PUBLIC LIBRARIES AND THE INTERNET

Roles, Perspectives, and Implications

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LIBRARIES UNLIMITED

Assessing Florida Public Library Broadband for E-government and Emergency/Disaster Management Services

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INTRODUCTION

The extent to which public libraries can adequately provide Internet-based services and resources to their users depends, in part, on the quality and speed of their connection to the Internet. These speeds, if fast enough, are termed as "broadband" and are measured in kilobytes per second (thousands of bytes received from or uploaded to the network per second or kbps), megabytes per second (millions of bytes received from or uploaded to the network or Mbps), or gigabytes per second (billions of bytes received from or uploaded to the network or Gbps). This chapter defines "broadband" in accordance with the Broadband Technology Opportunities Program (BTOP) Notice of Funding Availability definition of at least 768 kbps downstream and 200 kbps upstream (Broadband Initiatives Program, 2009). This definition is applied *at the workstation*, not at the front door, meaning that broadband Internet requires a minimum download speed of 768 kbps *and* a minimum upload speed of 200 kbps *at the workstation*.

There has been considerable discussion in recent years regarding the need for public libraries to better leverage their knowledge and skills in the provision of e-government and emergency/disaster management services and resources

(Bertot, Jaeger, & McClure, 2008; Gibson, Bertot, & McClure, 2009; McClure, McGilvray, Barton, & Bertot, 2007). E-government (electronic government) is the use of information and communications technologies to provide government services and enable a more interactive relationship between the government and its citizens. Emergency/disaster management services include public community information hubs, disaster recovery centers, and evacuee resources, among others.

There also has been considerable discussion about the need for increased/improved public library broadband connectivity to support e-government and emergency/disaster management services and resources (Bertot, 2009b; Mandel, Bishop, McClure, Bertot, & Jaeger, 2010; McClure & Jaeger, 2009). It is also important to recognize that underserved and unserved populations may be located in urban areas (Free Press, 2009). The State Library and Archives of Florida (State Library) initiated a statewide effort in 2009 to exploit improved broadband availability and to better leverage the delivery of e-government and emergency/disaster management services and resources among Florida public libraries where increased/improved delivery of these broadband-based services and resources would benefit public libraries and Florida residents.

This chapter provides an overview of the *Needs Assessment of Florida Public Library E-Government and Emergency/Disaster Management Broadband-Enabled Services* project conducted by the Information Use Management and Policy Institute (Information Institute) of Florida State University for the State Library and Archives of Florida. The needs assessment was funded by a grant from the State Library with the goals of (1) assessing the broadband capacity and need of Florida public libraries; (2) assessing the different e-government and emergency/disaster service roles Florida public libraries provide to the local communities they serve; and (3) describing some of these roles and the public library broadband capacity needed to support these roles. The project began April 28, 2009 and ended June 15, 2009. Although this project was limited to Florida public libraries, this chapter is intended to provide an overview of the needs assessment process and findings as a guide for other states and library systems to plan and conduct similar broadband needs assessments and services.

Overall, the study finds that the existing broadband connectivity speeds to most public libraries are extremely slow and largely inadequate to support effective e-government and emergency/disaster management services—to say nothing of supporting a range of other networked and electronic services. While the connection speeds to the library "front door" are largely inadequate, the *actual* connection speeds at public library outlets' (i.e., branch libraries) public access workstations are oftentimes only moderately better than dial-up connections. The report concludes that a major upgrade of public library broadband access and computing equipment is essential if public libraries are to serve effectively in e-government and emergency/disaster management service roles.

CONTEXT OF PUBLIC LIBRARY INTERNET ACCESS AND SERVICE PROVISION

Americans need broadband Internet access in order to participate successfully in the Information Society. However, millions of Americans do not have access to broadband Internet at home and rely on public libraries for free access

to computers and the Internet. To ensure that all Americans have the opportunity to participate fully in the interactive Web 2.0 environment, public library Internet access must be to the fastest possible Internet connections. In addition to this free access to the Internet and computing, public libraries serve in several Internet-enabled service roles, for example providing e-government and emergency/disaster management services. These services are affected by the libraries' connection speeds, with libraries able to provide more services as their Internet connection speeds increase. This section describes the current context in which public libraries access and use the Internet and a number of issues that affect the degree to which public libraries can successfully provide a range of broadband-based services to their users.

Importance of Free Public Internet and Computer Access

Americans who do not have home access to broadband Internet often rely on their local public library (among other public spaces) to provide free access to public high-speed Internet and computing (Communication Workers of America, American Library Association, & Speed Matters, n.d.). This is a large segment of the U.S. population—the Pew Internet and American Life Project identified 45% of American adults that lacked home broadband access in 2008 (Horrigan, 2008). Lack of home broadband access is more prevalent in rural communities (62% of rural Americans lack home broadband access) than suburban (40%) and urban (43%) communities. Microsoft has noted that the smaller populations and limited funding availability in rural and remote communities inhibit their ability to support public Internet access spots such as coffee shops, increasing their reliance on the public library for free public Internet access (Boyd & Berejka, 2009).

To best serve the Internet access needs of these communities, the public library's free public Internet and computer access needs to be provided on the largest possible bandwidth and in the fastest possible speed. Higher bandwidth and connection speeds facilitate faster and better access to the global Information Society, including e-government and emergency/disaster management services. Also, when public libraries gain access to higher connectivity speeds and greater bandwidth, that access has been brought into the community where last-mile connections can expand this high-speed Internet into private homes and businesses (Charytan, Zachary, DeVries, Sherwood, Zinman, Phillips, et al., 2009; Gupta, Berejka, Griffin, & Boyd, 2009; Hudson, 2007; Oblinger, Van Houweling, & Semer, 2009; Sheketoff, 2009). In this situation, libraries may serve as distributing hubs for improved Internet access in their communities.

Importance of Public Library Internet-Enabled Service Roles

Beyond Internet access, millions of Americans rely on public libraries for economic, educational, and social opportunities that they would not have otherwise (Golston, 2009; Kranich, 2006). Information technology and information resource training is a major component of the Internet-enabled service roles

public libraries provide. Other public library Internet-enabled service roles include: providing access to and assistance with e-government services, facilitating disaster management, especially in responding to community emergencies, and promoting civic engagement through e-government services (American Library Association, 2008; Bertot, Simmons, Brogardt, McGilvray, & Clark, 2009; Goldman, 2009; Sheketoff, 2009).

