets of comments were received, from individuals and organizations, including a summary of more than 1100 responses to a broadband issues survey that was organized by the Baltimore Broadband Coalition, a grassroots organization. This appendix summarizes the themes that were captured in the comments and includes representative excerpts. Excerpted comments from private and nonprofit institutions include the name of the commenting entity; all other excerpted comments were from individuals.

1. More broadband competition and better service are needed.

Several commenters raised concerns about Baltimore City's existing broadband access. The underlying theme of the comments addressed lack of competition: a limited number of broadband providers, offering expensive plans relative to capabilities (speed, data plans), with limited access points in public locations and low subscription adoption rates.

- There are strong and predominant perceptions among respondents that Baltimore lags behind many other cities in broadband options, affordability and speed, with less than 5 percent of survey respondents believing there is sufficient competition with comparable performance. Current broadband offerings in Baltimore fall short of the FCC's revised definition of broadband (25 and 3Mbps download and upload speeds, respectively).
- Many comments focused on the direct effects of lack of current competition and limited broadband deployment: impeding economic development, constraining job seekers, and limiting public access to Internet (at libraries, schools, parks, recreation centers and senior centers).
- Some comments addressed the effects of lack of current offerings on individual households in providing low-cost connectivity options (especially for those with low-incomes) and more universal access (via more Wi-Fi zones in public spaces, for example), increasing digital divide concerns.

2. Expanding and improving access to broadband will generate major benefits.

Some comments made the case for an aggressive effort to expand broadband access, especially focused on students and lower-income residents.

- "Baltimore should make low cost or no cost broadband a priority to leapfrog the many deficiencies of our infrastructure. Entertainment, games, job training, courses at every level and for every interest are on the internet. As businesses look to be more efficient with people working from home, good internet service provides opportunity at every level of employment."
- "Baltimore City Schools have a once in a generation chance to reshape the productive potential of the next twenty years of City students – through spending creatively, passionately and wisely the $1.1B of school construction funds. The design phase is under way for the initial schools and an element includes wiring these schools for the 21st Century. Getting this technology strategy right will enable teachers to profoundly rethink how our kids are taught, in what type of environments, how parents can get connected to the classroom, how these schools can reinvent their surrounding communities, and how school based broadband can add to our City's wired footprint."
- "In light of the tie between broadband adoption, workforce development, and employment, we believe it is imperative that the city have a laser-like focus on increasing broadband adoption among the populations most at risk for being 'non-adopters.' Engaging with private sector partners that have dedicated resources specific to broadband adoption and digital literacy must be a priority, if the city is to meet its goals of providing low-income Baltimoreans with the skills they need in a competitive workforce environment."
- Lack of broadband choices in Baltimore impedes economic development, modern education, and public access to the internet (in libraries, parks and recreation centers, senior centers, and schools, etc.).

3. Create a new entity to lead broadband expansion.

These comments urged Baltimore City to create a new entity to oversee the city's broadband expansion efforts.

- "An entity should be established to lead the city's effort. Although this could theoretically be led by city government itself, I believe it would be more appropriate for a non-profit organization recognized, supported and facilitated by the city to fill this function."
- "This Entity must be responsible to lead city effort to deploy fiber optic infrastructure and oversee fiber network operations."

4. Clarify Baltimore City government's role.

A number of commenters urged City leaders to clarify the City's role in broadband expansion and urged Baltimore City elected officials to stay engaged. Comments included:

- "What is most important is for city government to decide on the role it wishes to play. Will it lead the development of a municipal broadband utility or will it actively facilitate efforts to create an entity outside city government, such as a non-profit? There must be effective leadership, delineation of entity scope and adequate funding. The vision must include deployment of fiber to homes, businesses and institutions throughout Baltimore; otherwise, the plan will not be future proof. The fiber infrastructure must be open to promote effective competition among Internet service providers."
- "Much of the assets available to Baltimore City lie across a number of agencies and departments - while establishing a Broadband Authority will perhaps help coalesce these different entities, it will take leadership and a clear commitment to execute in order to fully realize our potential."
- "The elected officials that represent and speak for the people need to get involved as far as creating a non-profit or city organization to lead the charge. Such a large infrastructure and restructuring of the city's broadband system needs clear and decisive leadership to keep the focus on the task at hand."
- "An asset unique to Baltimore City which other jurisdictions don't have is we own our conduit, an immensely valuable and marketable asset. Revenues from privatizing the conduit system could be used for a number of broadband related initiatives, from providing free Wi-Fi in public areas, to capitalizing the maintenance and upgrade of systems, to financing technology training in our communities, to funding technology enabled improvements to city services, to wiring and equipping co-working facilities across our City."