NORTH FLORIDA BROADBAND AUTHORITY (NFBA)
UBIQUITOUS MIDDLE MILE PROJECT:
BROADBAND NEEDS ASSESSMENT, DIAGNOSTICS, AND BENCHMARKING OF SELECTED ANCHOR INSTITUTIONS

FINAL REPORT

(July 7, 2010 – December 31, 2011)

December 31, 2011

Charles R. McClure, **PhD** <cmcclure@lis.fsu.edu>
Director, Information Institute and Francis Eppes Professor

Lauren H. Mandel
<lmandel@fsu.edu>
Research Coordinator, Information Institute

Jeff Saunders
<jds10g@my.fsu.edu>
Research Associate, Information Institute

Nicole D. Alemanne
<nalemanne@fsu.edu>
Research Associate, Information Institute

Laura I. Spears
<lib03@my.fsu.edu>
Research Associate, Information Institute

Bradley Wade Bishop
<wade.bishop@uky.edu>
Assistant Professor, University of Kentucky School of Library and Information Science

The study team wishes to acknowledge the assistance of
Susan C. Thomas, Casey A. McLaughlin, Lynnsey K. Weissenberger, Karen Doster, and Sara Pierce.

For

Richelle Sucara, Interim General Manager
North Florida Broadband Authority

010 Louis Shores Building, 142 Collegiate Loop, P.O. Box 3062100, Tallahassee, FL 32306-2100
Telephone 850 645 5683 Fax 850 644 4522

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NFBA UBIQUITOUS MIDDLE MILE PROJECT: BROADBAND NEEDS ASSESSMENT, DIAGNOSTICS, AND BENCHMARKING OF SELECTED ANCHOR INSTITUTIONS: FINAL REPORT

The Information Use Management and Policy Institute (Information Institute)[1] at the Florida State University[2] has been conducting a number of activities in fulfillment of its award from the North Florida Broadband Authority (NFBA)[3] to conduct work in support of its $30 million Ubiquitous Middle Mile Project. These activities are needs assessment, benchmarking, and onsite diagnostics at selected anchor institutions in the NFBA service area: the 14-county North Central Rural Areas of Critical Economic Concern (RACEC)[4] plus Wakulla County.

This final report provides a summary of all project activities (July 7, 2010 – December 31, 2011), findings from the project, recommendations, and conclusions. This report is a comprehensive report that describes all data collection methods, data analysis, integration of the data collected via the three methods (web-based survey, focus groups, and onsite diagnostics), recommendations, and conclusions.

PROJECT PURPOSE

The overall purposes of this project are to (1) inform the deployment and configuration of the middle mile network, (2) increase the successful deployment and use of broadband at the various anchor institutions in the 14-county RACEC plus Wakulla County, (3) insure that users of the various anchor institutions obtain high quality and up-to-date broadband services, (4) position the NFBA to better document the success of the project based on intended outcomes described in the original proposal to the National Telecommunications and Information Administration (NTIA), and (5) assist in obtaining additional funds for broadband expansion and economic development in the region.

PROJECT GOALS

Specific project goals related to needs assessment are:

- Describe the existing and future broadband uses and applications of the region's anchor institutions;
- Identify factors that affect the likelihood that anchor institutions will adopt high-speed broadband;
- Assist the middle mile network designers to deploy and configure the network such that it best meets the current and future needs of anchor institutions; and
- Obtain baseline data that can be used to justify and support additional broadband funding requests for the region.

Specific project goals for the onsite diagnostics portion of the project are:

[1] http://ii.fsu.edu
[2] http://www.fsu.edu
[3] http://www.nfba-fl.org/
[4] http://www.eflorida.com/FloridasFuture.aspx?id=2108

- Describe the existing broadband networks currently deployed in the region's anchor institutions;
- Identify situational factors and issues that impact how anchor institutions deploy their broadband networks; and
- Determine ways that the region's anchor institutions can improve their network deployments to increase connection speeds at the workstation.

Specific project goals for the benchmarking portion of the project are:

- Describe the existing bandwidth being purchased at the "front door" and at the workstation-level for a sample of anchor institutions in the 14 county region;
- Determine the current cost for the bandwidth being purchased by anchor institutions;
- Identify the vendor(s) currently supplying the existing bandwidth for anchor institutions;
- Identify situational factors and issues that impact whether anchor institutions decide to obtain or increase broadband capacity;
- Obtain these benchmark data as of fall 2010 to demonstrate subsequent improvement in broadband capacity for anchor institutions in the region; and
- Obtain baseline data related to broadband connectivity and use that can be used to justify and support additional broadband funding requests for the region.

Accomplishment of these goals will directly assist the NFBA in accomplishing several project goals and objectives as outlined in their original proposal to NTIA.

PROJECT TASKS

This project had four main tasks (phases) as follows:

- **Task 1: Detailed Project Tasking**: During the first phase of the study, the study team detailed project tasking and performed other organizational activities, all in consultation with the NFBA project liaison. This task included organizational activities in preparation for beginning data collection for the needs assessment phases of the project. See the First Interim Report for Task 1 activities and status.[5]
- **Task 2: Data Collection**: During the second phase of the study, the study team conducted data collection activities that included a needs assessment and benchmarking survey, onsite diagnostics collection, and interviews and/or focus groups that followed up on the survey and collected data on situational factors and issues that impact anchor

[5] McClure, C. R., Mandel, L. H., & Alemanne, N. D. (2010). *North Florida Broadband Authority (NFBA) Ubiquitous Middle Mile Project: Broadband needs assessment, diagnostics, and benchmarking of selected anchor institutions: First interim report of project activities*. Tallahassee, FL: Information Use Management and Policy Institute, College of Communication and Information, The Florida State University. Available at: http://ii.fsu.edu/content/view/full/39900

institutions' awareness of and potential deployment of broadband networks. See the Second Interim Report for an overview of Task 2 activities and status.[6]

- **Task 3: Data Analysis**: During the third phase of the study, the study team analyzed, tabulated, and verified the various data collected in Task 2 using descriptive statistics, GIS mapping methodologies, and content analysis of primary themes. The third interim report delineated findings from each of the three methods (survey, focus groups, and onsite diagnostics).[7]
- **Task 4: Reporting**: During this task, the study team developed a final draft report (this report) that describes project activities, summarizes findings, identifies key issues, and makes specific recommendations for middle mile network deployment and strategies to better meet the anchor institution broadband service needs. It is anticipated that key NFBA staff will review the draft and make comments and suggestions which will serve as input into the final report. A member of the study team will be available to make an oral presentation to the NFBA if requested.

Reports of all previous projects are available at http://ii.fsu.edu/content/view/full/39900. Table 1 shows the status of all project activities.

Table 1: Key Activities, Status, and Time Line to Completion for all Project Tasks

ACTIVITY	STATUS UPDATE	TIMELINE
Task 1: Detailed Project Tasking		
1. Prepare for data collection activities – • Initiate development of contact list of selected anchor institutions. • Write letter that explains project details and importance to selected anchor institution participants. • Prepare to mail and/or email introduction letter to selected anchor institutions to introduce project.	Task complete	September 1-30, 2010

[6] McClure, C. R., Mandel, L. H., Alemanne, N. D., Saunders, J., Spears, L. I., & Bishop, B. W. (2011). *North Florida Broadband Authority (NFBA) Ubiquitous Middle Mile Project: Broadband needs assessment, diagnostics, and benchmarking of selected anchor institutions: Second interim report of project activities*. Tallahassee, FL: Information Use Management and Policy Institute, College of Communication and Information, The Florida State University. Available at: http://ii.fsu.edu/content/view/full/39900

[7] McClure, C. R., Mandel, L. H., Alemanne, N. D., Saunders, J., Spears, L. I., & Bishop, B. W. (2011). *North Florida Broadband Authority (NFBA) Ubiquitous Middle Mile Project: Broadband needs assessment, diagnostics, and benchmarking of selected anchor institutions: Third interim report of project activities*. Tallahassee, FL: Information Use Management and Policy Institute, College of Communication and Information, The Florida State University. Available at: http://ii.fsu.edu/content/view/full/39900

Table 1: Key Activities, Status, and Time Line to Completion for all Project Tasks, continued

ACTIVITY	STATUS UPDATE	TIMELINE
Task 1: Detailed Project Tasking, continued		
2. Begin development of survey methodology – • Decide whether to do a census (i.e., survey all institutions on the list) or use a sample (if there are more than 200 institutions); and • Create a professional-level account with Survey Monkey (http://www.surveymonkey.com/), which will be used for the online survey.	Task complete	September 1-30, 2010
3. Prepare to contact anchor institutions to develop a list of those interested in participating in the onsite diagnostics activities.	Task complete	September 1 – October 31, 2010
4. Begin development of sampling/selection methodology for interviews and focus groups that pulls a simple random sample of anchor institutions in each county, in which each institution in the county has the same probability of being chosen as does any other institution in the county.	Task complete	September 1-30, 2010
5. Begin drafting measurement instruments – • Draft survey instrument; • Draft metrics for diagnostics assessment; and • Draft interview and focus group questions.	Task complete	September 1-30, 2010
6. Prepare to produce survey – • Draft of Survey Monkey version; and • Draft of paper version.	Task complete	September 1-30, 2010
7. Begin developing a project website – • Include sections for project information, data collection instruments, a self-diagnostics tool, and project reports; and • Load a link to the Survey Monkey survey on the site.	Task complete	September 1-30, 2010
8. Work with NFBA liaison to fine-tune project tasking and data collection instruments.	Task complete	September 1-30, 2010
9. Present project tasking and planning to NFBA at Kickoff Meeting.	Task complete	August 18, 2010
10. Deliver first interim report that details completed project activities.	Task complete	September 2, 2010
Task 2: Data Collection		
1. Conduct survey of anchor institutions – • Mail survey packet (including cover letter, informed consent form, and a paper version of the survey) to selected anchor institutions; • Track survey completions; and • Follow up with survey recipients by phone and/or email to encourage and aid in survey completion.	Task complete	September 1, 2010 – January 31, 2011
2. Conduct interviews and/or focus groups with representatives of anchor institutions in each county.	Task complete	December 1, 2010 – April 15, 2011
3. Conduct diagnostics analyses at selected volunteer institutions (on-site and via the self-diagnostics tool).	Task complete	December 1, 2010 – April 30, 2011

Table 1: Key Activities, Status, and Time Line to Completion for all Project Tasks, continued

ACTIVITY	STATUS UPDATE	TIMELINE
Task 2: Data Collection, continued		
4. Deliver second interim report that details completed project activities.	Task complete	April 30, 2011
Task 3: Data Analysis		
1. Analyze, tabulate, and verify survey data – • Use descriptive statistics to analyze survey responses; • Describe the existing and future broadband uses and applications of the region's anchor institutions; • Describe the existing bandwidth being purchased at the "front door" and its availability at the workstation-level for the anchor institutions; • Determine the current cost for the bandwidth being purchased by anchor institutions; • Identify the vendor(s) currently supplying the existing bandwidth for anchor institutions; • Identify situational factors and issues that impact whether anchor institutions decide to obtain or increase broadband capacity; • Obtain baseline data related to broadband connectivity and use that can be used to justify and support additional broadband funding requests for the region; and • Use GIS methodologies to map metrics such as anchor institution broadband costs and connections speeds.	Task complete	May 1, 2011 – June 30, 2011
2. Analyze diagnostics – • Describe the existing broadband networks currently deployed in selected anchor institutions; • Identify situational factors and issues that impact how selected anchor institutions deploy their broadband networks; and • Determine ways that the region's anchor institutions can improve their network deployments and use of broadband.	Task complete	May 1, 2011 – June 30, 2011
3. Analyze interview and focus group data – • Identify situational factors and issues that impact whether anchor institutions decide to obtain or increase broadband capacity; and • Describe factors that affect anchor institutions' capacity to use broadband effectively.	Task complete	May 1, 2011 – June 30, 2011
4. Deliver interim report that details completed project activities.	Task complete	October 31, 2011
Task 4: Reporting		
1. Develop draft report – • Describe project activities; • Summarize findings and identify key issues; • Make specific recommendations for middle mile network deployment and strategies to better meet the anchor institution broadband service needs; and • Work with NFBA liaison to finalize report.	Task complete	November 1, 2011 – December 31, 2011

Table 1: Key Activities, Status, and Time Line to Completion for all Project Tasks, continued

ACTIVITY	STATUS UPDATE	TIMELINE
Task 4: Reporting, continued		
2. Develop 2-4 self-paced, online instructional modules regarding broadband and its importance – • Based on findings from activities 1-3, determine topics of the modules; • Develop the modules; • Pre-test the modules; • Modify modules (if necessary) based on feedback from pre-test; and • Roll out modules to NFBA anchor institutions.	Task complete	November 1, 2011 – December 31, 2011
3. Deliver final report and make oral presentations of findings to NFBA staff and NFBA board of directors.	Report complete ***Presentation TBD***	December 31, 2011 ***Date TBD***

DATA COLLECTION METHODS

Data collection activities included conducting a needs assessment and benchmarking survey, onsite diagnostics collection, and interviews and/or focus groups that followed up on the survey and collected data on situational factors and issues that impact anchor institutions' awareness and potential deployment of broadband networks. Key activities and status update for Task 2 are delineated in Table 1 (above).

Survey

The anchor institution broadband survey was mailed October 1, 2010 to the 320 anchor institutions identified in the NFBA service area. Additional surveys were sent to rural workforce boards and to members of the Rural Health Partnership after the January 19, 2011 focus group. Ultimately, 123 surveys were returned and analyzed during Task 3 (see below for more information on data analysis). More detail on the survey methodology follows.

Population and Sample

First, the project team developed a comprehensive list of all anchor institutions within the North Central RACEC and Wakulla County. Because the total population was 320 institutions, the project team decided to invite all institutions in the population to participate in the anchor institution broadband survey. That is, we did not select a sample.

A paper version of the survey was mailed to all 320 anchor institutions in the NFBA service area on October 1, 2010. Additional surveys were sent to 48 anchor institutions identified after the initial mailing, including workforce boards and members of the Rural Health Partnership. This brings the total to 368 anchor institutions surveyed for this project.

Survey Design

The project team determined that the most cost effective method of conducting the survey would be to use an online survey. After some deliberation, it was decided to use Survey Monkey Professional software for the survey. The survey was designed to obtain data that would meet the numerous goals of this project with as few questions as possible so as not to overburden the anchor institution staff completing the survey; two formats were created, a paper format and the online format.

To facilitate and encourage survey completion, the project team sent a mailing to all the anchors in the populations including a cover letter explaining the project and why their participation was needed for data collection and a paper copy of the survey so they could collect their responses before logging into the online survey. The cover letter and survey were provided to NFBA previously, but additional copies can be provided to the NFBA upon request. The paper version also was available to institutions unable to complete the survey online. Follow-up e-mails were sent to institutions that had not completed the survey every 2-3 weeks until the survey officially "closed" on November 30, 2010.[8] Responses were tracked to ensure that the project team did not send reminder e-mails to institutions that had completed the survey.

Survey Response Rate

Ultimately, 113 anchor institutions completed the survey, a 30.7% response rate. Respondents represented a wide variety of anchor institutions. Survey data were analyzed using descriptive statistics and GIS mapping during Task 3, with findings reported in the Third Interim Report.

Focus Groups

The project team conducted six focus groups and one interview to gather qualitative data that provides more detail and insights into anchor institution broadband needs, barriers, and enablers. Five focus groups were conducted with representatives of various anchor institutions in a 3-county area (to obtain representation from all 15 counties in the NFBA service area) and one was conducted with members of the Rural Health Partnership on January 19, 2011. In April 2011, the project team also conducted an interview with representatives from the Department of Management Services (DMS) to gather information about county health department broadband deployment. More detail on the focus group and interview methodology follows.

The study team determined that the best way to leverage available resources was to conduct five focus groups, each covering a three-county area. Counties were combined into the area groupings based on geographic proximity in order to minimize travelling distances for participants. In addition to determining these groupings, the study team identified one county in each of the three-county areas as the optimal location to conduct the focus group, making the selection based on which county was located most centrally in the three-county area. Table 2 delineates the three-county groupings, as well as the counties identified as most appropriate to host the focus groups.

[8] The survey actually remained open throughout the focus group and onsite diagnostics data collection periods so additional anchor institutions that participated in focus groups and desired an onsite diagnostic could complete the survey.

Table 2: Three-County Areas

Group	Counties	Host County
1	Baker, Columbia, Hamilton	Columbia
2	Bradford, Putnam, Union	Bradford
3	Dixie, Lafayette, Taylor	Taylor
4	Gilchrist, Levy, Suwannee	Gilchrist
5	Jefferson, Madison, Wakulla	Jefferson

Sampling Frame

The largest possible sampling frame for this project consisted of a list of the anchor institutions in the North Central Florida RACEC and Wakulla County that was developed for survey recruitment; this list was refined (i.e., updated) while the survey was in the field.

At the end of the online survey, respondents were asked for permission to be contacted for a follow-up interview. Those who responded negatively were removed from the sampling frame for the focus groups and other follow-up data collection activities; approximately 40% of total institutions declined a follow-up interview. Note that institutions in the sampling frame that did *not* complete the survey were retained in the focus group sampling frame in the hopes of recruiting some institutions to both attend the focus groups and complete the survey.

Sampling Methodology

The use of 3-county areas for focus group sampling necessitated stratifying the frame by the county groups. A stratified sample is one in which records in the total sample are distinguished by relevant characteristics to create strata, and the records are then sampled from within the strata.[9] The five three-county areas will be used as strata for this project, and samples will be drawn from within each area.

The sampling frame was relatively small, with a maximum of 86 records per 3-county group before those who had refused a follow-interview were removed. It was essential that focus group participants be drawn from the counties within each 3-county area. Therefore, a purposive sampling methodology was employed. Purposive sampling is a non-probability sampling method in which records are selected because they represent an important characteristic.[10]

Participant Recruitment

The records in the sampling frame fell into three types:

[9] Schutt, R. K. (2006). *Investigating the social world: The process and practice of research* (5th ed.). Thousand Oaks, CA: Sage.
[10] Schutt, R. K. (2006). *Investigating the social world: The process and practice of research* (5th Edition). Thousand Oaks, CA: Sage.

- Institutions that responded to the survey and agreed to be contacted for follow-up interviews;
- Institutions that responded to the survey and did *not* agree to be contacted for follow-up interviews; and
- Institutions that had not yet responded to the survey.

Institutions that refused to be contacted for a follow-up interview were removed from the sampling frame for the focus groups.

Of the remaining institutions, the most likely to agree to participate in the focus groups were those that responded to the survey and agreed to be contacted for follow-up interviews. These institutions were contacted first, with a goal of recruiting approximately 6-10 participants per focus group. Subsequently, institutions that had not responded to the survey were contacted as well. Reasonable attempts were made to recruit at least one participant per county and to recruit participants from a mix of anchor institution types.

Focus Group Locations

The project team initially scheduled five focus groups to be held in Columbia, Gilchrist, Bradford, Jefferson, and Taylor Counties. The Columbia and Gilchrist County focus groups occurred in November 2010, and the Bradford, Jefferson, and Taylor County focus groups occurred in January 2011. A sixth focus group was added at the Rural Health Partnership meeting in January 2011.

Focus Group Protocol

The focus groups followed a set protocol and a predetermined list of topics, which was modified twice (after the first round of focus groups and in preparation for the Rural Health Partnership focus group). The protocol included housekeeping-type activities, such as having participants sign in and complete nameplates, an introduction that explained what the project is about and the purpose of the focus group, and general information about recording and other procedures. The topics included general background on the participants and their institutions, participants' impressions of their institutions' current broadband and technology, impacts of broadband on regional economic development, and factors that affect broadband access and use in their institutions, among others. Each topic included several probing questions to elicit additional information. A separate list of questions was developed for the focus group with health-related institutions that focused on broadband and its impacts on healthcare. More detail on the protocol and questions can be provided to the NFBA upon request.