Providing e-government and disaster planning and response services to American communities is one of the ways that public libraries affect the communities they serve. For people without home broadband access, public libraries may be the only way to access e-government services (Bertot, Jaeger, Langa, & McClure, 2006; Goldman, 2009). Also, public libraries provide Internet access and assistance locating friends and family, or help with Federal Emergency Management Agency and insurance forms, in the wake of disasters (Benton, Rintels, & Hudson, 2009; Bertot et al., 2006; Jaeger, Langa, McClure, & Bertot, 2007; Kranich, 2006; McClure, Ryan, Mandel, Brobst, Hinnant, Andrade, et al., 2009). Public libraries' ability to provide these Internet-enabled services rests on their Internet bandwidth and connection speeds, because Internet connections that are too slow or too limited in bandwidth hamper the libraries' ability to provide Internet-enabled services (Communication Workers of America et al., n.d.; Goldman, 2009). Increasing public library Internet connectivity speeds and bandwidth can enhance the provision of e-government, emergency/disaster management, and other Internet-enabled services.

Complexity of Factors Affecting Workstation Speeds

There are a host of factors influencing the actual speed at public (or staff) Internet workstations (Bertot, 2009a; Bertot & McClure, 2007; Charytan et al., 2009; Mandel et al., 2010; Zachem, Don, McManus, & Waz, 2009). First, there are factors related to the type and number of connection(s) and *actual* (versus advertised) bandwidth the Internet Service Provider (ISP) provides to the library (Whitt & Lampert, 2009). Further, some libraries get their connection through local government offices such as the city or county and have little direct control over the nature (i.e., bandwidth and speed) of the connection they receive or the switches and other telecommunications equipment that the city or county uses to bring the bandwidth to the library.

In addition, the configuration of the library's network, the effectiveness of library network switches and routers, cabling, workstation age, and other factors affect workstation speeds. Switching technologies, latency effects, local settings and parameters, and the connectivity path from the door to a workstation also affect speed (Bertot, 2009a; Bertot & McClure, 2007; Charytan et al., 2009). Other factors stem from the simultaneous use of multiple Internet services, age and number of workstations, and users on a shared connection (Zachem et al., 2009). For example, if the library has wireless Internet routers on the same connection as the wired Internet, connection speeds will be slowed on all workstations. In addition, if the library's Integrated Library System (ILS) runs off the same network as the Internet workstations, the type and content/applications of the ILS will affect workstation speeds. Other factors that affect workstation speeds are the number of workstations connected on the overall

library network and the number of individual library networks that feed off the bandwidth coming in the front door. This is because the more users who are simultaneously running applications such as interactive videos and some gaming programs, the slower each connection is.

This discussion only begins to describe some of the factors that affect actual workstation speeds. A key issue, however, is to recognize that the bandwidth coming in the front door of the public library is *not* the bandwidth available at the workstation. Libraries need to understand how to measure the actual speed available at the workstation, as well as techniques to improve network efficiencies and other factors that can improve at-the-workstation connection speeds. For a library public access workstation to be connected to broadband Internet, that workstation must sustain a minimum download speed of 768 kbps and a minimum upload speed of 200 kbps, regardless of time of day, number of other workstations accessing the library's network, or any other factors impacting speed.

Context of Public Library Internet Access and Service Provision

With a growing number of applications requiring greater quantities of bandwidth, simply providing free public Internet access is not enough (National Telecommunications and Information Administration, 2004). Libraries now need to consider the speeds of their Internet connections as these impact the adequacy of the connectivity to meet library user and staff needs (Bertot & McClure, 2007). Libraries do not serve one user on an Internet connection at a time, limiting their ability to provide access to the maximum possible speeds that are achieved when there are few users on the same Internet connection.

This problem is more pronounced in rural public libraries that are more likely than urban and suburban public libraries to offer slower connection speeds, fewer public access workstations, and less wireless access (American Library Association, 2009). However, this does not mean that connection speeds and Internet access are sufficient in urban and suburban public libraries. Urban and suburban public libraries serve larger volumes of patrons and host more wireless access and advanced Internet-based services such as digital reference, licensed databases, audio content, and digitized collections, often on the same Internet connection, all of which slow the connection speeds available at the workstation.

To maintain and expand public Internet access, U.S. public libraries and K–12 schools may apply for E-rate discounts under the Universal Service Fund, Schools and Libraries Program, established by the Telecommunications Act of 1996 (110 Stat. 56 § 706). These discounts may be applied to selected telecommunications, Internet access, and internal connectivity. This funding is critical for public libraries' ability to sustain the provision of free public Internet access to U.S. communities.

In addition to E-rate funds, through the American Recovery and Reinvestment Act of 2009 (ARRA), the Federal government made funds available to upgrade public computer center capacity, which includes funding for broadband

build-out and public computer center upgrades through the Broadband Technology Opportunities Program (BTOP), administered by the National Telecommunications and Information Administration (NTIA), and the Broadband Initiatives Program (BIP), administered by the Rural Utilities Service (RUS) (Broadband Initiative Program, 2009). The RUS-administered BIP program was specifically for broadband build-out in rural areas, but libraries might have had difficulty determining their rural status especially considering the lack of clear definitions of "rural" in ARRA and the subsequent Notice of Funding Availability (American Recovery and Reinvestment Act, 2009; Broadband Initiative Program, 2009). A more direct and targeted funding opportunity for libraries was the NTIA-administered BTOP program, which emphasized the importance of community anchor institutions in deploying and sustaining the adoption of broadband Internet. The BTOP included set-aside funds for broadband build-out, public computer center capacity expansion (including public libraries), and sustainable broadband adoption education and training programs (for more information, see http://www.broadbandusa.gov/).