Onsite Diagnostics

Subsequent to survey and focus group data collection, the project team began conducting onsite diagnostics in select anchor institutions throughout the NFBA service area. Ultimately, 14 diagnostic sessions were conducted with schools, workforce boards, county commissioners, county health departments, towns, community colleges, public libraries, and rural health clinics. More detail on the onsite diagnostics methodology follows.

The project team conducted onsite diagnostics and broadband connectivity assessments for select anchor institutions from the North Central RACEC plus Wakulla County. The overall objectives of the onsite diagnostics were to accomplish the following:

- Describe the existing broadband networks currently deployed in the region's anchor institutions;
- Identify situational factors and issues that impact how anchor institutions deploy their broadband networks; and
- Determine ways that the region's anchor institutions can improve their network deployments to increase connection speeds at the workstation, and also improve network security and business continuity.

The methodology for conducting the onsite broadband benchmarking efforts was comprised of three phases: determining the sample, planning for and collecting data, and reporting.

Sampling

The first phase included a process for generating a pool of potential anchor institutions that qualify for the onsite diagnostics. This list was not limited to those institutions that had taken the North Central RACEC Anchor Institution Broadband Survey prior to the onsite visit.

Planning for and Collecting Data

The second phase included documents that the anchor institutions needed to prepare and have ready prior to the onsite visits. Prepared documents pertained to network information, such as network peak usage, workstation bandwidth speed tests, and a manifest of network equipment detailing age of computers and number of wireless access points. The assessment team also developed lists of potential interview questions and a template of diagnostic procedures. The onsite assessment team also provided the anchor institution with a care package of helpful information, tips, and resources regarding improving broadband quality at the institution.

Reporting

The last phase consisted of generating two kinds of reports. The first type of report was tailored to each anchor institution's onsite diagnostics results. This report was an overview of the findings for each individual anchor institution, and was provided to the individual institutions to fact check before Information Institute staff generated a final version of each report. The second kind of report was an aggregate report of North Central RACEC plus Wakulla County anchor institutions with recommendations for addressing network issues and improving broadband quality; this was compiled and written during Task 3 of the project.

In addition to the diagnostic team's report, anchor institutions have continuing access to the resources compiled on the NFBA project website (nfba.ii.fsu.edu). Specifically, the project team created a section of the project website entitled Toolkit (nfba.ii.fsu.edu/toolkit.html). Here, the project team provides a variety of self-help resources and recommendations to anchor

institutions for improving their network, as well as information technology procedures and documentation. This section is updated frequently as the project team locates and prepares materials for inclusion in the Toolkit.

The specific onsite procedures and findings depended upon many situational factors, including but not limited to the following:

- Type and size of the anchor institution;
- Their information technology (IT) needs;
- Outside constraints such as security policies; and
- Organizational factors such as trained, available IT staff.

Additional detail on each phase and specific questions asked/protocol followed were provided to the NFBA.

DATA ANALYSIS

Survey Findings

Introduction

The survey finds that anchor institutions in the NFBA service area are facing a number of situational factors that affect their ability to deploy and use broadband Internet in an effective way. For example, while half of respondents report paying for advertised broadband Internet speeds greater than 5 megabits per second (Mbps),[11] actual tested downstream speeds are vastly lower. And while the majority of respondents say that their Internet speeds meet staff and public needs most of the time or always, 70% of respondents indicate an interest in increasing their Internet speed. However, almost no institutions have plans to increase their speed, and half of respondents reporting that they would like to have higher Internet speeds say that they already have the maximum speed available to them, cannot afford to increase their speed, or do not have the technical knowledge to do so. The age of workstations in reporting institutions compounds this problem as older workstations tend to run at slower speeds, regardless of connection speed.

Staff and public comfort with broadband technology is another issue. Large portions of anchor institutions' staffs are reported to be comfortable with basic Internet and computer skills, but less than two-thirds are comfortable with advanced Internet skills such as searching for information and determining its accuracy. Very low percentages of the public are reported to be comfortable with even basic broadband-related skill sets. The largest percentage of institutions report no plans for staff or public training that would help improve these skills.

Needs assessment and benchmarking project goals related to the description of broadband Internet in anchor institutions are the following:

[11] 1 Mbps is equal to about 1000 kilobits per second, or kbps.

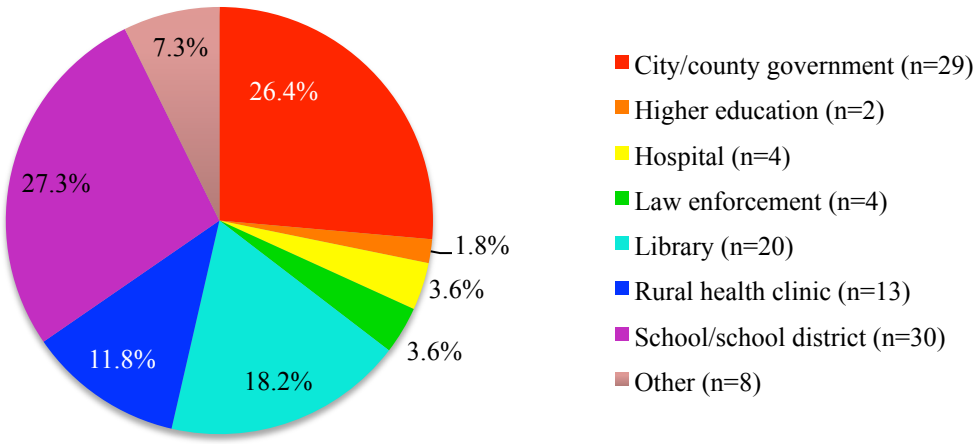
- Describe the existing and future broadband uses and applications of the region's anchor institutions;
- Describe the existing bandwidth being purchased at the "front door" and at the workstation-level for a sample of anchor institutions in the 14-county region;
- Determine the current cost for the bandwidth being purchased by anchor institutions;
- Identify the vendor(s) currently supplying the existing bandwidth for anchor institutions; and
- Identify factors that affect the likelihood that anchor institutions will adopt high-speed broadband.

The following section reports survey findings on the current state of broadband Internet at anchor institutions in the context of those goals, with the addition of an introductory section that overviews survey respondents.

Respondents

All types of anchor institutions included in the population responded to the survey. The top groups of respondents include schools and school districts (27.3%), city and county government entities (26.4%), libraries (18.2%), and rural health clinics (11.8%) (Figure 1). The library category includes both library systems and branch libraries, and the rural health clinic category includes federally-qualified health clinics. Community colleges, hospitals, and law enforcement agencies (1.8%, 3.6%, and 3.6%, respectively), represented the anchor institution types with the lowest survey response rates.

In addition to representing all types of anchor institutions, survey respondents represent all of the counties in the NFBA service area (Figure 2). The institutions with the highest response rates (schools, government entities, libraries, and health clinics) included respondents from most of the counties, and there was a higher level of response from several counties (Columbia, Putnam, Hamilton, Baker, and Union). Dixie and Jefferson counties had the lowest number of respondents.



Response rates differed for each question on the survey; the response rate for this question was n=110.

Figure 1. Respondents by Type of Anchor Institution

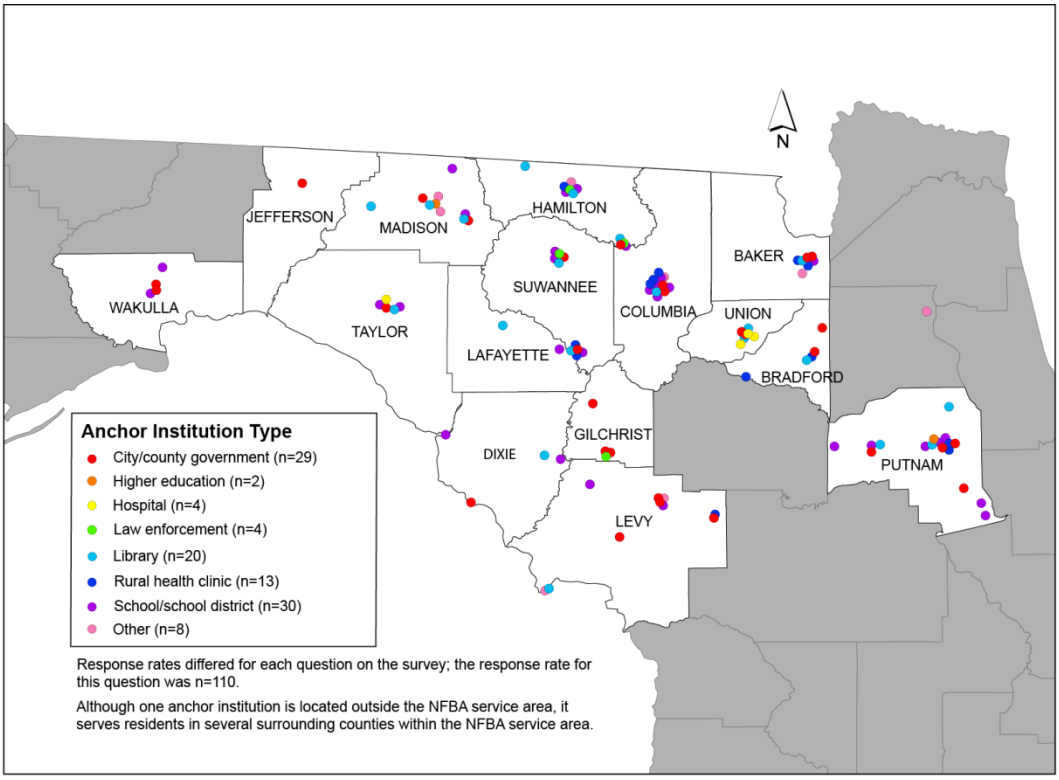


Figure 2. Type of Anchor Institution Respondents by County

Anchor institution representatives who completed the survey have a wide range of job titles (Table 3). Directors and managers constitute the largest group (50.7% including principal/assistant principal, city/town/county manager or county administrator, administrator, director/interim director, library director, manager, chief executive officer, president, mayor, commissioner, emergency management chief, manager/librarian, police chief, sheriff, and superintendent of schools). Many information technology (IT) staff also responded to the survey (26.3% including IT director, network manager, chief information officer, computer repair technician, computer technician, director of instructional technology, information systems director, and network specialist).

Table 3: Respondent's Job Title

Title	%	Title	%
Information Technology Director (n=19)	17.3%	Commissioner (n=1)	0.9%
Principal/Assistant Principal (n=14)	12.7%	Communications Supervisor (n=1)	0.9%
City/Town/County Manager, County Administrator (n=9)	8.2%	Computer Repair Technician (n=1)	0.9%
Administrative Assistant (n=7)	6.4%	Computer Technician (n=1)	0.9%
Administrator (n=6)	5.5%	Dir. of Instructional Technology (n=1)	0.9%
City/Town Clerk (n=5)	4.5%	Emergency Management Chief (n=1)	0.9%
Director/Interim Director (n=5)	4.5%	Information Systems Director (n=1)	0.9%
Library Director (n=4)	3.6%	Law Enforcement Operations (n=1)	0.9%
Manager (n=4)	3.6%	Lead Educator (n=1)	0.9%
Network Manager (n=4)	3.6%	Library Clerk (n=1)	0.9%
School Librarian (n=4)	3.6%	Manager/Librarian (n=1)	0.9%
Chief Executive Officer (n=3)	2.7%	Network Specialist (n=1)	0.9%
President (n=3)	2.7%	Police Chief (n=1)	0.9%
Finance Director/Assistant Director (n=2)	1.8%	Sheriff (n=1)	0.9%
HR Development & Systems Mgr. (n=2)	1.8%	Superintendent of Schools (n=1)	0.9%
Mayor (n=2)	1.8%	Operations Coordinator (n=1)	0.9%
Chief Information Officer (n=2)	0.9%		

Response rates differed for each question on the survey; the response rate for this question was n=110.

Existing and Future Broadband Uses and Applications

Year Anchors Obtained Service

A beginning point to looking at existing uses of broadband is to investigate when anchor institutions first obtained Internet connections. The majority of institutions (51.4%) can be considered later broadband adopters, having acquired Internet connections in 1999 or later. The other half of respondents divides fairly equally between early adopters (1995 and earlier, 23.8%) and the early majority (1996-1998, 24.8%) (Figure 3). The median year in which respondents obtained service is 1999, with service start dates reported from 1986-2007. Early adopters and early majority subscribers predominate in counties that represent the highest survey response rates (especially Columbia, Putnam, Hamilton, and Suwannee). Bradford, Union, and Dixie counties had only later adopters (Figure 4).

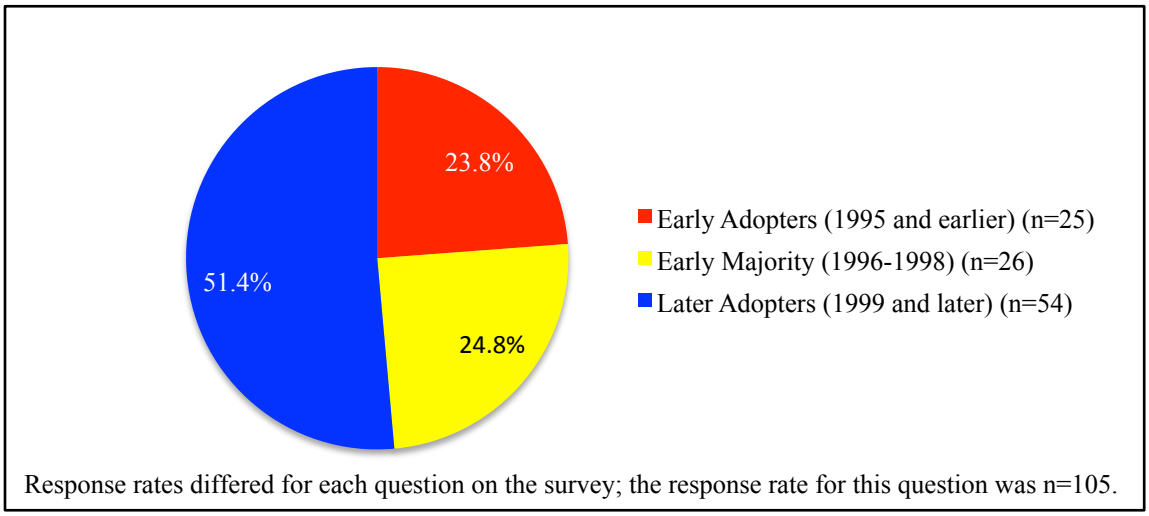


Figure 3. Year Respondents Obtained Internet Service

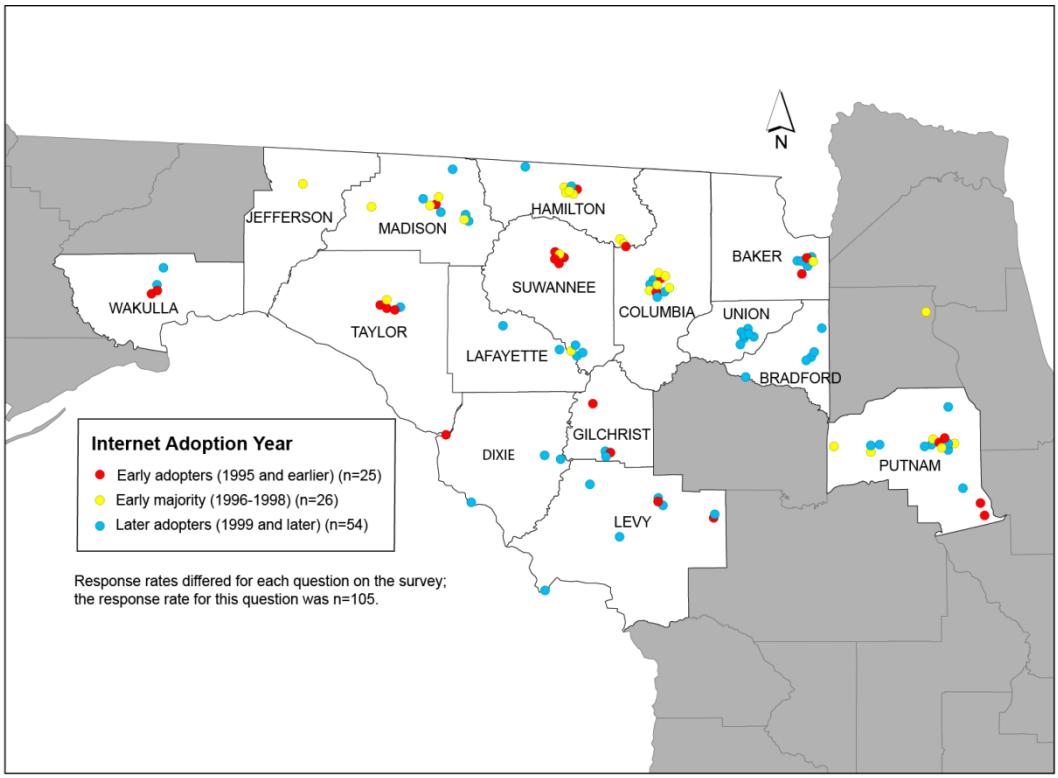


Figure 4. Year Respondents Obtained Internet Service by County

Wi-Fi Availability

In addition to looking at when anchor institutions first obtained the Internet, it is useful to know whether they offer Wi-Fi service on their broadband connections since sharing one connection for both landline and wireless Internet can degrade the speeds on both networks. The

majority of institutions (73.0%) report having Wi-Fi networks, and the 27.0% of institutions that do not have Wi-Fi tend to be in the central or eastern portion of the NFBA service area. While the majority of reporting institutions in Levy County have no Wi-Fi, all of the Madison, Suwannee, Taylor, and Wakulla County reporting anchor institutions have Wi-Fi networks (Figure 5). All of the anchor institutions reporting they have Wi-Fi service make it available to staff inside the building, and 38.2% make it available to the public. The Wi-Fi umbrella does not cover areas outside the building in most cases, with 39.7% of institutions reporting that staff and 17.6% reporting that the public can access the Wi-Fi network outside the building (Figure 6).

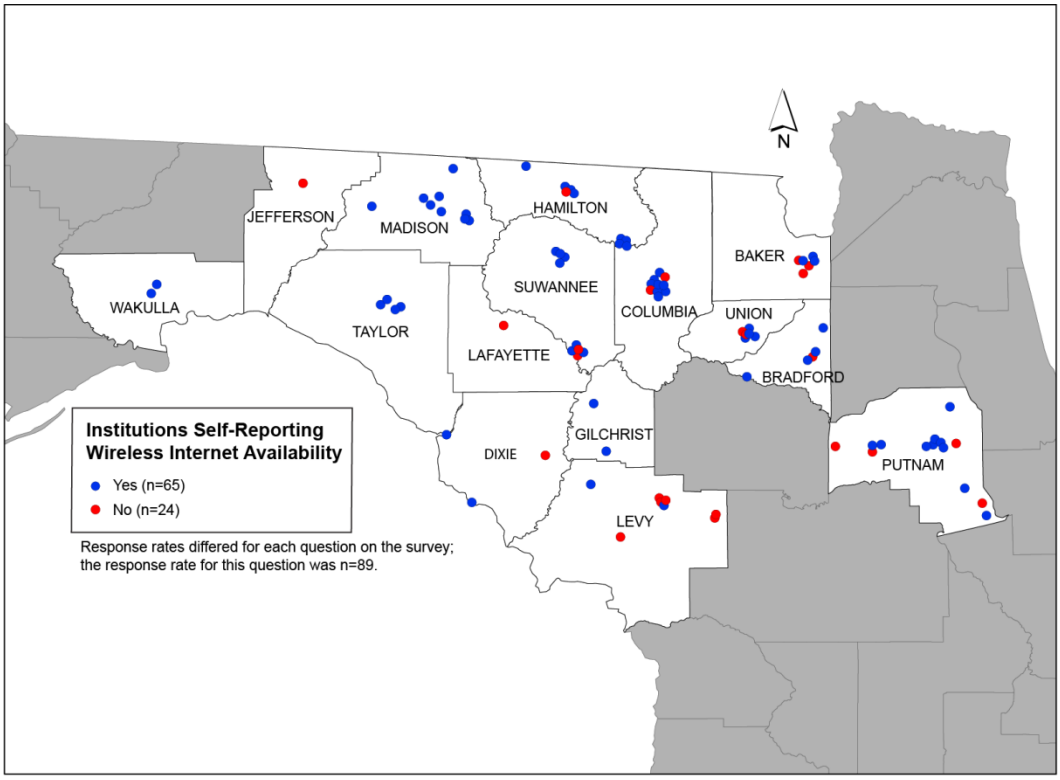


Figure 5. Institutions with and Without Wi-Fi by County

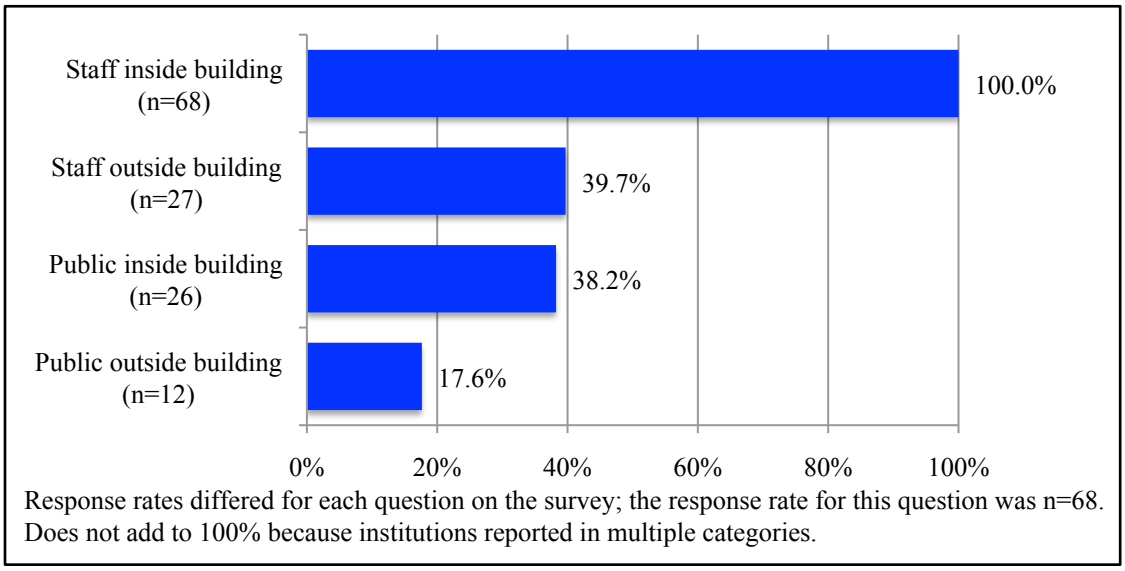


Figure 6. Availability of Wi-Fi to Staff and Public in Institutions with Wi-Fi

Uses of Broadband

Respondents identified the services for which the public uses broadband at their institution from a set list. Educational resources and databases (88.1%), e-government services (71.4%), and email (71.4%) dominate the public use of the Internet at anchor institutions that offer public Internet. Services for job seekers and social networking are also popular (54.8% each), as is the use of broadband to increase computer and Internet skills (50.0%) (Figure 7).

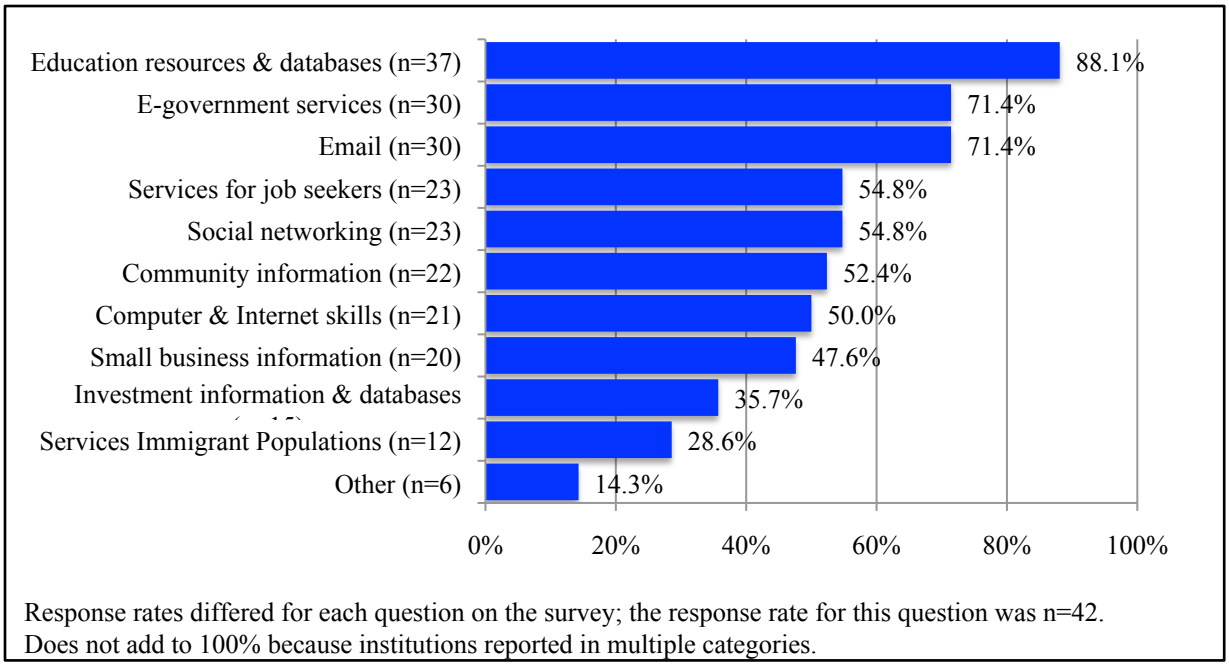


Figure 7. Applications and Tasks for Which the Public Uses the Internet

Examination of existing and future uses of broadband in anchor institutions must consider the degree to which the anchor institutions' staffs and public users are comfortable with broadband and technology, as this may indicate future needs. Survey respondents assessed their staffs' comfort level with a number of broadband-related skills on a 5-point scale ranging from Extremely Comfortable to Not at All Comfortable. Most institutions report that their staffs are extremely or very comfortable with basic email skills such as writing and sending email (87.4%), basic Internet skills such as getting online (85.1%), and basic computer skills such as using a mouse (83.9%) (Figure 8). Also, 62.1% believe that their staffs are extremely or very comfortable with advanced Internet skills such as searching for information and determining its accuracy. The story is very different for basic broadband and basic wireless—26.4% (each) of institutions reporting that their staffs are extremely or very comfortable with knowing what they are or their uses, advanced wireless—11.5% reporting staffs are extremely or very comfortable with skills such as configuring a network, and advanced broadband—10.3% reporting staffs are extremely or very comfortable with skills such as configuring an internal network. It should be noted that the last two skill sets are those at which the entire staff would not be expected to be proficient since those are likely the domain of IT staff.

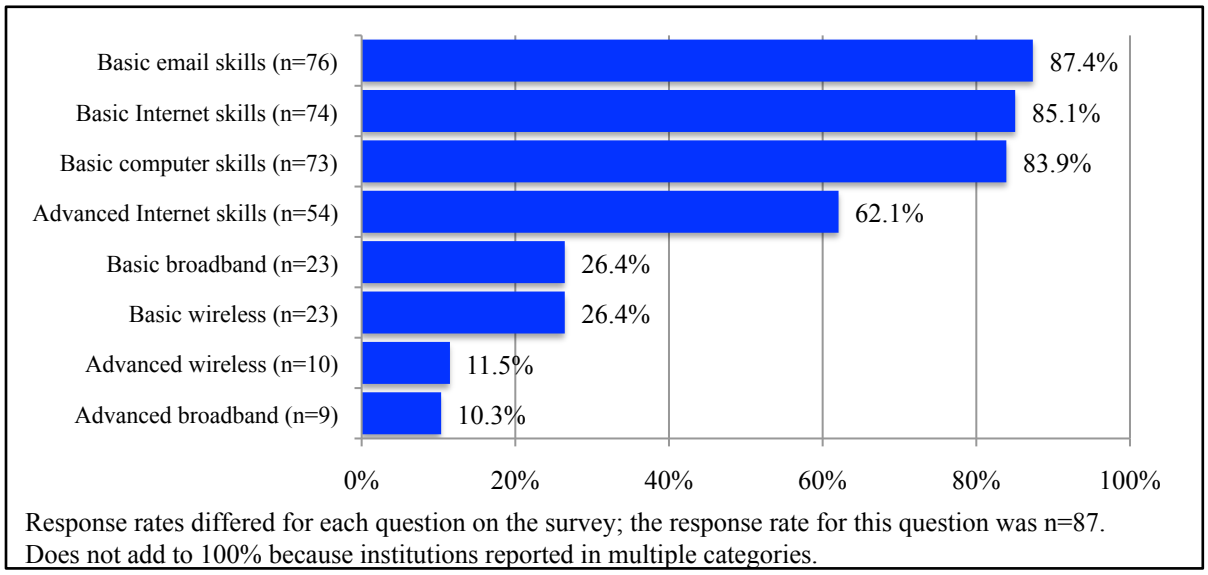


Figure 8. Staff Comfort with Internet-related Topics-Extremely/Very Comfortable (5 Point Scale)

In contrast, anchor institutions report that a fairly low percent of the rural public is comfortable with even basic skill sets such as basic Internet and computer skills (42.2% each) and even basic email skills (33.3%). In fact, these were the only skills anchor institutions identified where the public has any level of public comfort, with extremely low response numbers (n=3 or fewer) for the other skills (Figure 9).

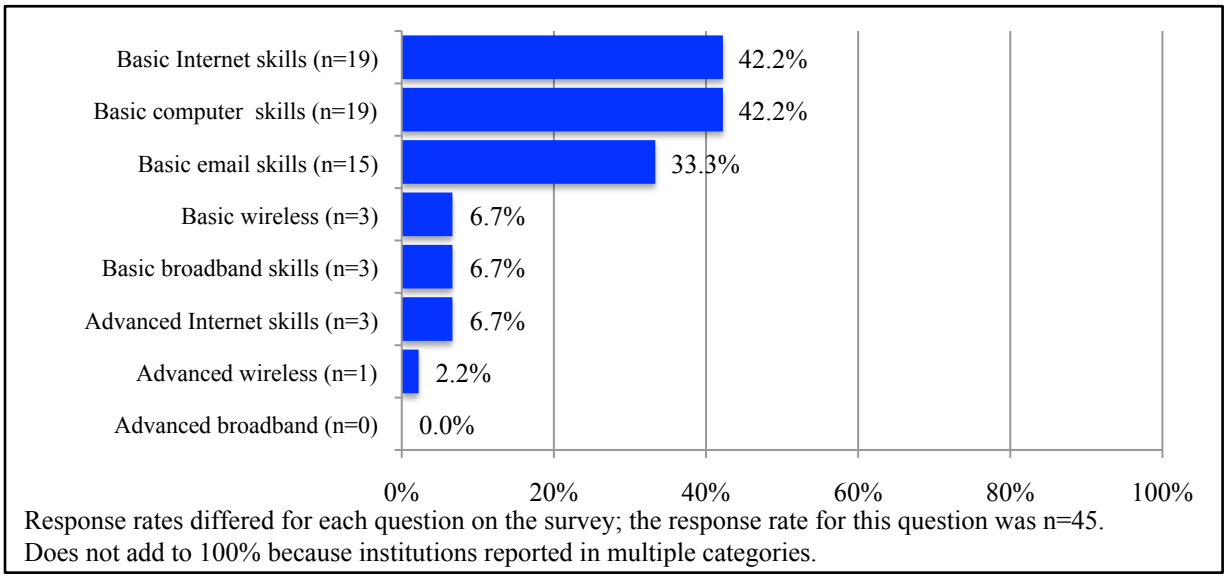


Figure 9. Public Comfort with Internet-related Topics-Extremely/Very Comfortable (5 Point Scale)

Given the broadband-related tasks already occurring at anchor institutions and the discussion about staff and public comfort levels with technology topics, it is important to consider what types of training anchor institutions are offering to their staff members and public users. The largest percentage of institutions report no plans for staff training in the next year, but about a third of institutions are planning some advanced Internet training for staff. There are almost no plans for advanced broadband training, so staff comfort levels in this area may not rise in the near future (Figure 10). Little formal training is planned for the public on Internet and broadband topics (Figure 11).

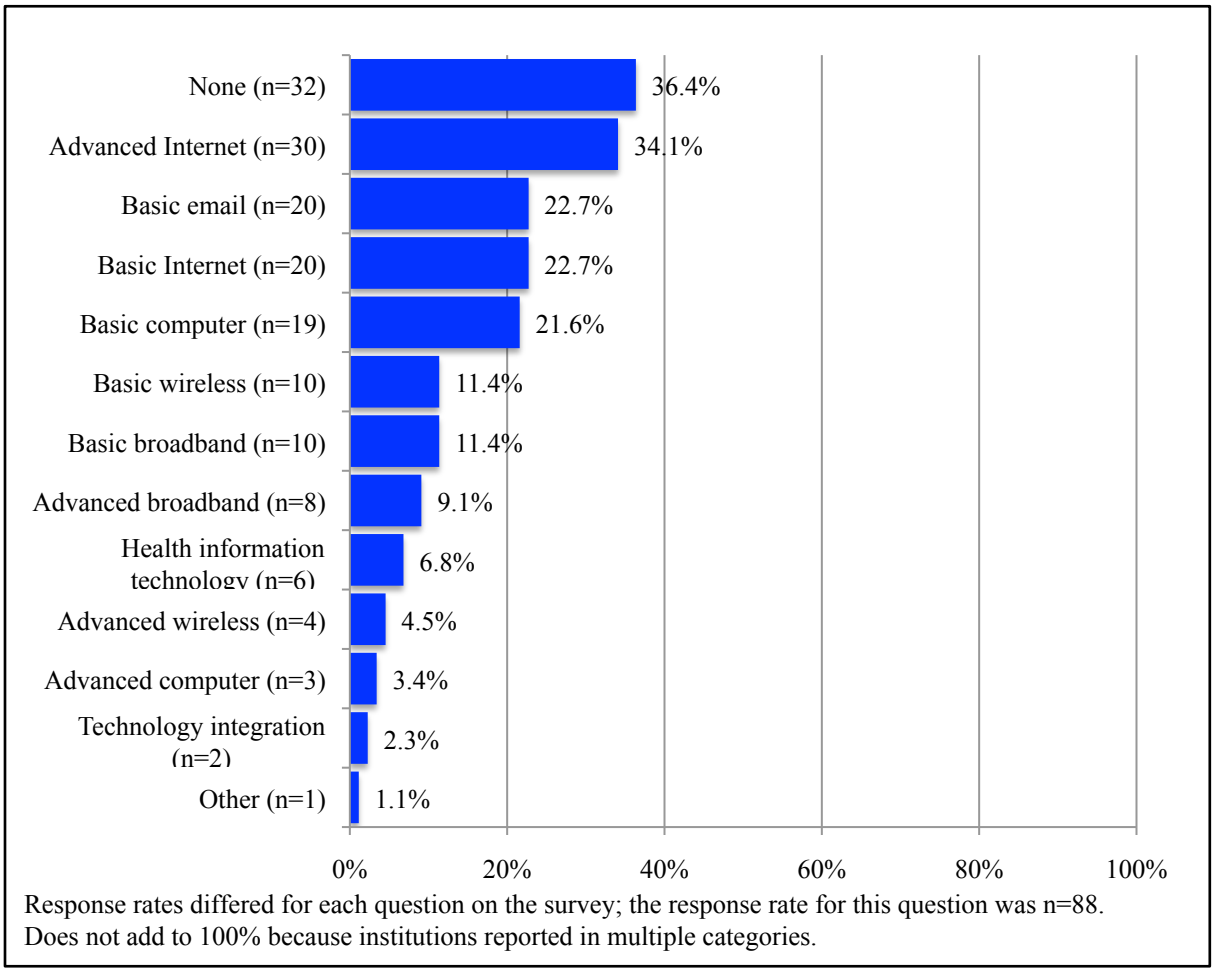


Figure 10. Plans for Staff Training Within the Next Year by Topic

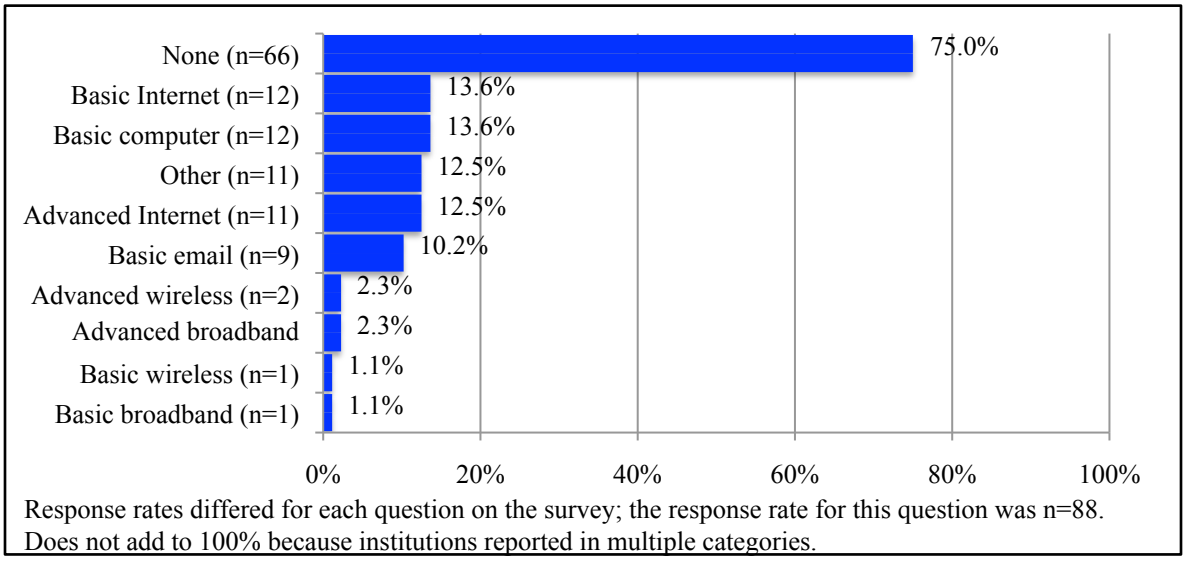


Figure 11. Plans for Public Training Within the Next Year by Topic

Adequacy of Current Broadband to Meet Staff and User Needs

The majority of respondents indicate that Internet speeds meet staff needs with Most of the Time (65.9%) and Sometimes (19.3%) (Figure 12). Relatively few respondents (12.5%) say that their broadband is always sufficient to meet staff needs. Only 2.3% say that their needs are rarely met and no respondents report that their needs are never met, so anchor institutions' Internet is meeting staff needs at least some of the time. The story for the sufficiency of broadband for meeting public needs is slightly different, with 55.8% reporting that broadband is sufficient most of the time and 25.6% reporting that it is sufficient sometimes (Figure 13). Also, a small percentage (2.3%) report that their broadband never meets the public's needs.