Summary of Current Context

Millions of Americans rely on public libraries and other public institutions to provide high-speed Internet access to engage the global Information Society. These Americans may lack access to home broadband Internet because they live in remote, rural, or unserved locations, or because they cannot afford the higher costs of broadband connections. For these underserved and unserved Americans, public library free public Internet access is crucial. However, this access must be at the highest possible speeds and largest possible bandwidth to overcome inefficient network configurations, other factors impacting workstation speeds, and situational factors affecting each library's ability to provide different levels of broadband-enabled services. Enhanced Internet access will enable public libraries to better provide free public Internet access and associated Internet-enabled service roles, including e-government and emergency/disaster management services.

METHODOLOGICAL APPROACH TO THE NEEDS ASSESSMENT

The needs assessment described in this chapter focused on one particular state, Florida. However, the methodology employed in this study can be applied to assessing the needs of public libraries in smaller settings (e.g., counties) or other states. The methodology is described here to provide an explanation of one approach to conduct a public library broadband needs assessment.

Project Goals

The overall goals of this project were to assess the broadband capacity and need of Florida public libraries in relation to the provision of e-government

and emergency/disaster service roles. Specific project goals included the following:

* Describe a number of e-government and emergency/disaster management service roles that the public library could provide its local community;
* Estimate the resource requirements necessary for public libraries to perform the e-government and emergency/disaster management service roles;
* Estimate the level of interest that different types of Florida public libraries would have in offering these various e-government and emergency/disaster management services;
* Identify and analyze Florida public libraries' Internet connectivity speeds and costs;
* Improve public library broadband connectivity and e-government and emergency/disaster management services.

Ultimately, this needs assessment was designed as a first step toward improving Florida residents' access to and use of broadband-based e-government and emergency/disaster management services, as well as assisting public libraries in obtaining better broadband connections, and better supporting these activities at the local and state levels.

Project Methodology

Research team members employed a multi-method data collection approach to conduct the needs assessment. Data-collection approaches used in this study included:

* *Literature review*: Review of the literature regarding public library technology and broadband use and deployment;
* *Interviews*: Interviews with selected public librarians, emergency management officials, and others knowledgeable about the topic to understand existing broadband connections and configurations in Florida public libraries, define levels of e-government and emergency/disaster management service roles, test and validate the service roles, estimate capacity and willingness to serve in these service roles, and obtain feedback related to the usefulness of developed maps that indicate public library Internet connectivity;
* *Public library case studies*: Selected public libraries described and collected data on current broadband connections and infrastructure, workstation connectivity speeds, and network configurations;
* *Public library site visits*: Onsite review and tests of workstation connectivity speeds and network configurations at selected public libraries;
* *Geographic Information System (GIS) analysis of public library telecommunications*: Use of GIS software to manage, analyze and map Florida

public library broadband data from the Bill & Melinda Gates Foundation Florida public library technology dataset (2009) made available from the State Library;

- *Public library national survey data analysis*: Analysis of the *Public Library Funding and Technology Access Survey* (Bertot, McClure, Wright, Jensen, & Thomas, 2009) related to technology and broadband use and deployment in Florida public libraries;

- *Connectivity costing models*: Investigation of several possible models by which to cost out library equipment and bandwidth upgrades as part of a statewide BTOP program, based on a public library's situational technology needs.

These methods were selected for their applicability to an exploratory, statewide public library technology needs assessment.

Data Quality

Libraries that conducted speed tests for the case studies and site visits utilized a free Internet-based connection speed measurement tool, available at http://www.speakeasy.net. The tool sends a signal from one of Speakeasy's servers (located around the United States) to the workstation and measures both download and upload speeds. A number of factors *outside* the library can influence speed tests, such as the connection between the workstation and Speakeasy, any sluggishness due to Speakeasy's servers, and the selection of the server from which to calculate the speed. These factors limit the reliability of the Speakeasy connection speed tests; however, these are the best tools available for libraries to test connection speeds easily and inexpensively. The speeds reported here are estimates, but they provide more detail than relying solely on ISP-advertised front door connection speeds.

The study team employed a combination of purposive and cluster sampling for the study's iterative multi-method data collection efforts. The study was exploratory and purposeful, thus limiting the generalization of the data. The data collection approaches, however, provided detailed and overlapping findings regarding broadband capacity issues associated with providing e-government and emergency/disaster management services and resources in public libraries. By using an iterative and multi-method approach, the study team identified and triangulated perspectives on broadband needs for the delivery of e-government and emergency/disaster management services and resources in public libraries from both the public library and user populations, thus ensuring reliable and valid data.

FINDINGS FROM THE NEEDS ASSESSMENT

The needs assessment used a number of data collection techniques that resulted in multiple findings. The findings presented a preliminary picture of Florida public library broadband connectivity in the summer of 2009 and the

extent to which Florida public libraries had adequate broadband Internet access to provide e-government, emergency/disaster management services, and a range of other electronic and networked services. Additionally, the findings included the estimated cost to upgrade Florida public libraries' Internet connections and technology equipment through a statewide BTOP program to better provide these Internet-enabled services to Florida residents; the State Library's BTOP application subsequently went unfunded.

Overall, the findings indicated there were areas throughout the state that experienced low connectivity speeds and high connection costs. There were also a broad range of local situational factors affecting Internet speeds and connection costs for individual public library outlets. These connectivity issues hindered many librarians and libraries from adequately serving their communities, which turn to the libraries for emergency/disaster management and e-government services (see Chapter 5 on emergency and hurricane service roles elsewhere in this book), as well as free and publicly available broadband Internet access to participate in today's Information Society. However, slow Internet connectivity speeds, high Internet connection costs, and situational factors greatly impact libraries' ability to adequately support e-government and emergency/disaster management services.

This section provides an overview of the findings from the needs assessment. This is a foundation for the following section, which will provide recommendations for other libraries seeking to conduct technology needs assessments or understand public library broadband-enabled services.

Pockets of Low Connectivity and High Connection Costs

The findings from the needs assessment showed wide variation among connectivity speeds and costs across the state of Florida, and from region to region. Although public library outlets in regions with higher populations such as Southeastern Florida and the Tampa Bay area tended to have higher connectivity speeds (see Figure 7.1), there were library outlets with slower connectivity speeds in these areas as well as elsewhere in the state. When viewed aggregated by county, the public library data also showed variation in connectivity speeds (see Figure 7.2) and costs (see Figure 7.3) across the state, although rural counties (e.g., Dixie and Gilchrist) tended to show slower connectivity speeds and higher average costs.