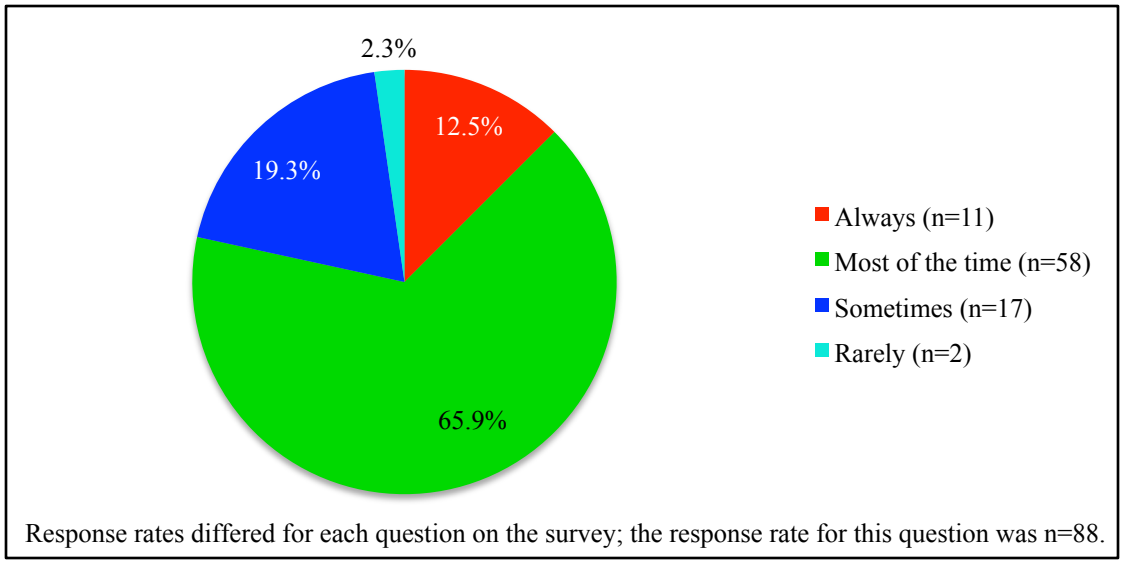


Figure 12. How Often Internet Speed Meets Staff Needs

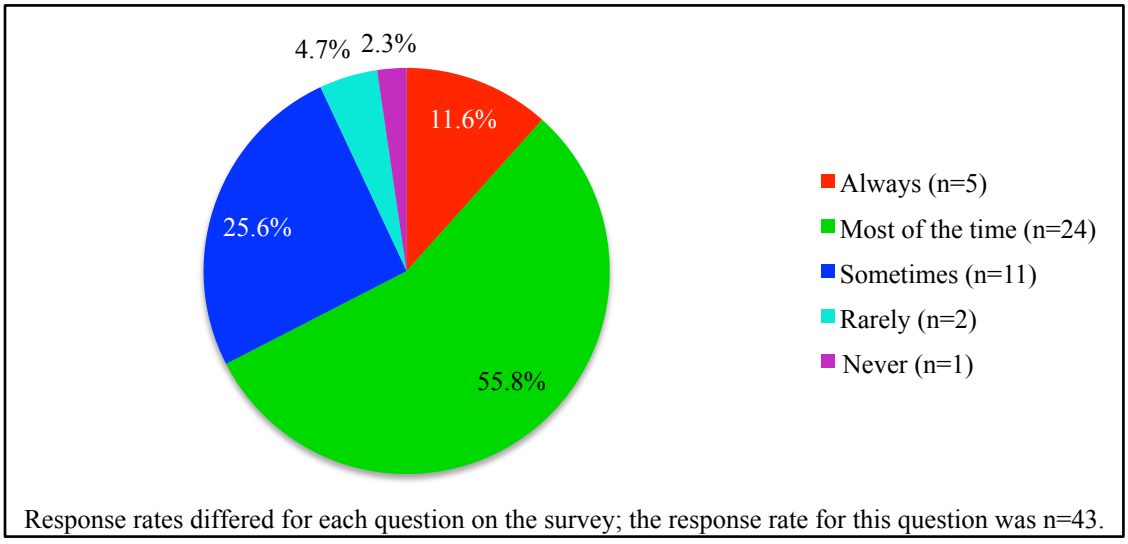


Figure 13. How Often Internet Speed Meets Public Needs

Existing Bandwidth Purchased at the "Front Door" Compared to Workstation-Level Speeds

Connection Speed

More than half of institutions have advertised connection speeds in the range of 1.6-10 Mbps, with 33% reporting speeds of 1.6-5 Mbps and 21% reporting speeds of 5.1-10 Mbps (Figure 14). Slightly over 18% of institutions have advertised speeds at or below 1.5 Mpbs; on the other hand, 27.6% have advertised speeds of 10.1 Mbps or greater. Higher education institutions, hospitals, rural health clinics, and schools/school districts are the only anchor institution types to report advertised speeds greater than 20 Mbps, and city/county government, libraries, and schools/school districts were the only institutions reporting speeds of less than 1.5 Mbps (Figure 15). This indicates there is a wide range of speeds present in schools/school districts as this category of anchor includes institutions in both the greater than 20 Mbps and less than 1.5 Mbps ranges, although many more schools/school districts report speeds in the higher range (30.8% have greater than 20 Mbps) than in the lower range (3.8% have less than 1.5 Mbps).

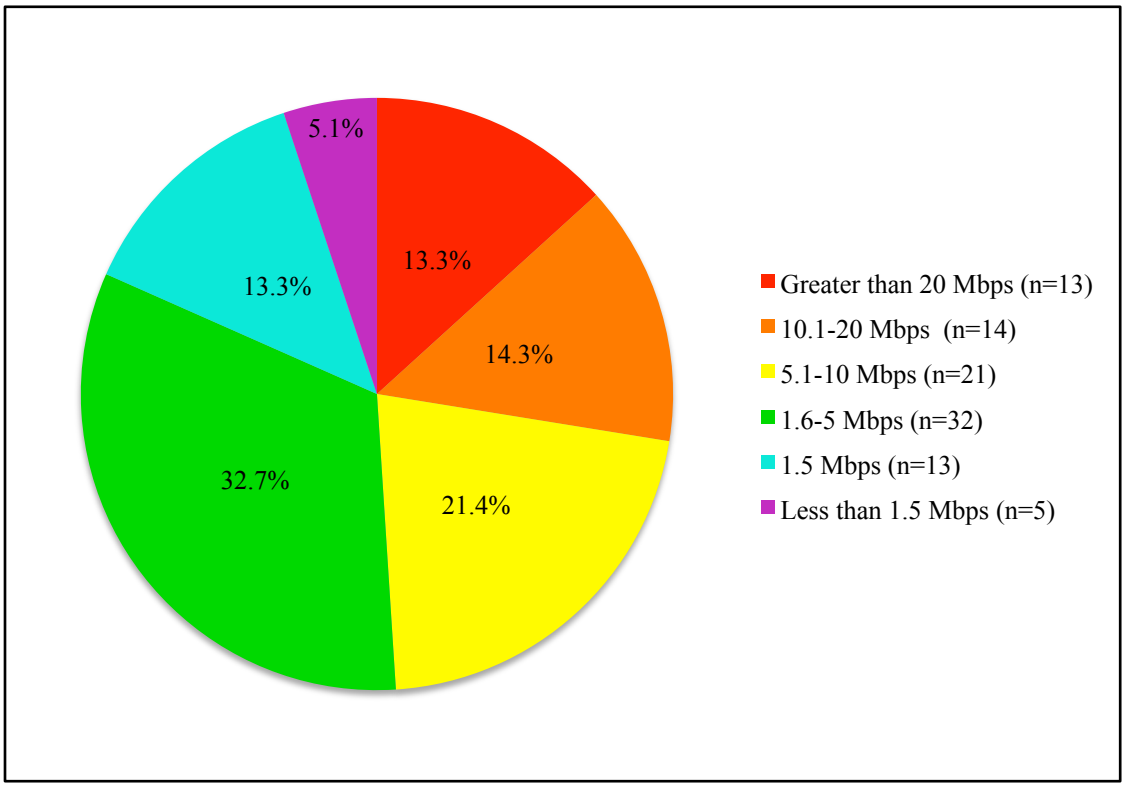
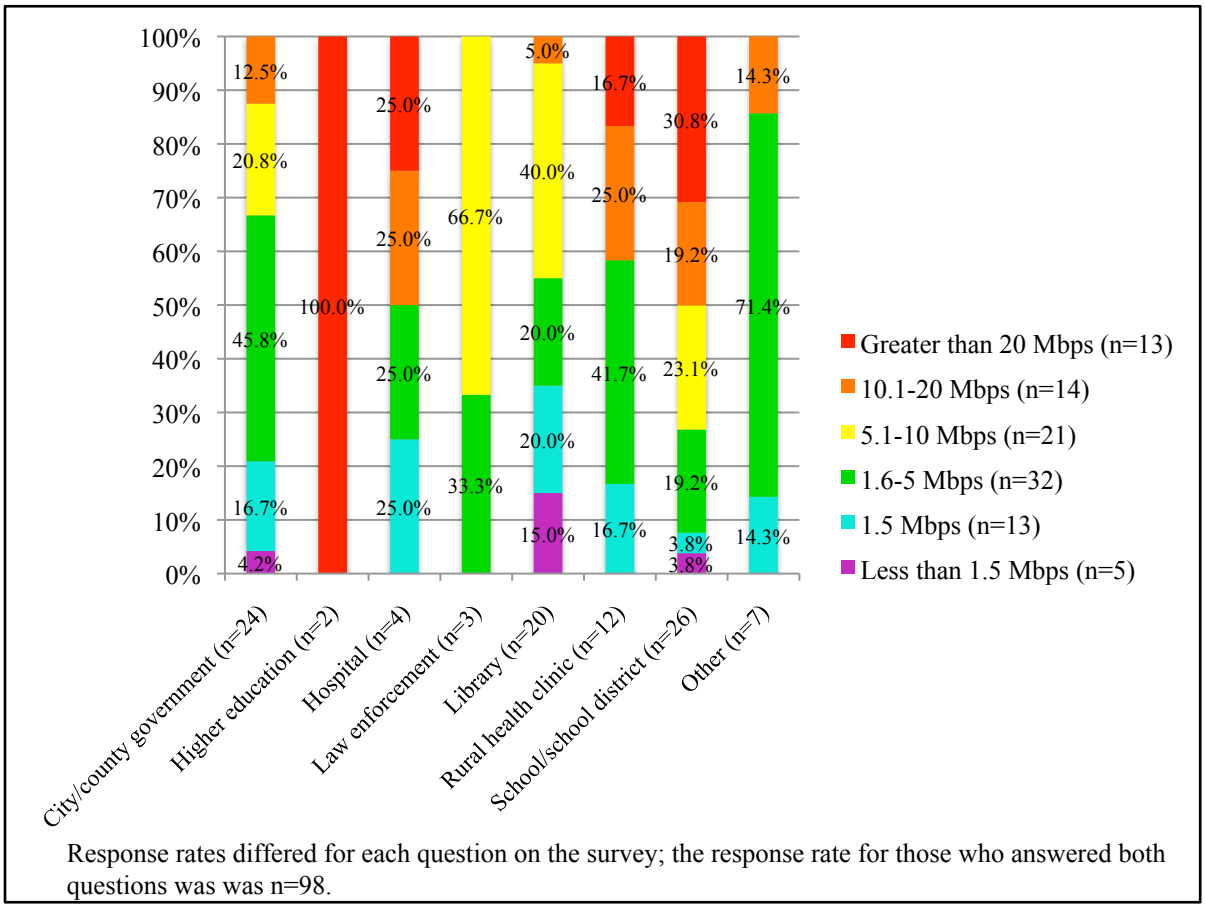


Figure 14. Advertised Speed at the "Front Door"



Response rates differed for each question on the survey; the response rate for those who answered both questions was was n=98.

Figure 15. Advertised Speed at the "Front Door" by Type of Anchor

Respondents completed speed tests (using http://speedtest.net/) on one staff workstation and one public workstation per institution (for institutions that have public access workstations). Almost 40% of staff workstations have downstream speeds of 1.6-5 Mbps (Table 4). This compares relatively favorably with the advertised speed—about 33% of institutions report advertised speeds of 1.6-5 Mbps. However, the comparison of actual speed to advertised speed displays a larger variation in other speed categories. For example, while 21% of institutions report an advertised speed of 10.1-20 Mbps, 16% report that downstream speed at a staff workstation, and while only 5% of institutions have an advertised speed of less than 1.5 Mbps, 26% of speed tests at a staff workstation result in downstream speeds that low. These results indicate that many anchor institutions are not getting the advertised speed at the workstation level. Upstream speed test results at staff workstations show an even larger disparity: 63.0% of respondents report a measured speed of 1.5 Mbps or lower. Fewer than 25% of the anchors report their public workstations have downstream speeds greater than 5 Mbps, 39.5% have downstream speeds less than 1.5 Mbps, and 71.8% of all public workstations report upstream speeds less than 1.5 Mbps (Table 5).

Table 4: Comparison of Advertised Speed to Measured Speed at a Staff Workstation

	Less than 1.5 Mbps	1.5 Mbps	1.6-5 Mbps	5.1-10 Mbps	10.1-20 Mbps	Greater than 20 Mbps
Advertised Speed	5.1%	13.3%	32.7%	21.4%	14.3%	13.3%
Downstream at Staff Workstation	26.0%	3.9%	37.7%	15.6%	9.1%	7.8%
Upstream at Staff Workstation	59.3%	3.7%	19.8%	8.6%	2.5%	6.2%

Table 5: Comparison of Advertised Speed to Measured Speed at a Public Workstation

	Less than 1.5 Mbps	1.5 Mbps	1.6-5 Mbps	5.1-10 Mbps	10.1-20 Mbps	Greater than 20 Mbps
Advertised Speed	5.1%	13.3%	32.7%	21.4%	14.3%	13.3%
Downstream at Public Workstation	39.5%	--	36.8%	13.2%	5.3%	5.3%
Upstream at Public Workstation	71.8%	2.6%	12.8%	5.1%	2.6%	5.1%

Advertised speeds of 10.1-20 Mbps distribute well across the counties, but institutions in only half of the counties report speeds above 20 Mbps (Figure 16). Bradford, Dixie, Gilchrist, Jefferson, and Lafayette Counties have no institutions reporting advertised speeds above 5 Mbps, but these counties also have low numbers of institutions reporting. The speed story described above—lower actual speeds than advertised speeds—is true by county as well; Figures 16-18 show the difference in advertised versus downstream speeds at staff and public workstations.

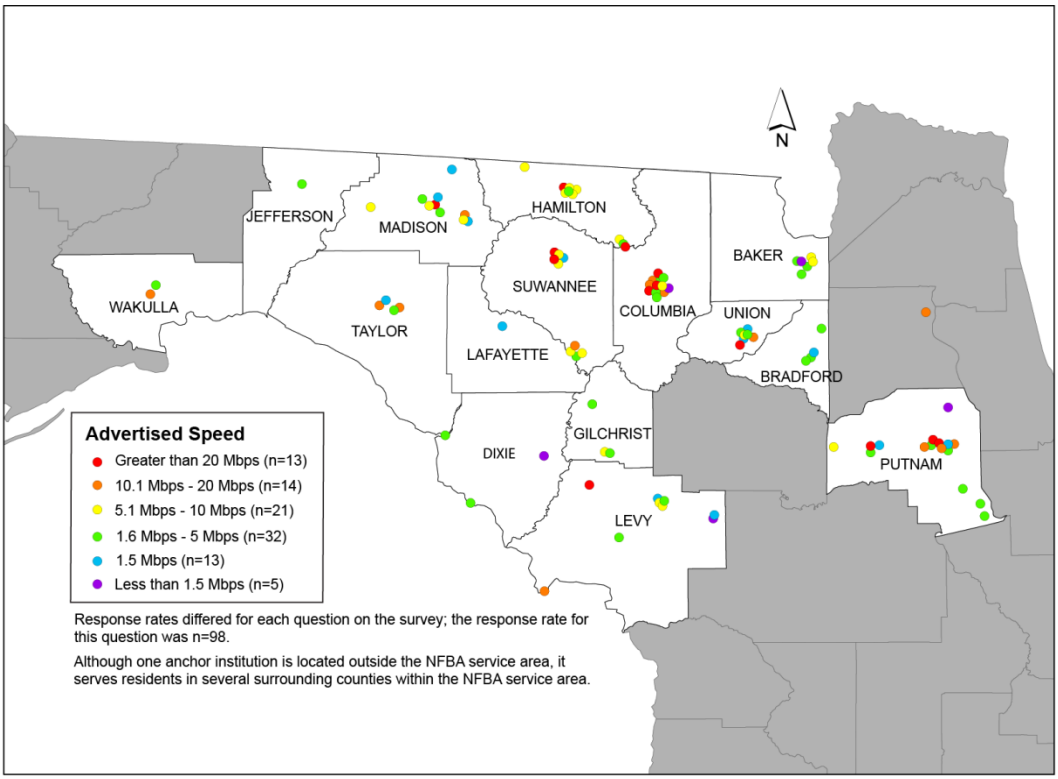


Figure 16. Advertised Speed at the "Front Door" by County

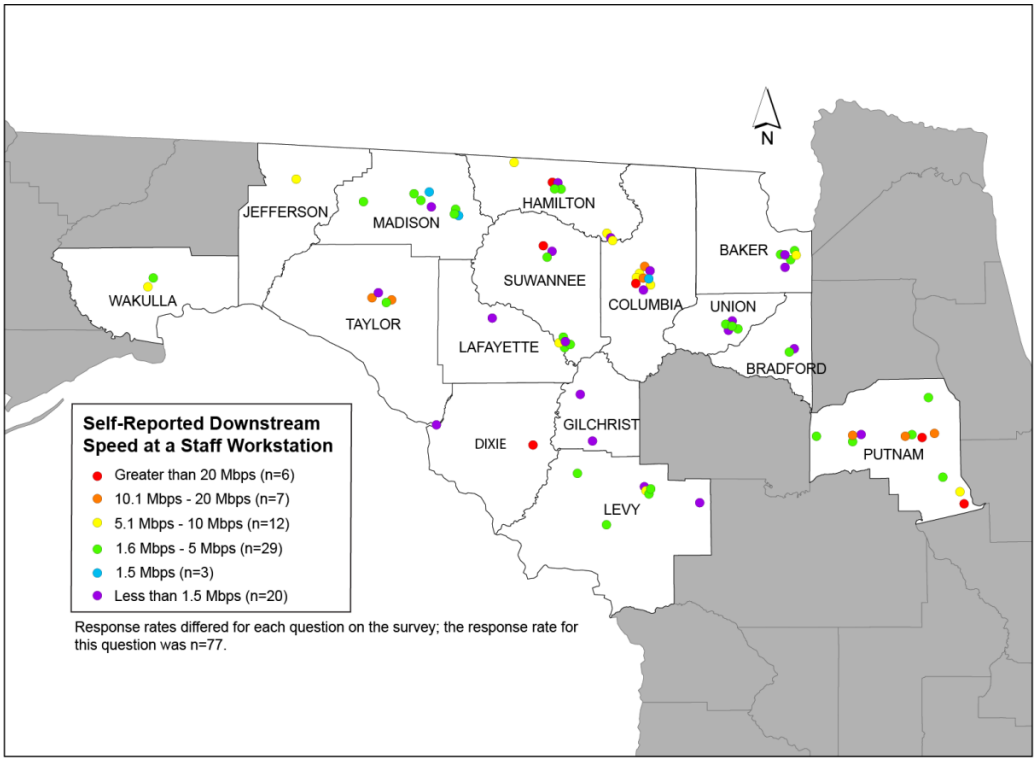


Figure 17. Actual Downstream Speed by County – Staff Workstation

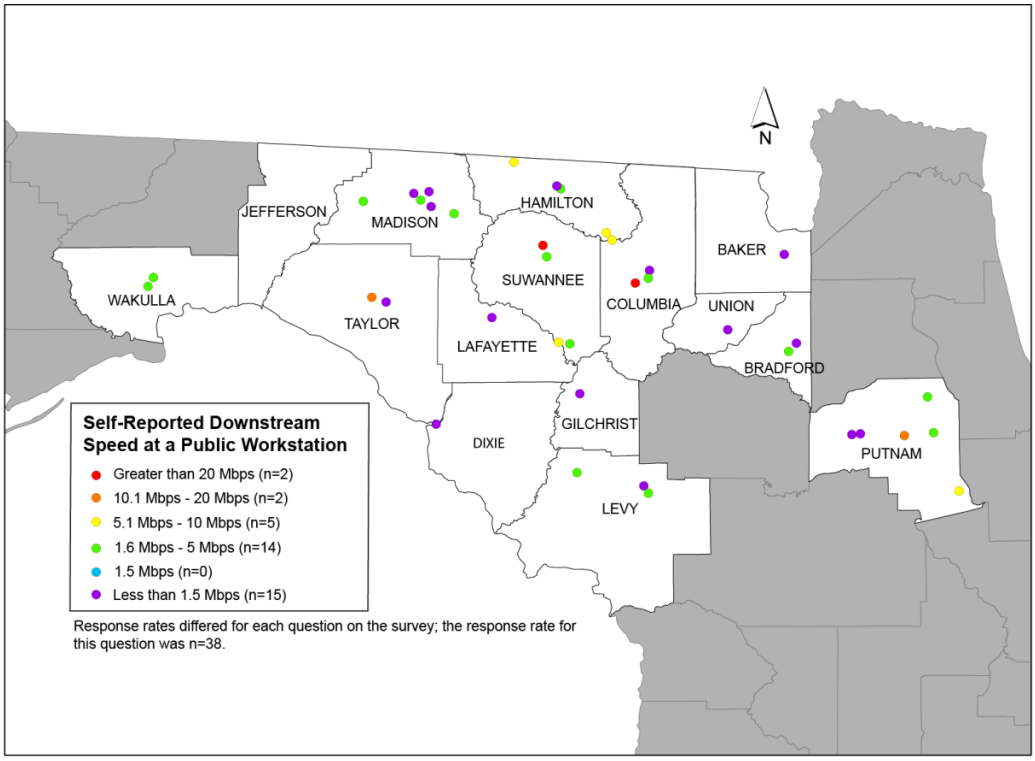


Figure 18. Actual Downstream Speed by County – Public Workstation

Staff and Public Workstations

In addition to having slower downstream and upstream speeds than advertised at both staff and public workstations, anchor institutions use relatively older computers. Over half (53.2%) of all staff workstations at reporting anchor institutions are 3-4 years old or over 4 years old (Figure 19). In contrast, 17.9% of reported staff workstations are less than a year old (Figure 19). Similarly to staff workstation age, public workstations that are 3-4 years old comprise over half (51.8%) of all public workstations in reporting institutions (Figure 20), and 16.6% of all reported public workstations are less than one year old.

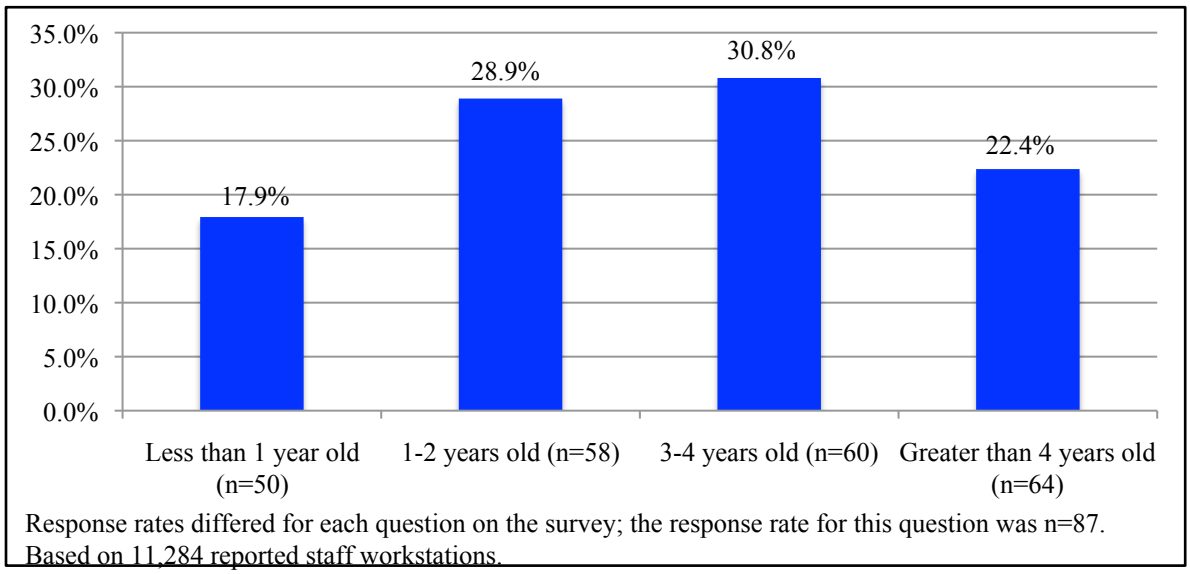


Figure 19. Age of Staff Workstations (Based on Total Number of Reported Workstations)

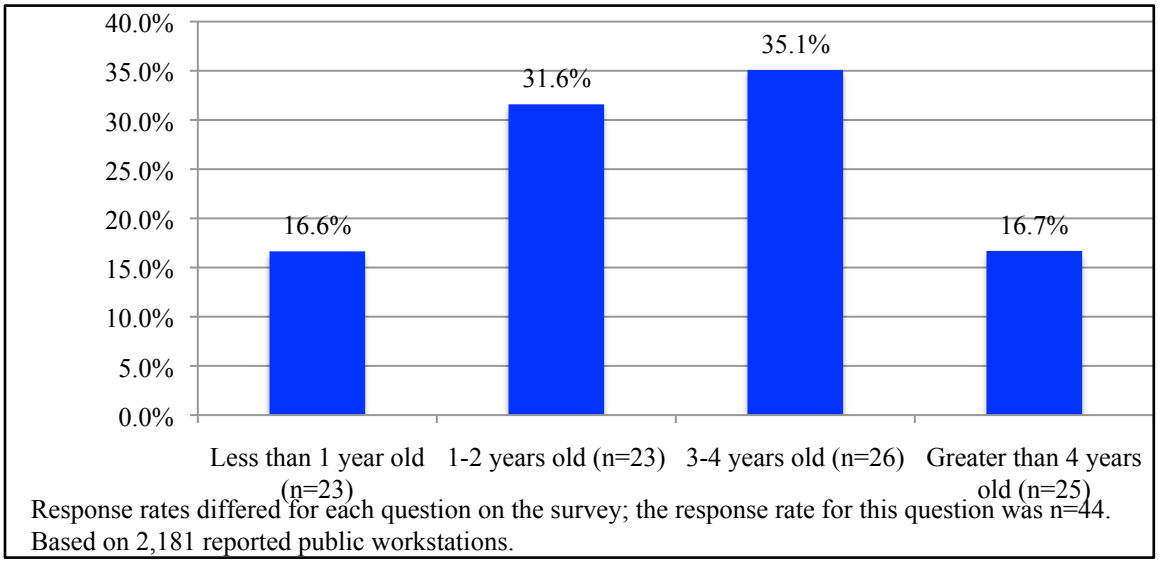


Figure 20. Age of Public Workstations (Based on Total Number of Reported Workstations)

Current Cost for Anchor Institution Bandwidth

Internet Cost and Source of Funds

Institutions are paying a wide range of costs for their Internet service. The majority (62.7%) pay less than $5,000 per year (Figure 21). Two institutions report paying over $50,000 per year, and about a third (34.0%) pay $5,000-$49,999 annually. Columbia, Hamilton, and Union Counties have concentrations of higher-cost broadband ($5,000-$19,999) (Figure 22). The median cost among all respondents is $2,880 per year, with a range of $50 to $174,592 for annual Internet service charges. The majority of funds (73.4%) used to pay for Internet service come from institutions' own budgets, with county/regional (29.1%) and state (25.3%) budgets representing most of the balance (Figure 23).

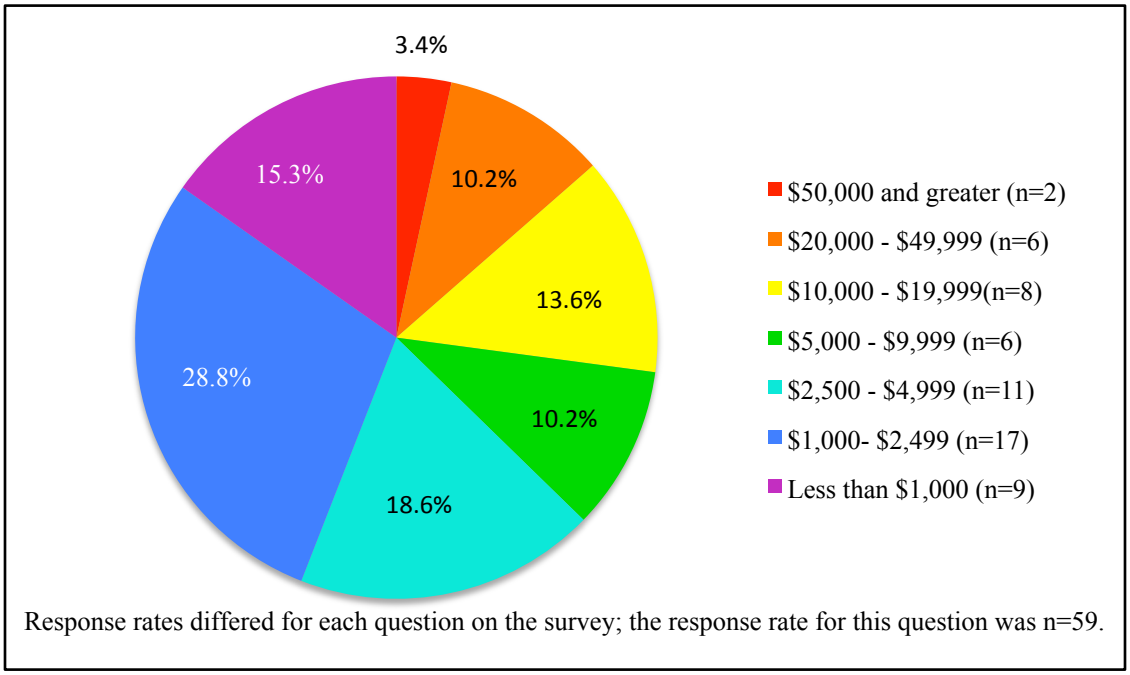


Figure 21. Total Annual Cost of Internet Service (All Institutions)

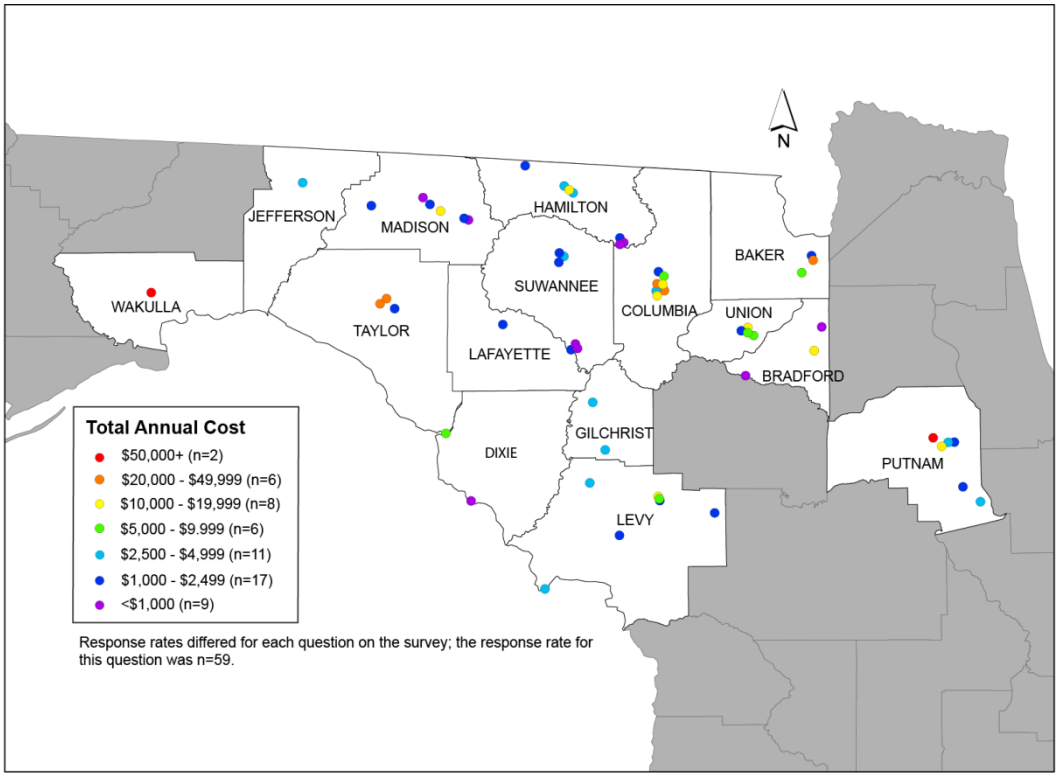


Figure 22. Total Annual Cost of Internet Service by County (All Institutions)

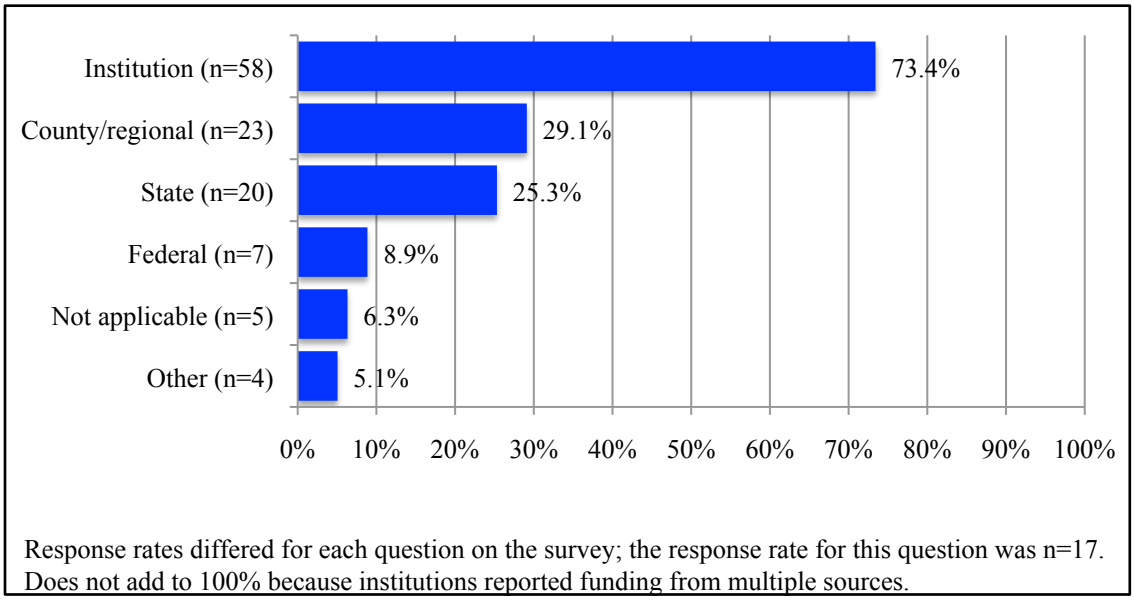


Figure 23. Source of Funds to Pay for Internet Service

Most schools and libraries (64.7%) pay less than $1,000 per year after their E-rate discounts;[12] 11.8% pay $2,500-$4,999 (Figure 24). These figures may explain why the majority of reporting institutions pay less than $5000 per year; it is not necessarily that the Internet Service Providers (ISPs)[13] are charging less than $5,000 per year, it is more than two-thirds of schools and libraries (which comprise 45.5% of all survey respondents) are receiving a federal discount on their Internet costs.

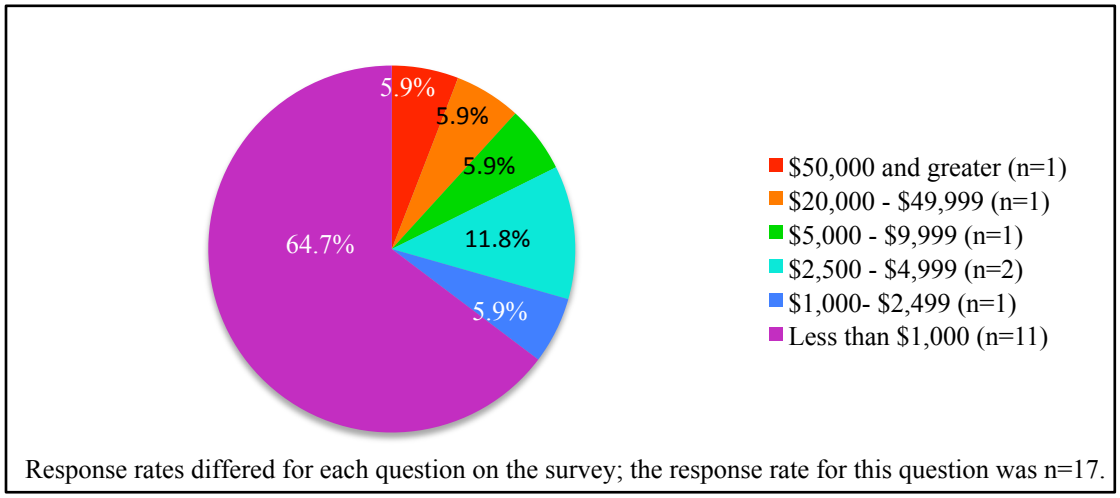


Figure 24. Total Annual Internet Cost for Schools and Libraries After E-rate Discount

Vendor(s) Currently Supplying Existing Anchor Institution Bandwidth

Type of Connection and Internet Service Provider

Slightly under half of respondents (43.0%) have DSL connections, followed by fiber (22.0%) and Ethernet (21.0%) (Figure 25). Nine percent of respondents report using a cable modem. Respondents subscribe to a range of ISPs. The most frequently reported ISPs are AT&T and Windstream (25.0% and 24.0%, respectively), followed by Century Link (18.0%) (Figure 26). Fifteen percent of respondents report being on the DMS state contract; this may represent AT&T subscribers as well given that AT&T is the provider on the state contract, in areas where AT&T offers service. Ten percent report subscribing to Comcast, which comports with the 9.0% who report having a cable modem (Figure 25). The survey shows a regional distribution of ISPs. AT&T serves most in the eastern section of the NFBA area, and Century Link predominates in the western end (Figure 27). Windstream subscribers concentrate most in the central portion of the NFBA service area, but the ISP is also in Putnam County.

[12] E-rate is a federal subsidy program for schools and libraries to obtain discounted telecommunications service, including Internet. Discounts are based on the percentage of the school age population receiving free or reduced lunch within the entire service population. For more information, see: http://www.usac.org/sl/

[13] An Internet Service Provider (ISP) is a company that provides the front-door connection to the Internet, such as AT&T, Comcast, and in Florida, the Department of Management Services. ISPs for the NFBA service area are discussed below.