Connection speeds impact the level of services libraries can offer the public, and in fact, over 75% of Florida public libraries reported that existing connection speeds were insufficient to meet patron and staff demand. Also, most of the librarians who participated in case studies were "shocked" at the drop-off in the connection speeds from the front door to individual workstations at the branches. Only Sarasota County public libraries averaged connectivity speeds over 50 Mbps (75.94 Mbps), the highest for the state (see Figure 7.2). The next highest average speeds were public libraries in Indian River (50 Mbps), Charlotte (45 Mbps), and Leon (33 Mbps) counties. Without these speeds, public libraries may be able to provide only minimal e-government and emergency/disaster management services such as filling out online forms, but they will not be able to support advanced applications such as large volume file transfer, digital video
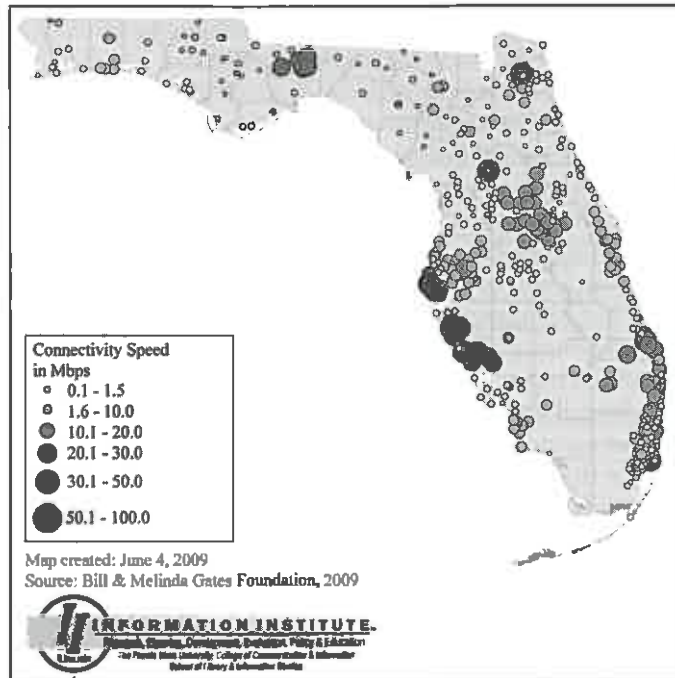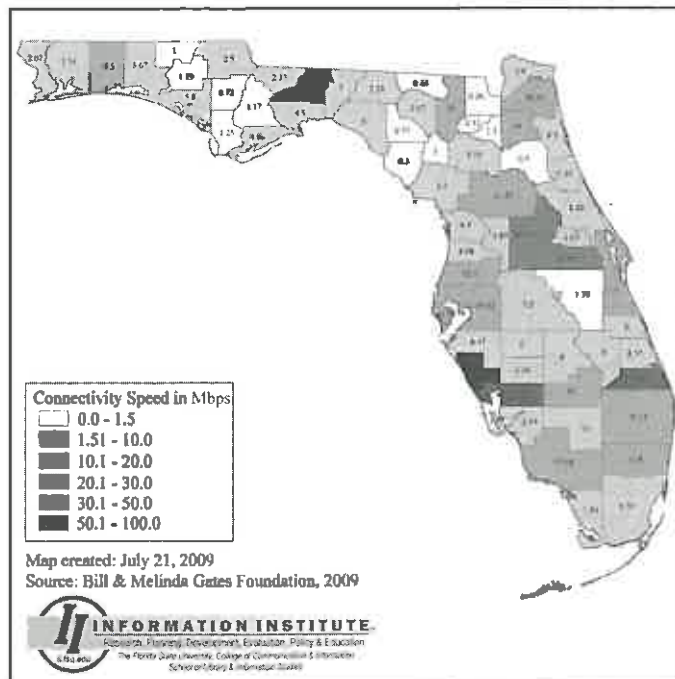
Figure 7.1 Public Libraries' Connectivity Speed: Florida 2009.

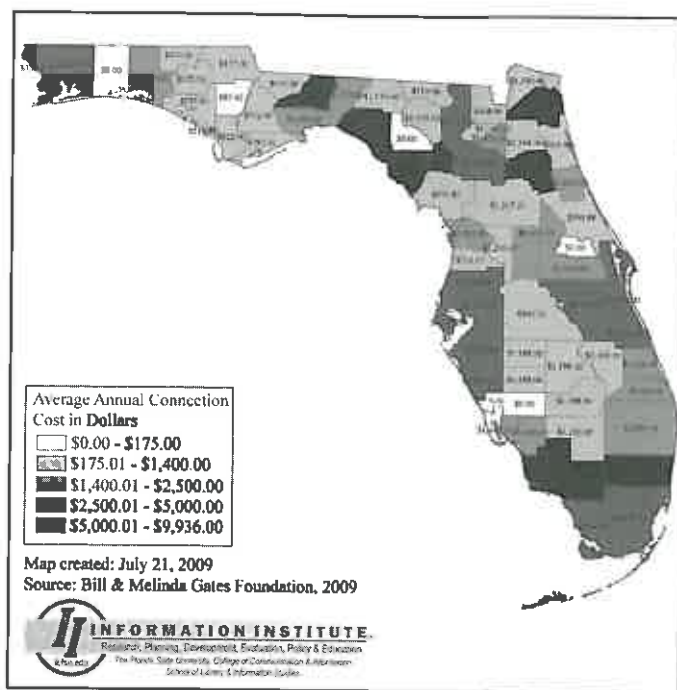**Figure 7.2 Average Connectivity Speed for All Public Library Outlets by County: Florida 2009.**

Figure 7.3 Average Annual Connection Cost for All Public Library Outlets by County: Florida 2009.

streaming, downloading, sharing, remote education, and building control and maintenance (Goldman, 2009).