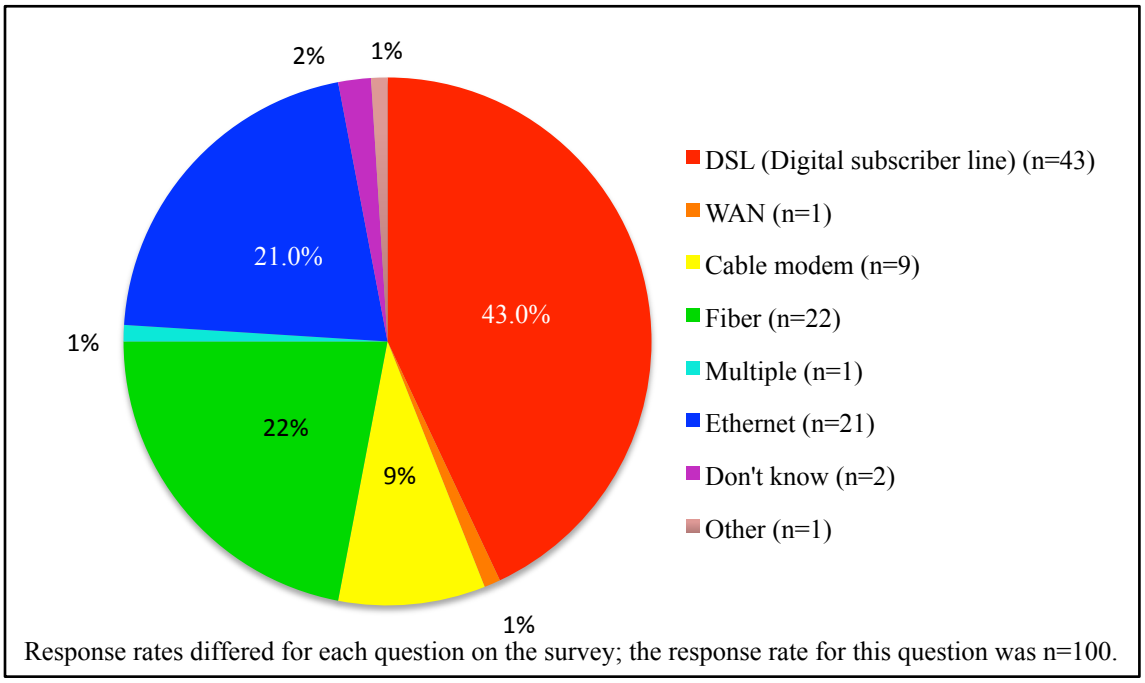


Figure 25. Respondents by Type of Internet Connection

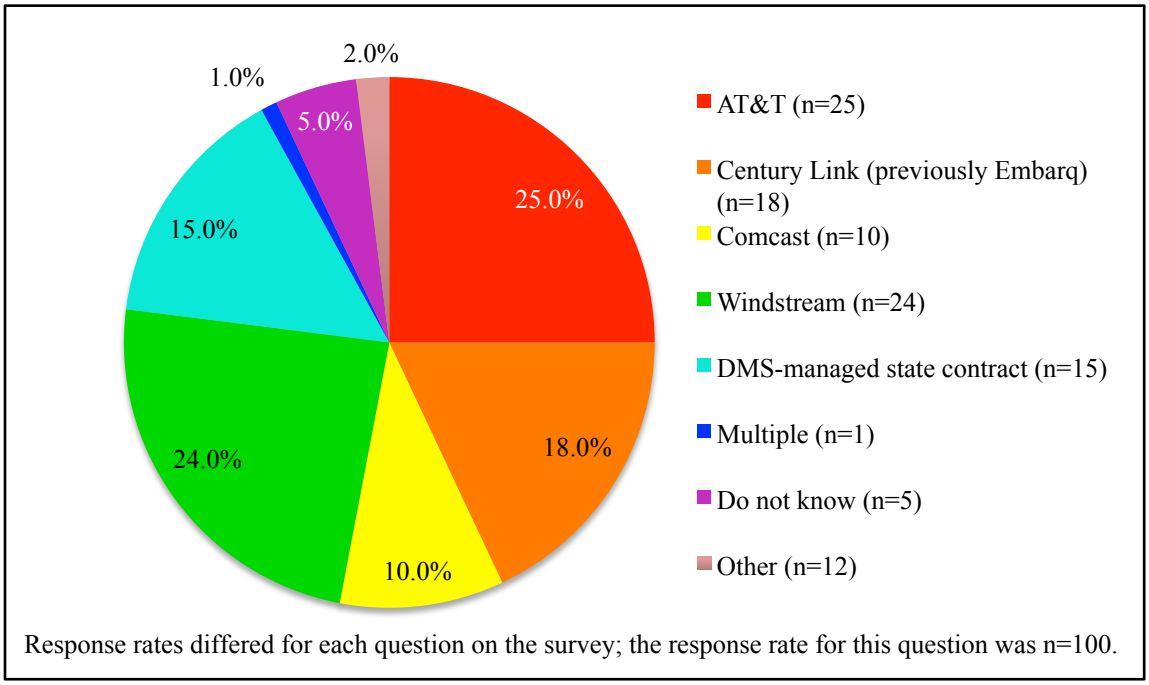


Figure 26. Respondents by Internet Service Provider

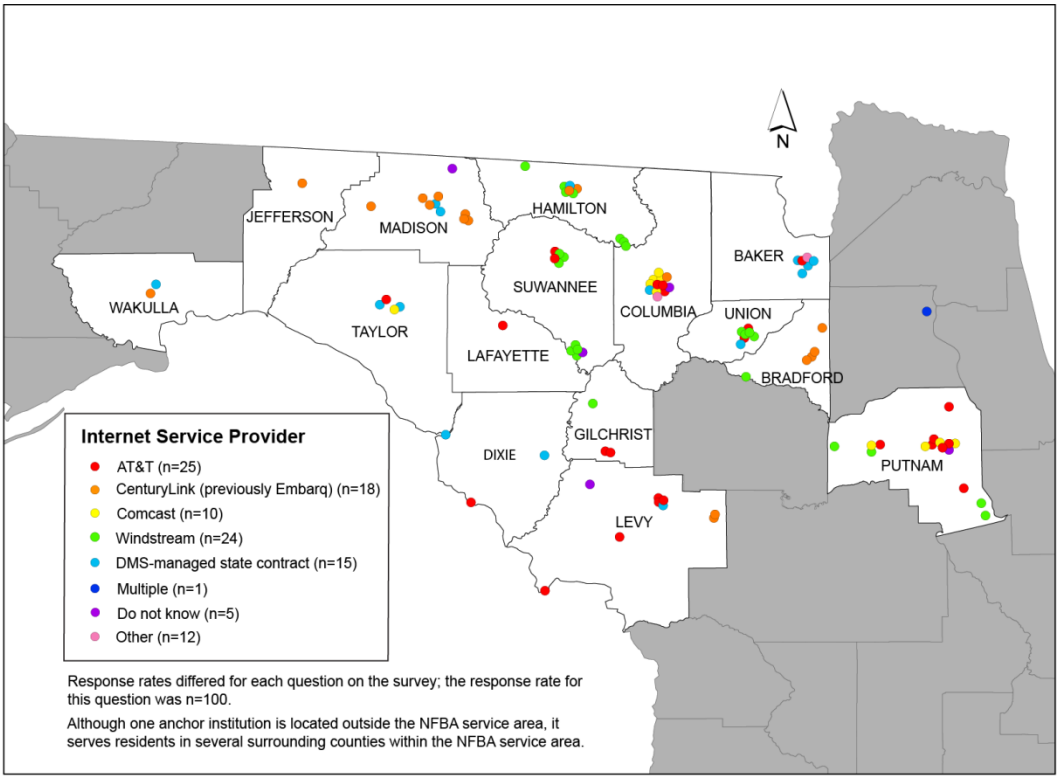


Figure 27. Internet Service Provider by County

Factors Affecting Anchor Institution Adoption of High-Speed Broadband

Increasing Speed and Obtaining Wi-Fi

Seventy percent of respondents indicate an interest in increasing their Internet speed (Figure 28), but only 7.1% have plans to do so. This question uncovers two major barriers to adoption of high-speed broadband Internet—28.3% of respondents cannot afford faster Internet, and 24.2% are currently at the maximum speed available to them. According to survey respondents, a lack of technical knowledge is not a driver in this decision. When asked what speed they would like to have, 28.3% of respondents indicate their institutions' connection speeds already are sufficient (Figure 29), which matches with the 29.3% of respondents that lack interest in increasing their connection speed (Figure 28). On the other hand, 52.5 % of respondents would like to have speeds above 10.1 Mbps (Figure 29).

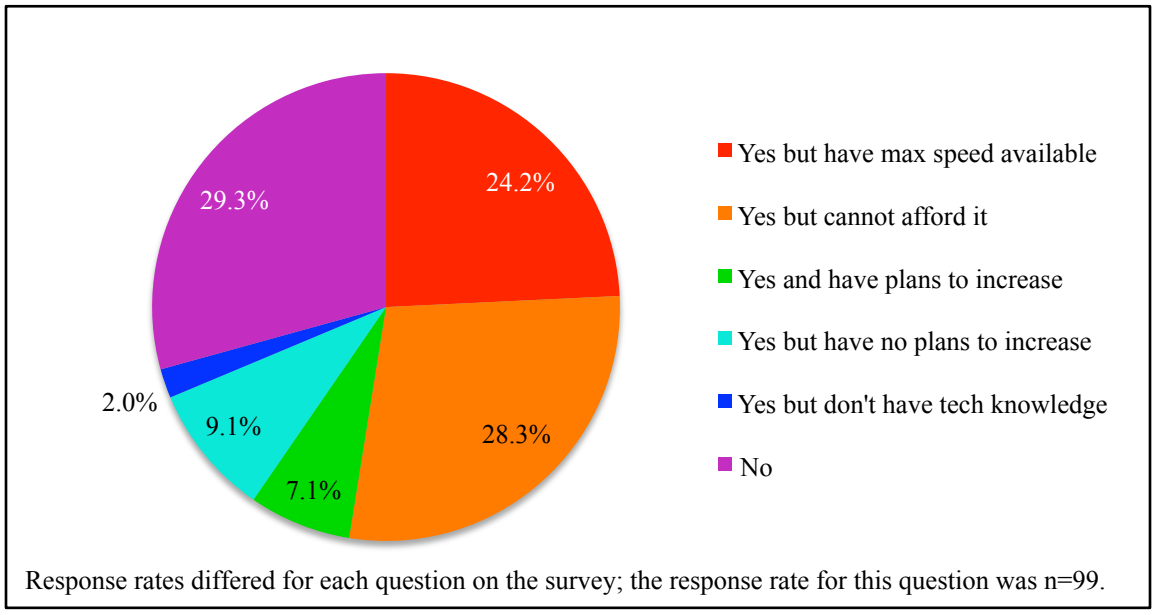


Figure 28. Interest in Increasing Connection Speed

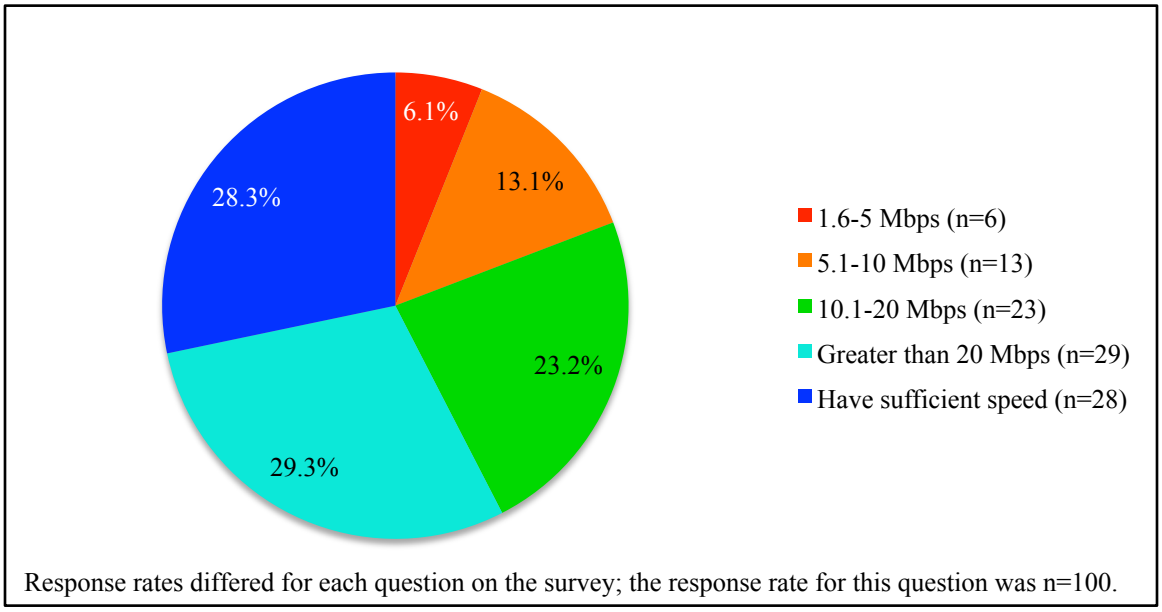


Figure 29. Desired Internet Connection Speed

Only 29% of those who don't have Wi-Fi (27.0% of respondents do not have Wi-Fi currently; see Figure 5) are planning to obtain it within the next year and 16.7% are planning to do so in more than 12 months (Figure 30). However, the majority of anchor institutions that do not have Wi-Fi currently (54.2%) have no intention of adding a Wi-Fi network.

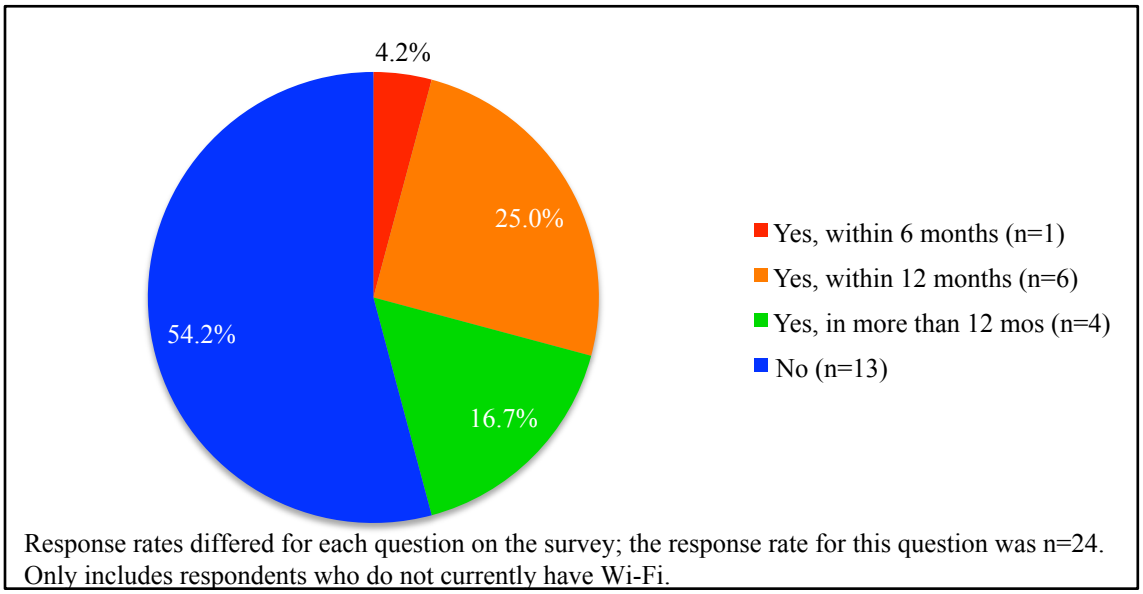


Figure 30. Plans to Obtain Wi-Fi

As noted previously, costs and availability are the largest obstacles to obtaining broadband and increasing speed, with 70.3% of respondents indicating ongoing maintenance costs as an obstacle, 70.3% reporting Internet service cost as an extremely or very important obstacle, and 69.3% of respondents reporting availability of providers (Figure 31). Also, technical issues and personnel are significant factors, with 58.4% of respondents noting that each is an extremely or very important obstacle. While almost 60% of respondents noted issues with the availability of specialized IT personnel as an obstacle here (Figure 33), when asked about their interest in increasing Internet speed, only 2% replied that they would like to increase speed but lack the technical knowledge (Figure 28). These are all significant barriers to the introduction of Wi-Fi as well as obtaining broadband and increasing speed (Figure 32).

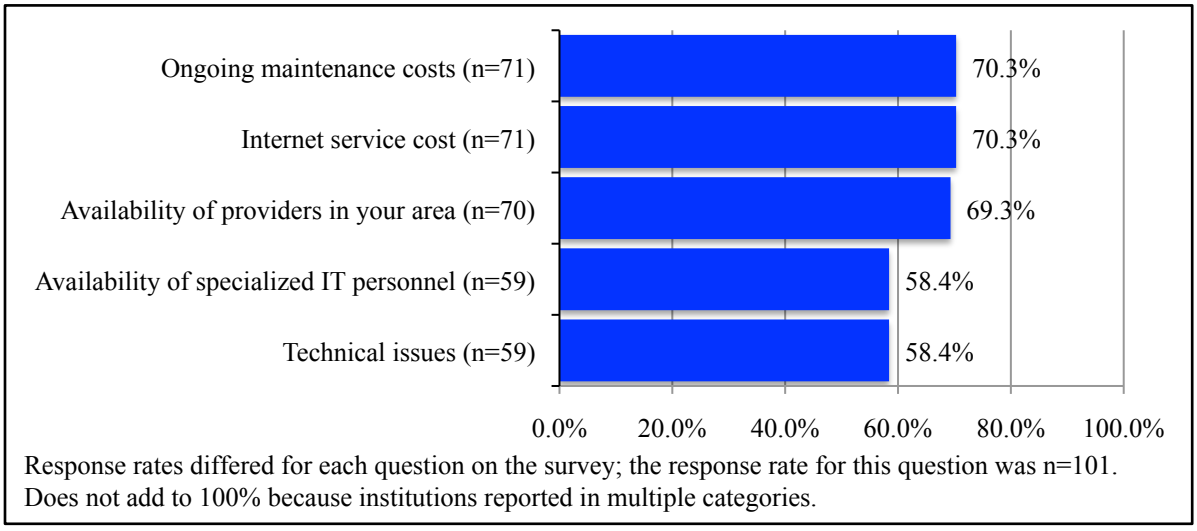


Figure 31. Obstacles to Obtaining Broadband or Increasing Speed-Extremely/Very Important

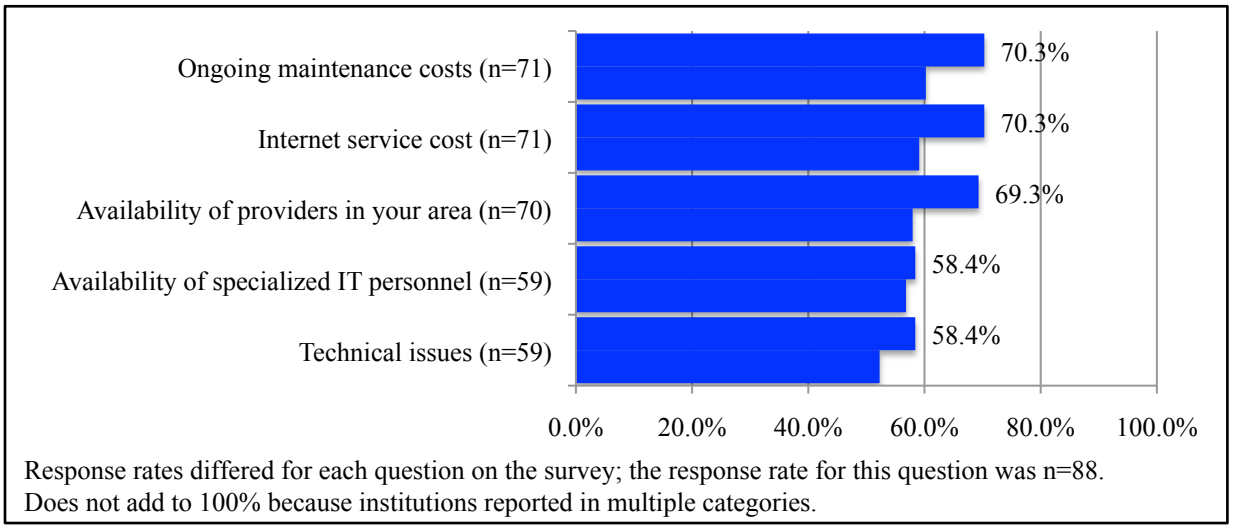


Figure 32. Obstacles to Instituting Wireless Service-Extremely/Very Important

The IT Director has authority to contract for Internet services in 24.5% of institutions (Table 6). Hover, in most cases, the person with such authority is an administrator of some sort. It is therefore unknown how much expertise decision makers have about broadband, its potential, and what kind of networks are needed to meet present and future needs of the staff and public.

Table 6: Title of Person with Authority to Contract for Internet Services

Title	%	Title	%
Information Technology Director (n=25)	24.5%	Media Services (n=2)	2.0%
Director/Interim Director (n=11)	10.8%	President (n=2)	2.0%
City/Town Manager (n=7)	6.9%	Sheriff (n=2)	2.0%
Manager (n=7)	6.9%	Department of Health (n=2)	1.0%
Multiple (n=7)	6.9%	District Level (n=1)	1.0%
Manager/Librarian (n=5)	4.9%	Finance/Assistant Finance Director (n=1)	1.0%
Chief Executive Officer (n=4)	3.9%	HR Development & Systems Manager (n=1)	1.0%
Commissioner/Board of County Commissioners (n=4)	3.9%	Network Specialist (n=1)	1.0%
Network Manager (4)	3.9%	Owner (n=1)	1.0%
Superintendant of Schools (4)	3.9%	Police Chief (n=1)	1.0%
Administrator (n=3)	2.9%	Principal/Assistant Principal (n=1)	1.0%
Library Director (n=3)	2.9%	Trustee/Board of Trustees (n=1)	1.0%
City/Town Clerk (n=2)	2.0%	County Coordinator (n=1)	1.0%

Response rates differed for each question on the survey; the response rate for this question was n=102.