Like connectivity speeds, average annual Internet connection costs for public libraries varied widely across Florida. Certain counties on average paid significantly higher rates for connectivity than others (see Figure 7.3). Rural counties tended to have higher prices, such as Dixie County, where public libraries paid an average of $7,129.00 annually. However, urban areas also showed variation among Internet connection costs. For example, libraries in Southeast Florida (Figure 7.4) fell into every range of costs used on the map, from the $0.00 to $750.00 range (i.e., the lowest) to the $5,000.01 to $9,936.00 range (i.e., the highest). In some cases, the higher costs were related to higher connectivity speeds, but this was not always the case. This preliminary data indicates further investigation might be required to detail *why* a wide disparity of Internet connection costs occurred around the state, but the data does clearly point toward a considerable assortment of costs incurred by public library outlets.

Situational Factors Affecting Broadband Internet Connectivity

The case studies and site visits indicated that myriad situational factors affect the Internet connection costs at each individual public library outlet. These factors include the number of simultaneous users on a shared network; the effectiveness of network switches, routers, and cabling; switching technologies,
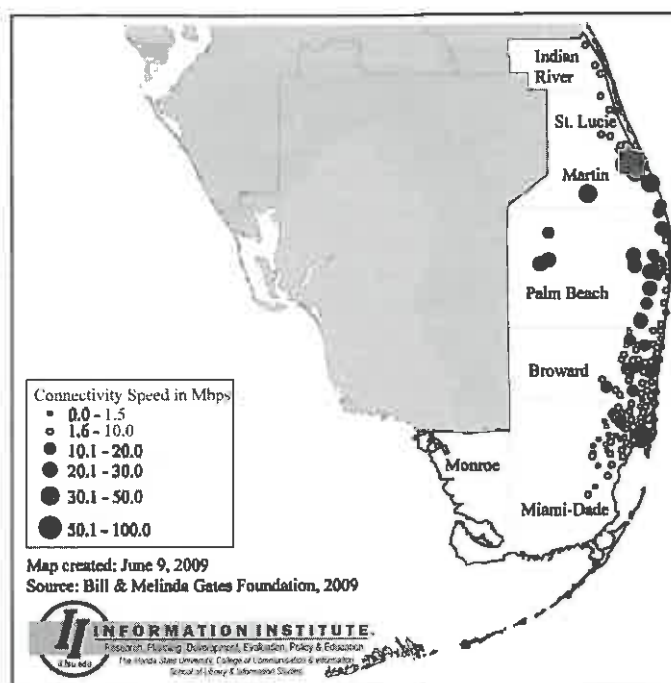
Figure 7.4 Public Libraries' Connectivity Speeds: Southeast Florida, 2009.

latency effects, local settings and parameters; and the ultimate connectivity path from the door to a workstation. The possible telecommunications network configurations are endless and can significantly affect workstation speeds, depending on the configuration and efficiency of transmissions through those networks.

Many of the libraries that participated in the case studies initially suspected that their existing broadband connections were inadequate for the various applications and demands being placed on them. A number of the libraries provided examples and anecdotes that depicted the limited bandwidth and minimal connection speeds they had. For example, libraries reported users complaining frequently that response time at the workstation was "very slow" and asking staff what was "wrong" with the workstations, as well as internal network monitoring software showing that network load (i.e., the level of traffic exerted on the network at one time) was above 95% and sometimes above 100% between 11:00 a.m. and 6:00 p.m. One librarian reported that "The DSL that our ISP provides is very unpredictable. The service is very erratic. When you have more than four patrons on the computers the bandwidth drops. Patrons get very upset when they get disconnected and lose their work." These are but a sampling of the comments and examples obtained from the case studies. Each library had extensive examples and user anecdotes depicting the inadequacy of existing broadband service to the library.

The costs that an individual public library pays for its broadband are largely dependent on which ISP is providing service to that library and the success with which that library has negotiated its service contract with the ISP. The case studies showed that while the general cost categories were similar across the various

libraries, the actual amounts of the costs varied considerably from library to library. For example, the cost of a T3 (44.7 Mbps) connection to the front door at one library versus another can be quite different, network configurations may differ in size and complexity, and costs associated with technical staff can vary considerably. In addition, some library costs are embedded in costs that are charged against other organizations or in some instances provided "free" to the library. Finally, there is a need for public librarians to better understand the range of contract options for broadband services available from various ISPs.

Both the case studies and follow-up interviews asked about the libraries' network configurations. Although it is difficult to generalize findings regarding these configurations because of a range of situational factors that affect each library's network, several observations can be made. Public libraries that are dependent on a broadband connection coming through the county, municipality, a school, or other means have limited to no control over the network configuration and other management factors. Many public librarians have limited understanding of what broadband is exactly, how broadband speeds and network configurations affect applications at the workstation, why a high-speed broadband connection is necessary, what broadband speed is needed, and what can be done with connections of different speeds and bandwidths. Additionally, descriptions of network configurations from the case studies and interviews varied considerably due to local situational factors indicating that the most critical needs for upgrading a library's broadband may vary considerably from library to library. These are some of the primary observations that resulted from discussions regarding Florida public libraries' network configurations.

No matter which of these situational factors affect an individual outlet, the associated cost-related factors are large inhibitors to libraries' ability to provide public access Internet connections. However, faster Internet alone is not a sufficient solution for public libraries. As the case studies show, libraries also require funding for infrastructure upgrades, additional/newer workstations, staff, and staff training. Funding efforts such as BTOP that are geared toward increasing public library Internet access and connectivity must take into consideration these associated needs.

An important finding of this study is that libraries need to recognize that the broadband speed at the front door is not the actual speed available at the workstation. Broadband access, deployment, use, and services provided are significantly reduced by the time the connection leaves the front door of the library and before it is available at the workstation. The basic pressure points that affect the broadband speed at the workstation include the following:

- *Broadband speed at the front door:* Although an ISP may contract with the library to provide a 20 Mbps connection, for example, the actual speed coming to the library can be considerably less, so libraries need to utilize network "sniffers" that examine and monitor network traffic and other tools that can determine what speed actually is available as it comes into the library.

- *Library network and telecommunications configuration:* The manner in which the library's network is configured, deployed, moves through switches, servers, and routers, and is managed, can result in significant loss of bandwidth at the workstation.

- *Number of workstations, wireless routers, and other peripherals*: The more workstations, wireless routers, and other peripherals that are connected to the network and in use at the same time, the more this negatively impacts the speed available at a given workstation.

- *Age of workstations, wireless routers, and other peripherals*: Generally speaking, newer workstations and other peripherals require less bandwidth to run various applications, and they better use and manage the bandwidth available.

- *Type of applications in use*: Internet-accessed applications range from those requiring relatively little bandwidth use (e.g., text-only email) to bandwidth hogs (e.g., interactive high resolution videos) and the more bandwidth hogging applications that are operating on the network at any one time, the less broadband speed there will be at any given workstation.

These factors taken together affect the *load* (i.e., traffic) on the network and ultimately determine the *drop-off rate* (i.e., the decrease in connection speed between the front door and the workstation) and the broadband speed at the workstation. The experts in network management interviewed for this study said that libraries should make a goal of having a minimum of a consistent T1 connection (i.e., 1.5 Mbps) *at the workstation*.

Impacts on E-government and Emergency/Disaster Management Service Roles

The study team originally identified two levels of e-government and emergency/ disaster management services, basic and advanced, with two possible models for advanced-level services—partnership and Web services. During a 2010 research project conducted for the Pasco County Public Library Cooperative, these service roles were tested as to their validity and efficacy. From the findings of that study (McClure, Bishop, Mandel, & Snead, 2010), the study team reconfigured the service roles from a 4-cell matrix to a pyramid structure (Figure 7.5). The pyramid includes four levels of public library e-government services: basic, library driven, agency driven, and collaborative.

The e-government and emergency/disaster management service levels offer challenging goals for Florida public libraries. Indeed, the vast majority of Florida public libraries are likely not to be qualified even for basic level services, given the limited broadband, internal network infrastructure, and staff to assist in e-government and emergency/disaster management services. Thus, significant efforts will need to be taken to provide the necessary broadband, internal network, workstations, other production/telecommunications equipment, and technical staff for libraries to provide the more advanced (i.e., higher up the pyramid) levels of e-government and emergency/disaster management services.

Achieving the basic level of public library broadband-enabled services in Florida will extend a basic level of e-government and emergency/disaster management services uniformly throughout the state. This service level is
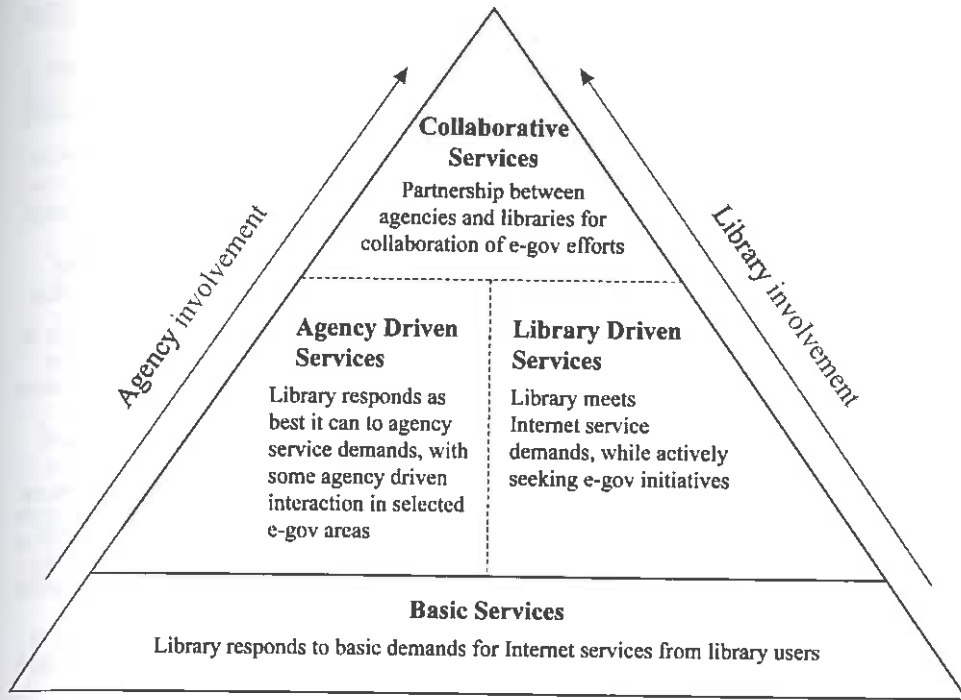
Figure 7.5 Public Library E-government Service Roles Pyramid.

important because it seeks to meet citizen demand for last resort Internet service in each Florida community in terms of broadband connection speeds, availability of workstations, and provision of adequate time to identify appropriate e-government resources and services, understand their use, and make applications to obtain government benefits. However, without stimulus or other funding to increase broadband access, public libraries across the country are struggling to provide even the basic level of these services.

The advanced levels, whether library driven, agency driven, or collaborative, expand Internet-enabled e-government and emergency/disaster management services in at least three directions: for residents and visitors, government agencies, and use of broadband technologies. Advanced level services focus on bringing public libraries beyond the basic level of broadband capacity which can support improved broadband at the community level. Provision of an advanced level of public library broadband-enabled e-government and emergency/disaster management services could enable other institutions, such as schools, hospitals, and local community businesses also to increase broadband capacity and add local broadband-enabled content to the Internet. This level can be approached via three models: library driven services, characterized by the library taking a more proactive approach to the provision of e-government services than just meeting on demand user needs; agency driven services, characterized by public libraries acting in a reactive stance to the demands of government agencies; and collaborative services, characterized by an active partnership between government agencies and public libraries.