Staff and Public Comfort with Broadband-Enabled Applications

The levels of staff and public comfort with broadband enabled applications and advanced Internet skill areas (Figures 8 and 9 above) are factors that potentially inhibit he adoption of

faster and more robust broadband Internet. As noted above, both staffs and public users of anchor institutions are not extremely or very comfortable with advanced wireless or broadband, and few public users are extremely or very comfortable with basic wireless, basic broadband, or advanced Internet skills (6.7% for each). If the staff and public are unable to make use of the improved broadband, or are unaware of its potential to improve their work and private lives because of such, it may be less likely that they will express demand for broadband improvement.

In addition, if decision-makers are aware of the lack of skill level, they may be less likely to authorize broadband improvements on the basis that their staff and users will no utilize such improvements fully. Although respondents are aware of the skill level issues, there are few plans for training that would ameliorate the situation (Figures 10 and 11 above). It is unclear whether the lack of training plans is due more to resource issues (such as time and money) or simply an expression of a lack of expressed need for training. In either case, this is a clear barrier to adoption of higher speed broadband.

Other Potential Concerns

The fact that institutions are mostly self-funding for the Internet (Figure 23 above) can be a facilitator of broadband adoption because they may have greater control over their own budgets than over the availability and use of outside funds; however, this may be a barrier if budgets are not high enough to support faster broadband connections and expanded broadband services. The relative age of staff and public workstations—53.2% of staff workstations and 41.8% of public workstations are 3 or more years old (Figures 19 and 20 above)—is a potential problem. Older computers may not be able to handle high-speed Internet connections efficiently, so improvements in broadband speed and capacity may not add materially to the day-to-day operations of anchor institutions or their public users.

Summary of Survey Findings

The results of this survey show a distinct need for improvement of broadband Internet and broadband support in the NFBA anchor institutions. True high-speed Internet service is a rarity among this group,[14] broadband-related skill sets are not high, and many of the staff and public workstations are relatively old. However, the staffs of these institutions may not be aware of the extent of this problem or its potential ramifications given their lack of knowledge of advanced Internet and broadband topics. Very few respondents indicate that their broadband is insufficient for staff and public needs and there are few plans for improving broadband-related skill sets, despite the low speeds reported at staff and public workstations as compared to advertised speeds. Even where there is an awareness of the need for improvement, there may not be sufficient resources or support for such improvement—many respondents indicated a desire to increase their Internet speed, but almost none have plans to do so, possibly due to lack of funding, knowledgeable staff, or other resources. Additional analysis of survey findings will appear in the final report (December 31, 2011).

[14] The FCC now defines broadband as 4 Mbps downstream and 1 Mbps upstream, which is still below the speeds recommended by Microsoft, Google, and others in their comments to the FCC with regard to a proposed definition of broadband.

Focus Group Findings

Introduction

While focus group participants anticipate eagerly the high-speed broadband that is to become available via the NFBA middle mile network, they raise a number of concerns and issues regarding their ability to connect to, deploy, manage, and use high-speed broadband. Findings suggest that participants believe someone (although it is unknown who) needs to address and resolve a host of infrastructure and support issues before they can take advantage of high-speed broadband. Some of these infrastructure support issues relate directly to particular concerns regarding out-of-date networks, hardware, and software at their anchor institutions; the need for a better understanding of what broadband is and why it is important; the role of the NFBA in assisting them; and other issues related to efforts such as how improved broadband access will, in fact, support local economic development.

The range of anchor institution support needs include education, broadband planning, promoting broadband availability, understanding current and future broadband applications, economic development techniques, and updating physical facilities, among others. Anchor institutions (and others) will need to address these concerns to obtain, deploy, and exploit high-speed broadband fully. The most pressing needs are for anchor institutions, either separately or in collaboration with other county or regional anchor institutions (or with others), to develop broadband plans. These plans need to describe and schedule a process for the anchor institution (with others) to take advantage of the newly available high-speed broadband, which likely will cost significantly less than the broadband that is currently available. The plans will need to identify strategies related to awareness; education; network, hardware, and software development; collaboration; implementation of new broadband services; organizational impacts from broadband; economic development; and other topics.

Participants make it very clear to the study team that, while completing the middle mile project to make broadband more accessible and affordable is an important step, equally or more important is assistance to individual anchor institutions in accessing, deploying, and using the broadband to better meet staffs' and users' broadband needs. A number of participants are not aware of how they could, in fact, take advantage of higher speed and less expensive broadband due to restrictions placed on them by the very difficult financial situations facing their institutions.

Needs assessment and benchmarking project goals related to the focus groups are the following:

- Describe the existing and future broadband uses and applications of the region's anchor institutions;
- Identify situational factors and issues that impact whether anchor institutions decide to obtain or increase broadband capacity; and
- Assist the middle mile network designers to deploy and configure the network such that it best meets the current and future needs of anchor institutions.

The following section reports focus group findings in the context of those goals, with the addition of an introductory section that overviews focus group respondents.

Respondents

The Information Institute study team conducted six focus group sessions in the NFBA service area in December 2010 and January 2011 to better understand anchor institution broadband needs and issues. Overall, 58 participants representing multiple types of anchor institutions throughout the North Central RACEC plus Wakulla County, welcome the opportunity to connect to high-speed broadband at significantly reduced costs compared to what they currently pay. Focus group participants represent all 15 counties in the NFBA service area (Figure 33) and a variety of anchor institution types (Figure 34). Also, participants hold myriad titles within their organizations (Figure 35). Study team members who conducted the focus groups obtained a significant amount of information, as each group included 8-12 participants and lasted, typically, two hours. The themes of the focus group discussions were similar, so the following sections report findings as a summary of all six meetings rather than on an individual, session-by-session basis.

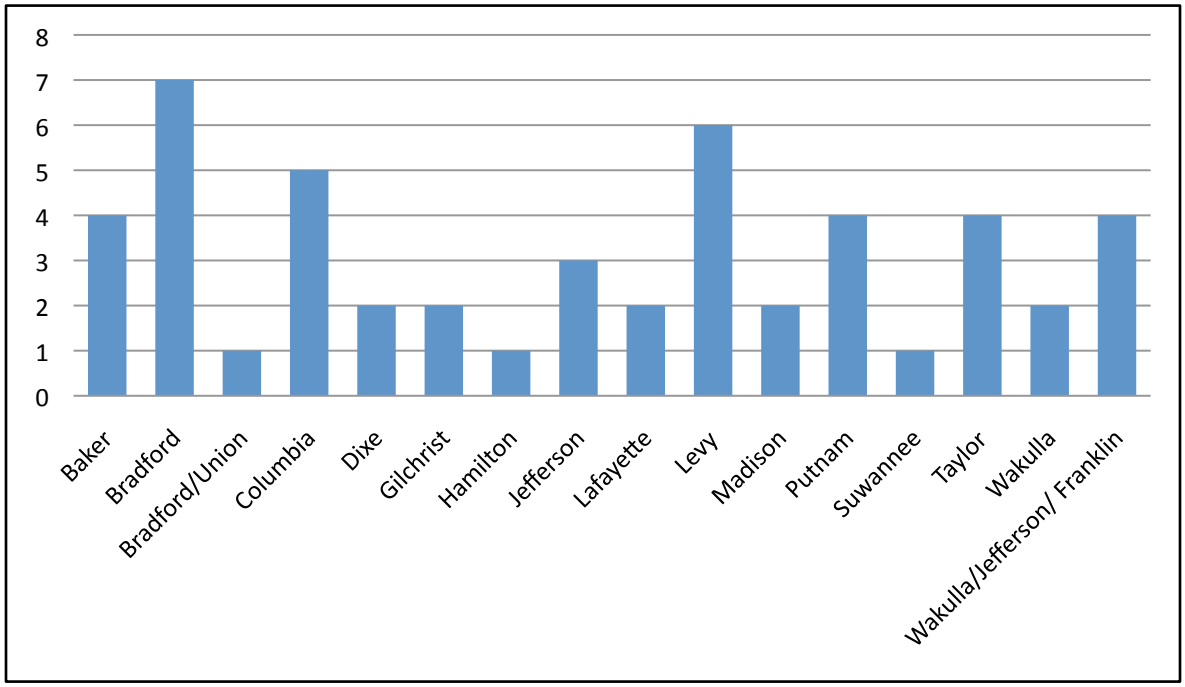


Figure 33. Number of Representatives from Each County in NFBA Focus Groups

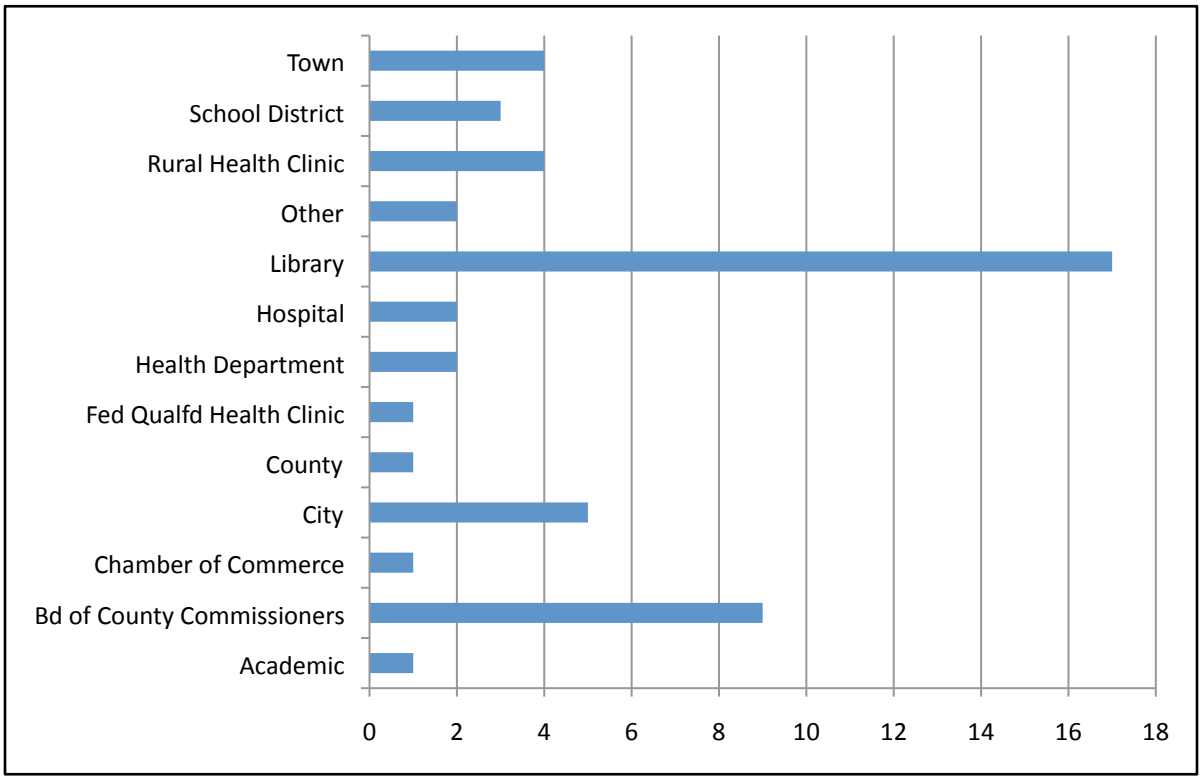


Figure 34. Number of Representatives from Each Anchor Institution Type in NFBA Focus Groups

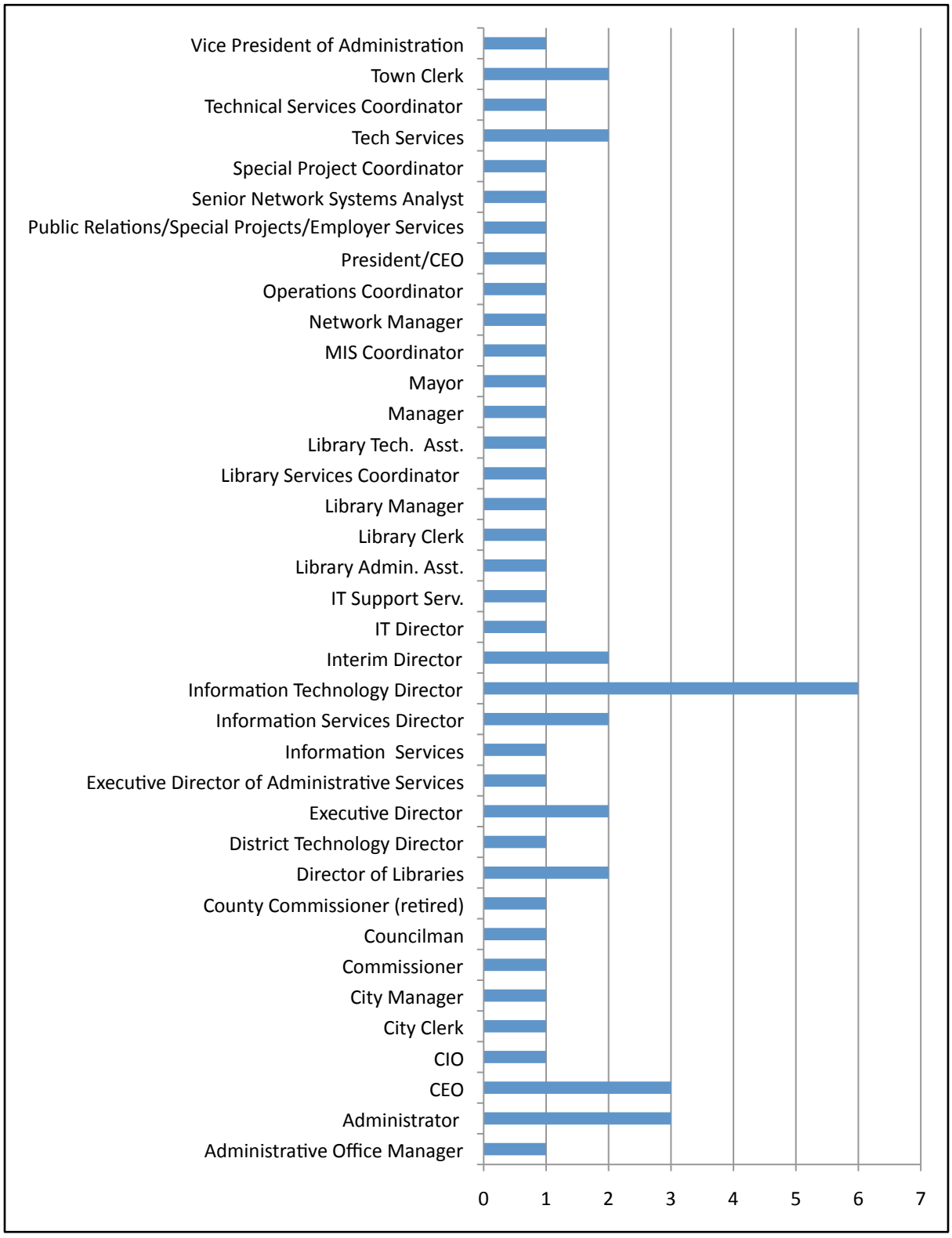


Figure 35. Job Titles Held by Anchor Institution Representatives at NFBA Focus Groups

Anchor Institutions' Existing and Future Broadband Uses and Applications

Internet Connectivity

Participants report a broad array of types of Internet connectivity from a range of ISPs at varying degrees of cost. Connections range from dial-up speeds to 20 Mbps at the front door, to locations in selected counties where only an air card or satellite connection are possible because no ISPs make broadband connections available. Assessment shows a wide range of the quality and/or cost of broadband from the various ISPs. Most participants report they do not understand pricing structures for governmental units, other anchor institutions, and residences very well as there appear to be significant differences in pricing depending on which type of organization or residence is involved.

Participants have a number of horror stories regarding getting connected, negotiating contracts, obtaining reliable services, etc. One participant comments that, regarding broadband connectivity in her county, "there is the good, the bad, and the nonexistent." In reference to another county, a participant says, "It's a nice place to visit, but I wouldn't want to get Internet there." A number of participants report difficulties in obtaining adequate speeds and high quality services from the state contract. One participant notes that it takes him all week to do a complete organizational backup due to slow speeds and another reports that when she attaches four or more JPEGs to an email, the system usually crashes.

Anchor institution participants that have clients who need to access services from their homes (such as hospitals, schools, libraries, cities and counties with e-government services) raise concerns about the lack of, or limited, broadband connectivity to these residences. One person notes that even if they significantly improve high-speed broadband at their institution, it may not help people who use those services at home unless they, too, can connect to and afford the new high-speed broadband services.

Participants' define "sustainability" of any new or upgraded broadband connections largely in terms of obtaining the broadband initially at a cheaper cost than they pay now, but there is no real notion of finding extra resources to sustain better broadband if it were to cost more than what the anchor institution pays now. Most participants think that the best strategy to sustain a new high-speed broadband connection would be to obtain the connection at a significantly reduced price compared to what they currently pay and use the difference to maintain or expand broadband services. Others believe that any cost savings on the broadband connection simply will return to the central agency governing their budgets.

Internet Connectivity Costs and ISP Contracts

One participant notes that whatever the monthly cost is for the connection, it is too expensive. This point about cost is critical. Almost all respondents note that whatever they currently pay for Internet connection would be the maximum they could pay for any new or enhanced connections that might result from the NFBA middle mile project. Indeed, many of the participants are under pressure to *reduce* ISP and broadband costs due to bleak budgets in

these rural counties. Most agree that cost for broadband is the single most important factor that would determine the purchase of additional or higher speed broadband.[15]

Some county and municipal government representatives are uncertain as to the provisions of the state contract with AT&T and how the availability of that contract affects their access to other ISPs for obtaining high-speed broadband. Indeed, a person from a county health department is under the impression that she has no choice but to obtain her Internet connection through the Department of Management Services (DMS) via the AT&T statewide contract. She has requested specific procedures to remove her institution from that contract and negotiate with other ISPs for broadband services.[16]

In terms of broadband development, participants note that oftentimes there are a large number of ISPs (including satellite-based ISPs) operating within a county or region. The degree to which they can be compared in terms of "best" cost, or "highest dependability," or "fastest speed," or other criteria is difficult to determine. And whether they actually can serve a remote geographic area successfully also may be difficult to determine. Indeed, a number of participants indicate some considerable dissatisfaction with the marketing and promotion done by ISPs versus what they are actually able to deliver in their particular region.

A number of the library and school representatives understand the E-rate program and its importance to the support and sustenance of broadband in their institutions, but others have no familiarity with the E-rate program or the Rural Health Care Pilot Program (RHCPP).[17] Participants from schools and libraries clearly understand that AT&T qualifies to provide E-rate discounts, but that the NFBA does not yet qualify.[18] The school and library participants make it absolutely clear that if they cannot obtain E-rate discounts from a new ISP, they will not switch. It is not as clear if other institutional representatives, including some city/county officials, understand what the E-rate program is and its importance to schools and libraries.

Just prior to conducting the last two focus groups, a spokesperson from NFBA announced that the NFBA network probably would not meet the requirements to qualify for obtaining E-rate discounts until the end of 2011. In terms of a time line, the best case scenario for schools, libraries, and rural healthcare clinics in the NFBA service area would be that the NFBA qualifies prior to November 2011; schools, libraries, and rural health care clinics submit their applications to obtain the discounts to the federal government in November 2011; the government approves the applications; and then, beginning in July 2012, the schools, libraries, and rural health care clinics could start receiving the E-rate discounts for NFBA-supplied broadband connections.