TABLE 7.1   Critical Success Factors for Public Library Broadband-Enabled E-government and Emergency/Disaster Management Services

Critical Success Factor	Description	Importance
Connection to the door	Bandwidth provided to the libraries' doorstep	Determines upper limit of number of workstations and users who can be supported at one time, as well as type of broadband-enabled applications available
Internal infrastructure	Routers, switches, wiring, load management, etc.	Bandwidth available at the doorstep may be lost by poor equipment and wiring, poorly designed or installed networks, and other internal infrastructure
Telecommunications staff	Assess bandwidth need, design network architecture, bid and negotiate telecommunications pricing, install and maintain equipment, and optimize bandwidth	Telecommunications experts can mitigate problems of overpaying for broadband connections or losing capacity by planning and maintaining internal telecommunications infrastructure
Workstations and peripherals	Workstations (including laptops and netbooks), broadband-enabled technologies, and peripheral equipment (e.g., printers, scanners) available for public use	Workstations are the most visible portion of a public library's broadband capacity
Computer staff	Develop a technology plan, purchase, install, and maintain information technology	Needed to negotiate, purchase, and maintain equipment according to a well-designed plan
Public service broadband assistance	Plan and deliver broadband-enabled services, including training and aid offered by the library	Public libraries can maximize broadband services if they have staff who are comfortable with the technology and familiar with how to aid the public
Availability of broadband-enabled e-government and disaster management aids	Internet services available to assist the public in e-government and disaster management	The public needs broadband-enabled aids to identify needed e-government and disaster management services, and to understand what they do and how to use them

TABLE 7.1   (Continued)

Critical Success Factor	Description	Importance
Technology capacity to produce broadband-enabled aids locally	Enabling local production of broadband-enabled content for Web distribution (e.g., Webcams and video editing software)	Broadband Internet is necessary to produce materials facilitating the use of e-government and disaster management resources, and to serve as the local center to help local businesses, agencies and the public learn how to be broadband-enabled content producers
Application staff to produce broadband-enabled aids locally	Produce broadband-enabled content	Knowledgeable personnel are necessary to create localized broadband-enabled content
Agency responsibility	Responsibility for government agency programs, benefits and services	The public library is asked to explain programs, services and benefits to residents via Web-based or other publications, but not provided with knowledgeable local or other staff to do so
Public library liability	If public library personnel, making their best effort, provide incomplete or false information, or assist a resident making an application that is later rejected	Librarians need clarification of federal, state and local liability laws as they relate to public libraries

There are numerous factors that are critical to successful deployment of the various levels of public library broadband-enabled e-government and emergency/disaster management services. Table 7.1 describes selected critical success factors and why each is important to public library broadband-enabled e-government and emergency/disaster management service deployment. For example, the lack of high speed broadband at the workstation for some libraries significantly decreases their ability to provide e-government and emergency/disaster management services. Increased bandwidth and faster connections will improve public libraries' ability to provide information technology training; educational, job-seeking, and e-government resources and services; and wireless and wired free public Internet access. A public library's ability to address some or all of these critical success factors will determine the potential level of broadband-enabled services that library can provide to the community it serves.

Cost Logic Models

The study team investigated several models for estimating costs to upgrade Florida public libraries' broadband connectivity, and therefore their ability to provide e-government and emergency/disaster management services, utilizing Broadband Technology Opportunities Program (BTOP) funding under the Public Computer Center (PCC) funding category; however, the State Library's BTOP application was not funded. The original intent was to develop a cost logic model that considered purchasing additional bandwidth through a statewide ISP contract, with libraries differentiated by population size and demographics. However, based on the National Telecommunications and Information Administration (NTIA) Notice of Funding Availability, which would not cover costs for broadband upgrades in the PCC program (Broadband Initiatives Program, 2009), the team abandoned the plan to upgrade library bandwidth.

Instead, the team developed a set of four models to upgrade internal equipment that could facilitate faster speeds at the public access workstations, including switches, routers, workstations, etc. Working with the State Library and a technology vendor, the study team developed four cost models based on library facility square footage, a measure suggested by the technology vendor as a reasonable, practical, and expedient method to approximate technology needs for public computing facilities. The four categories were as follows:

- Small libraries: outlets with less than 5,000 square feet;
- Medium libraries: outlets between 5,000 and 10,000 square feet;
- Large libraries: outlets between 10,000 and 20,000 square feet;
- Extra large libraries: outlets between 20,000 and 40,000 square feet.

These assume that library technology needs are directly related to the physical size of the facility, which may not be the case depending on situational factors such as the amount of bandwidth coming to each library, the population served, and the degree of advanced Internet applications already in use. However, given the time constraints imposed on developing cost models for use in applying for BTOP funding, the study team agreed with the technology vendor to attempt a facility size-based model as a good first effort at fitting public libraries into systematized technology upgrade cost models.

These models also assume that libraries participating in the statewide program would upgrade their bandwidth to meet the NTIA broadband definition at the workstation (768 kbps downstream and 200 kbps upstream) by utilizing the statewide ISP contract pricing and E-rate discount. In addition to developing four facility size-based models, the study team created a menu of extra equipment available for libraries, including laptops and laptop carts, designed to allow libraries to expand the number of available public access workstations without remodeling or expanding library facilities, as well as serving as a mobile training lab to expand public training options.

Although all Florida public libraries fit into the size ranges outlined above, once the State Library began soliciting libraries to participate in the program it became evident that systematized cost models would not work well for the Florida public libraries. The situational factors that impacted Florida public libraries'

broadband Internet access and service provision also impacted the utility of the cost models. Each library had unique technology and service needs and the libraries could not be placed easily into a set of cost models, whether by population, facility size, or any other criterion. Instead, the study team worked with the State Library and the state certified vendor to develop a menu of equipment options from which libraries could select only the equipment they needed—regardless of their size or community context.

The equipment menu included workstations, software, laptops, switches, routers, and services such as onsite network efficiency assessment, individualized consulting time, and evaluation of program success. The State Library provided the menu to each public library to select the equipment necessary to upgrade that library's public access computing to current FCC broadband standards. In addition to the equipment options, wireless installation and upgrades and specific LAN (land area network) and server equipment were offered to libraries on an as-needed basis. The goal of this fixed-cost menu approach was to aggregate purchasing and facilitate smooth, quick upgrades for Florida public libraries, in keeping with the BTOP's goals of leveraged federal dollars and expedient deployment.

The study team's attempts to create categorized models that could be applied to public libraries based on population demographics and facility size failed to account for the unique situational factors each library faced. Ultimately, situational factors demanded an equipment menu, rather than a broader cost logic model, so that each library could select *only* the equipment necessary for *that* library to raise its public computing capacity. The majority of libraries selected workstations and mobile training labs, as well as some LAN equipment. A few of the larger libraries required unique services (e.g., wireless upgrades and system-wide LAN equipment), the costs of which were estimated on a case-by-case basis. The study team then calculated a total estimated cost for all necessary upgrade equipment for libraries participating in the State Library's BTOP grant program to increase Internet connection speeds at the workstation and the ability to provide e-government and emergency/disaster management services to Florida residents.

Summary of Key Findings

Well over half of Florida public libraries reported connection speed insufficiency at some times, and this was more pronounced in rural and suburban public libraries. Outlets all over the state reported connection speed insufficiency and the majority of Florida public libraries reported the number of public access workstations was insufficient to meet patron needs some or all of the time, to say nothing of the insufficiency of connection speeds in supporting e-government and emergency/disaster management services. Situational factors played a critical role in affecting each library's technology access and services. These factors cannot be ignored when considering how best to help libraries improve network efficiencies and computer equipment.

Pockets or not, the cost and speed of the Internet connections for Florida's public library outlets disabled many librarians and libraries from adequately serving their communities. These communities turn to their public library

outlets for emergency/disaster management and e-government services, as well as free and publicly available broadband Internet access to participate in today's Information Society. However, slow Internet connectivity speeds, high Internet connection costs, and situational factors greatly impact libraries' ability to adequately support e-government and emergency/disaster management services. The cost models and statewide BTOP application were designed to help Florida public libraries upgrade computer and network equipment, improve network efficiencies, and increase workstation connection speeds so the libraries would be better poised to serve in the identified e-government and emergency/disaster management service roles.

NEXT STEPS

Recommendations for Florida Public Libraries

This study documents the significant need Florida public libraries had for increased broadband (both speeds and connections) and a range of other equipment and services related to the provision of broadband-enabled services from these libraries. Connection speeds at the front door varied considerably around the state, but overall most Florida public libraries were unable to meet existing demand and had little capacity to provide additional access to broadband services and resources. The study recommended that purchasing new workstations, routers, and switches for public libraries, as well as consulting time to assess and improve the efficiency of library networks, could upgrade connection speeds to the workstation.

The study identified numerous reasons why the actual bandwidth at the workstation can be seriously compromised from the speed at the front door. As a general statement regarding Florida public libraries' Internet connections, there were too many workstations (many of which were outdated), wireless routers, and other peripherals connected to the library network; there were not enough library networks available throughout the system; and there were too many simultaneous users of the library workstations using too many broadband-sensitive applications. Many librarians lacked the knowledge and training to manage and deploy efficient networks resulting in bandwidth that was basically "wasted" in the network. A major recommendation from this study, in addition to the significant need for obtaining drastically improved broadband connections and support services for Florida public libraries, was that simply providing these libraries with large upgrades in existing broadband, or providing additional broadband connections to the library, might not provide significant improvement of Internet connection speeds at the workstation. Many Florida public libraries will need significant technical staff in areas related to network and telecommunications management, workstation and network configuration and deployment, and broadband services planning and deployment, to ensure the design and deployment of efficient connections, internal wiring and network configuration, and upgraded workstations and related equipment.

The impact of these findings and conclusions on Florida public librarians and residents is of significant concern. As Florida libraries tried to recover from the recent vote to cut property taxes, the housing collapse, and the recession,

residents were significantly handicapped by not being able to access and use effectively a range of broadband-enabled services and resources at their local public libraries. In terms of completing online job applications, interacting electronically with local, state, and federal e-government tasks, and collaborating effectively with local and state emergency/disaster management officials, Florida residents were disadvantaged in their access to quality broadband-enabled services and resources available through their public libraries. Attention should be given to remedy these issues and improve Florida public libraries' ability to provide adequate public computer and Internet access and services, including e-government and emergency/disaster management services.

Recommendations for Other Public Libraries

While the majority of the results of this needs assessment are not generalizable beyond Florida, the needs assessment process and e-government and emergency/disaster management service roles are. This study shows the value of a technology needs assessment in reviewing the current situation and recommending actions for improvements. Libraries around United States and elsewhere can employ some or all of the methods employed in this needs assessment to evaluate their own network efficiencies and e-government and emergency/disaster management services. It is crucial for individual public libraries to understand the situational context in which they provide Internet access and services, including successes, weaknesses, deficiencies, and inefficiencies, so they may seek funding through E-rate and other programs to improve their Internet connections and public access computing.

For example, libraries in other states may have access to GIS, statewide library, and other Internet connection data files and can produce maps depicting the Internet connection speeds and costs for public libraries in their state. This process may be facilitated by the nationwide broadband data-mapping project currently being undertaken by NTIA. In addition to mapping library Internet connectivity, other libraries can conduct technology and Internet case studies, site visits, and interviews to understand better the situational factors impacting public library Internet access and broadband-enabled service provision. Ultimately, this study demonstrates the critical need to consider situational factors in any public library technology needs assessment or upgrade plan. The study team strongly recommends that library technology needs assessment and upgrade plans consider situational factors rather than attempting a cookie-cutter approach that will not meet the unique needs of each public library.

Libraries need to consider that, in upgrading computing capacity, a key evaluation metric of success will be the number of workstations currently with connection speeds of less than 786 kbps down and 200 kbps up versus the number of workstations that meet or exceed these speeds *after* the upgrade. It is possible that upgrades, even with increased bandwidth at the front door, still may not meet the FCC requirements for broadband connectivity at the *workstation*. Libraries still may have poorly designed and deployed networks serving too many workstations, wireless routers, and bandwidth-hogging applications to meet the FCC standard for broadband workstation speed. This is especially true

in libraries where countless users access the network at one time, many of whom rely on the library to access bandwidth-hogging applications such as file-sharing, Web 2.0 tools, and e-government forms and services. In such instances additional onsite assessment may be necessary to either re-configure the technology and telecommunications infrastructure or to obtain additional broadband at the front door.

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