[15] At the time the study team conducted these focus groups, specific costs for different types of connections and their speed from NFBA were not available for participants to review and offer comments.
[16] An interview with staff from the Department of Management Services indicated that county health departments can contract with ISPs under certain conditions, but that process requires approval from the state Department of Health.
[17] Like E-rate, the Rural Health Care Pilot Program (RHCPP) is a federally funded subsidy program to provide discounted telecommunication service (including Internet) to rural healthcare institutions. For more information, see http://www.usac.org/rhc-pilot-program/
[18] NFBA officials expect to have the network qualified for E-rate discounts by the end of 2011.

Networks

Participants also report a broad range of internal organizational types of networks and configurations with various types of servers, routers, workstations, and other equipment. Depending on available resources and physical requirements, some counties have countywide networks and others do not. There is significant agreement that much of the network hardware is dated (i.e., three or more years old) and that this likely contributes to poor Internet connectivity. In addition, a number of participants are not technically oriented and have limited knowledge about their ISPs, Internet connections, or natures of their internal networks.

Administrators' Understanding of Broadband

A number of the administrators in organizations represented by focus group attendees do not see the importance or need for improved broadband. One person notes that if his boss does not understand why better broadband deployment and access is important, then he certainly will not use scarce local resources to purchase broadband. One director of county IT states that most organizations in his county would be able to perform adequately with a T1 line (which provides speeds up to and including 1.544 Mbps). Yet, one person tells of a small start-up company in his town wanting to establish a call center and finding that available bandwidth in that town would not support 20-25 new workstations; this delayed the call center's opening by months.

Evaluation

Some participants assume that whatever their current broadband connection and speed are, they are "good enough." So participants cannot answer easily the question of what "good enough" broadband connectivity, speed, and cost are. Such is especially true given that a number of the participants are not aware of various broadband services and applications that *could be offered* if the anchor institution were to have high-speed broadband. Some who think that they have "good enough" bandwidth and "good enough" broadband applications do not see the need for ongoing institutional- and community-based evaluation of broadband connectivity and services.

Participants also identify the importance of evaluating their users' broadband needs as a basis for developing and deploying various broadband applications and services. They note, however, some concerns with such an effort:

- There are few resources available at the anchor institutions to identify the broadband needs of either institution staff or clientele in a systematic way;
- If they were to ask staff or clientele what broadband services or applications they need, it is unlikely that they would have adequate knowledge to know what to request; and
- A number of participants state, quite frankly, that they do not know what broadband services and applications they could recommend for implementation.

Once again, the sense from a number of the participants is that they would need help in identifying which broadband services they need *now* and how to prepare staff and/or clientele for *future* broadband services.

Some participants recognize the need for an ongoing data collection process to document and determine the degree to which anchor institutions improve, extend, or expand broadband connectivity and services. They realize that, similar to other organizational expenses, their administrations likely would request justification and accountability of broadband and broadband services. But data are not available from all North Central RACEC and Wakulla County anchor institutions to benchmark their existing broadband connections, services provided, speed, and cost, for example, because many do not know what they are and either have not or are unable to report this data on the survey discussed above.

Thus, there is a recognition that it is important for anchor institutions and others to be able to demonstrate the impacts, outcomes, increased productivity, benefits, jobs retained or added, and cost-savings, among other potential measures, resulting from subscribing to high-speed broadband. One participant states that although perceived user needs would not drive upgrades, a growing tax base might help justify increased spending. Such measures, especially institutional/community impacts and outcomes resulting from improved broadband, would be very useful for obtaining additional external funding. They are unclear, however, as to how to do this type of evaluation and who, specifically, would do it.

Situational Factors and Issues Impacting Whether Anchor Institutions Obtain or Increase Broadband Capacity

Barriers/Enablers

Broadband "barriers" and "enablers" are factors that either limit or contribute to the success with which individuals and organizations obtain, deploy, manage, and apply broadband. These factors can be demographic, technical, economic, political, or educational in nature and can originate within or externally to an organization. From the focus group sessions, the study team identified a number of possible barriers that are likely to limit the success of broadband access, deployment, and use in anchor institutions, including:

- Lack of resources;
- Limited knowledge/awareness about broadband and broadband applications and how best to deploy and use them;
- Failure to recognize innovative broadband applications and how to apply them for organizational effectiveness or improved services to clientele;
- Inability to contract successfully with ISPs;
- Difficulties in educating users (e.g., hospital patients, library patrons, county government services users, etc.) on how to use new broadband-based services successfully;
- Local elected officials (or others in positions of authority) who lack awareness of the potential for broadband deployment;
- Failed previous efforts to upgrade broadband availability and/or reduce its cost;
- Resistance to change;
- Organizational inertia;

- Old and out-of date network hardware and software; and
- Inability of various city/county or other anchor institutions to work together on broadband planning and economic development.

Many of the barriers participants identify ultimately relate to lack of resources. Figure 36 depicts how these barriers can affect five key factors contributing to whether or not an institution has the ability to obtain or upgrade broadband connectivity.

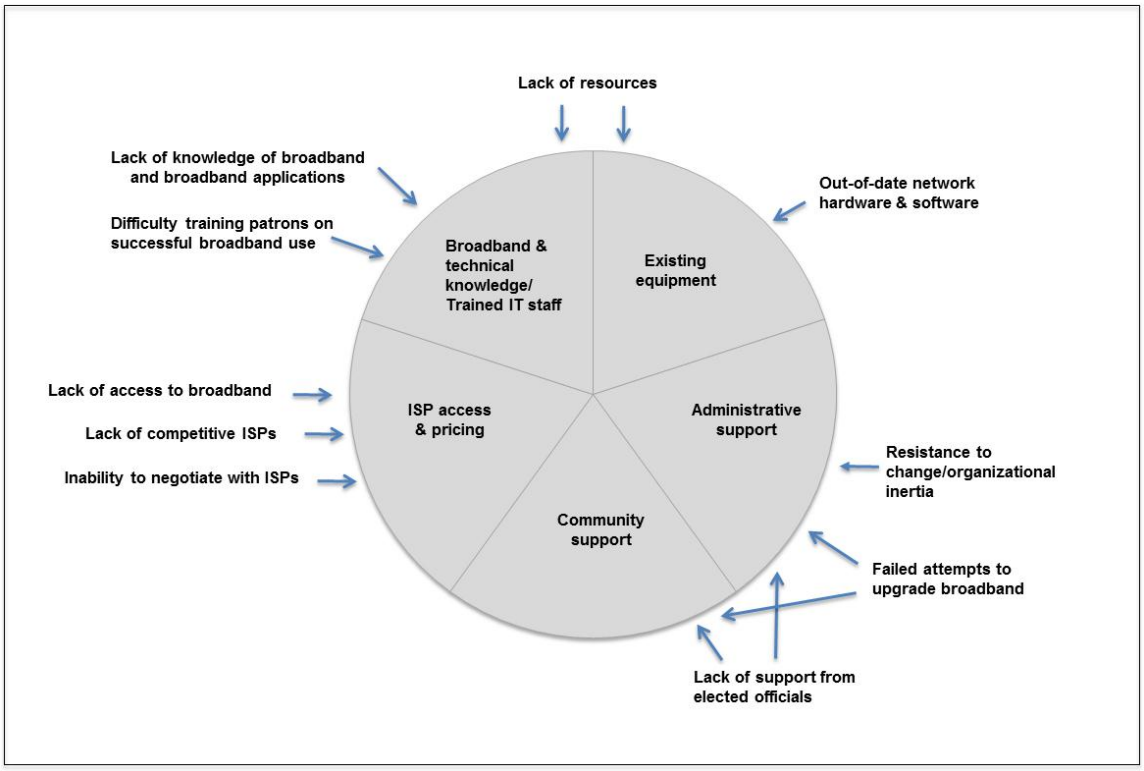


Figure 36. Broadband Barriers and Their Effect on Factors Contributing to Adoption

The focus group sessions also indicate a number of possible enablers that are likely to contribute to broadband success in anchor institutions:

- Individual knowledge of broadband, its use, how best to deploy it, and so on;
- Existence of a high-quality internal network within the anchor institution;
- Existence of new(er) technology equipment;
- Access to additional funding to support network/computer upgrades and/or upgraded broadband connectivity;
- Administrative leadership and support;
- Available and trained IT staff;
- Access to an ISP with inexpensive broadband connections;
- Ability to develop a strategic plan to obtain and deploy broadband – especially if that plan cuts across and leverages various anchor institutions in the county; and

- Interest and enthusiasm to experiment with and promote innovative applications of broadband.

A number of participants believe these are significant factors related to their organizations' success in broadband access, deployment, and use, but only few of these factors are present in their institutions.

The lists of barriers and enablers above are likely only beginning lists, as they pertain only to North Central RACEC and Wakulla County anchor institutions. Moreover, a number of participants point out that some enablers and barriers likely will vary considerably depending on the nature of the organization, its staff members, its geographic location, and a host of other situational factors. In addition, participants note that anchor institution staffs and administrators may not understand specific strategies for minimizing barriers and maximizing enablers very well understood, thus, they welcome information on the need for specific training and/or procedures and strategies for minimizing barriers and maximizing enablers.

Politics and Regulatory Issues

A number of the focus group participants raise questions as to why ISPs have not made inexpensive high-speed broadband available to their communities or organizations already. There is some difficulty in understanding the different models of "open markets" and "competitive markets" versus a regulatory market, and that the NFBA project plans to rely on open and competitive markets to deploy broadband. Prior experiences of focus group participants with ISPs in their counties are not positive with regard to ISPs' desire to provide easily accessible and affordable broadband (as one participant exclaims, "AT&T has promised, and promised, and promised").

Participants do understand that if ISPs still do not see a particular region of a county as "profitable" after deployment of the NFBA middle mile, the ISP is unlikely to enter the market. Many have questions as to what conditions would make "the last mile" competitive and profitable for ISPs. There is some concern that anchor institutions still might not use a new and innovative middle mile network built by the NFBA because of last mile connectivity problems and issues.[19] Participants have little knowledge in, or interest about, the role of local, state, and national information/telecommunication policies regarding broadband deployment and use.

Focus group participants do not have a good understanding of the broader context of federal and state information policies and regulations that affect the provision of broadband in the RACEC and Wakulla County (see, for example: Federal Communications Commission *National Broadband Plan*,[20] *Telecommunications Act of 1996*,[21] Florida Public Services Commission,[22] etc.) and impact broadband deployment to *participants'* anchor institutions.

[19] After the first three focus group sessions, NFBA received approval to be a "last mile provider" if no other ISP would serve a geographic area as a last mile provider. Receiving this approval did help participants to feel more assurance that last mile issues could be resolved better.
[20] http://www.broadband.gov
[21] http://en.wikipedia.org/wiki/Telecommunications_Act_of_1996
[22] http://www.psc.state.fl.us/utilities/telecomm/

Ultimately, what participants want is easily accessed and affordable high-speed broadband at their institutions *now*.

Despite the limited interest in local, state, and federal telecommunications and broadband policies, there is much support for a "public broadband infrastructure" which everyone is *entitled* to access and use as a resident of the United States. Participants assure the study team that there is, indeed, a digital divide and most agree that this divide exists in *their* counties. There is considerable support for the idea of a public broadband infrastructure, but some participants are unclear if such a model is different than the NFBA competitive market approach or if the NFBA project will, in fact, reduce the digital divide given the many barriers that exist in their counties and organizations beyond the lack of a middle mile infrastructure.

From a number of the focus group sessions, there is the general sense that if one has not lived in these various rural counties, one really has no idea what it is like in terms of access (or lack thereof) to amenities and having high-quality services such as broadband. One participant states that government officials in Tallahassee and in other large metropolitan areas just "don't get it" as to the barriers, issues, and economic challenges rural residents face. The sense is that people come through the county (and have done so for a number of years) talking about economic development or other "improvements" that will occur, but in fact, nothing much changes. Further, as one person states, local issues are more about making a decent living and trying to keep kids from leaving the county than they are about broadband use.

Availability of Trained IT Staff

Participants worry that many local governments and other anchor institutions may not be able to take advantage of *any* "new and improved high-speed broadband" since they do not have (or only have inadequately) trained IT staff available to assist them with deploying broadband in their organizations. Participants recount numerous examples of being unable to use existing broadband, of institutional connections and networks not working properly or at all, and of trying to fix computer problems themselves when they know little to nothing about networks and computers. For example, one participant tells of attaching multiple wireless routers to one T1 line and being surprised when the routers significantly reduced the speed of the entire network.

Participants who have no countywide IT staff position are "jealous" of those counties that do have an IT person to help manage the broadband and internal networks. However, one county IT staff person points out that it is virtually impossible to "manage" IT in his county with only his one position. Others point to efforts to obtain "volunteers" to manage their networks and computers with only some success. Ultimately, as participants point out, there is no money available to hire an IT person for their institutions and if there were some funding available, it likely would not be enough to attract a qualified IT person. Finally, the issue of what constitutes a "qualified" IT person clearly differs among participants from different counties and anchor institutions.

Participants offer a number of possible approaches that may be implemented to assist them in having better IT support. One person suggests a "circuit rider" model in which anchor institutions might share access to and use of an IT specialist. Another suggests that the NFBA

provide a toll free number with 24/7 IT deployment and network management assistance available. And others suggest that broadband contracts with ISPs should include onsite IT consulting as part of the "package" price. Most of the participants agree that obtaining IT support during and after the point at which broadband connectivity increases is essential to the ultimate success of using broadband at their anchor institutions.

Upgrading Physical Facilities for Broadband

Some participants comment that physical facility issues at their anchor institutions would inhibit the deployment and use of broadband. Some of the concerns center on the following:

- Old buildings with many load-bearing thick concrete walls that are difficult to renovate;
- Inadequate electrical grids (and outlets) within the anchor institutions;
- Limited staff to assist users or other staff in how to use and take advantage of new broadband applications;
- Limited space for new or upgraded workstations to accommodate users (in libraries or health departments, for example); and
- Old network equipment such as routers, servers, and cabling that cannot take advantage of high-speed broadband.

There are few specific strategies for how anchor institution participants would address these concerns, except, as one person comments there may be state or federal grants to help them. None of the participants anticipate local resources being available in the near future to address these concerns with their physical facilities.

Ways to Deploy and Configure the Middle Mile Network to Best Meet Anchor Institutions' Current and Future Needs

Few of the focus group participants spoke directly to the topic of physical configuration of a middle mile network, largely due to lack of knowledge necessary to comment on this topic. However, much discussion centered on other factors that could contribute to successful middle mile infrastructure deployment (i.e., deployment that results in increased subscribership). Those factors—education/training needs, understanding what a middle mile project is, and the role of the NFBA—are discussed below.

Education/Training Needs

Participants are very much aware of the need for additional education and training related to broadband ISPs, contract negotiation, connectivity, deployment, internal network design and management, applications, use, planning and evaluation, and other topics. Indeed, the range of educational and training needs that participants and the study team identify also includes broadband marketing, uses of broadband for economic development, retooling organizations in terms of workflow to best leverage/exploit broadband, convincing governing boards that increased broadband at the workstation is actually needed, and more.

A number of participants comment on the contributions that the public library makes in their counties to provide a range of broadband, workstation, and software training. For some, the public library is the only place in the county to obtain "free" training and one-on-one assistance for activities such as submitting online job applications. But library staff note they are extremely hard-pressed to maintain such training and that, most likely, their institutions will have to cut back training with any additional budget cuts.

An interesting component of this awareness for education/training needs is the participants' perceived importance of onsite and one-on-one education and training that would be most appropriate for their particular situation. Thus, many of the participants prefer a model of education/training that also includes consulting advice. While it is likely that a number of basic educational modules would be useful for many participants, during the discussions it became clear that the education/training needed for a hospital in Starke would be quite different than that for a school district in Perry. Moreover, participants point out that "they do not know what they do not know," so there they might need training in their counties related to topics about which they currently are unaware.

Participants repeatedly asked study team members if we have a schedule for education/training; the topics being offered; who or what entity provides the education/training; when education/training opportunities will be available; and if they will be onsite, online, or through a combination of delivery platforms. Some participants doubt that online webinars would be acceptable as they may not have the bandwidth to participate. Still others, when informed about the February 16-18, 2011 Florida 2011 Rural Summit on economic development,[23] discounted it immediately as they are unable to travel and/or have no resources to support such travel. One person said that he could have attended the Summit only if he used personal leave and paid his own way. This suggests that face-to-face trainings held in central locations also may be problematic for many anchor institutions' staffs.

Understanding a "Middle Mile" Project

Many participants do not understand that, overall, there is first a connection to a trunk line (often owned by an ISP), then there is a connection from that trunk line to a location where other ISPs can compete to access that connection (could be fiber or WiMAX[24] towers), then there is a last mile connection to the actual organization, typically provided by a local ISP, and finally the "last foot" goes from the front door of the organization to individual workstations. The last foot connection is primarily the internal organizational network within the anchor institution.

Some participants do not understand that while the NFBA focuses primarily on the middle mile, the NFBA also became an ISP of last resort for areas where other ISPs refuse to enter a particular market/region.[25] Participants recognize that the primary factor that likely determines if an ISP will enter a market is profitability. Thus, many are concerned that the middle mile project in and of itself may not "be enough" for ISPs to enter their region and for the

[23] http://iog.fsu.edu/2011summit/2011_Rural%20Summit_Registration_Pack.pdf
[24] http://www.wimax.com/general/what-is-wimax
[25] Subsequent to the focus groups, NFBA became an ISP of last resort.

ISPs to be profitable in offering the broadband service. Or as one participant asks, "will the NFBA middle mile deployment in fact encourage more ISPs to compete and enter a market or region driving down costs or increasing access to better broadband speeds?"

In some instances there is concern that, regardless of the middle mile project, some geographic areas still may not obtain significant broadband connectivity. For example, participants at one focus group note that currently Steinhatchee and Jena have very poor access to broadband at a reasonable cost. Participants want to know, specifically, if these areas will be "by-passed" and what the broadband speeds and costs will be for organizations and residences in this area if it is, in fact, overlooked.

Some focus group participants are interested to know what incentives local governments, chambers of commerce, and other municipal entities might be willing to offer an ISP to make it more lucrative for them to enter a market. There is some concern that, in fact, local governments have little ammunition with which to bargain for such incentives. Ultimately, however, participants are clear that if ISPs, or some package of incentives for the ISPs, do not provide "cheap or better broadband," they are unlikely to subscribe. In addition, it is not clear how "cheap" broadband has to be before a local anchor institution might think it "cheap enough" to subscribe. There is a sense that what one participant considers "cheap broadband" may be quite different than what another considers to be "cheap broadband."

Role of the NFBA

There is some confusion regarding the exact roles, responsibilities, and activities of the NFBA, for example:

- Does the NFBA conduct education/training?
- Can the NFBA help anchor institutions find an ISP and can the NFBA be an ISP of last resort?
- Will the NFBA provide IT consulting/expertise in local organizations?
- Will the NFBA assist local governments in promotion and recruitment to attract new companies, retain existing jobs, and bring more jobs?
- How does the NFBA create, retain, and attract jobs at the county level? And are counties, in effect, "in competition" against other counties to get these jobs?
- How do local governments provide input to the NFBA on key issues?
- How does a "middle mile" network specifically affect anchor institutions' actual access to better and cheaper broadband?
- Will completion of the middle mile project, in fact, result in more ISP competition?
- Who or what entity is available to assist local anchor institutions and agencies exploit and use the broadband, both in their organization and for overall county economic development?
- Which particular broadband services are needed or could be deployed to *best* benefit particular organizations or user groups (e.g., paying county bills online, telemedicine, interactive, high-speed video conferencing)?

While there are straightforward answers to a number of these questions, participants are not clear on what those might be. Indeed, one participant is surprised that there still will be a cost to subscribe to the NFBA's broadband, having thought the connection would be free.

Additional Findings

In addition to the findings pertinent to the original goals of the study, the focus groups lead to several other emergent findings: the relationship between broadband availability and economic development, broadband and disaster planning and recovery, and broadband planning at the anchor institution and county levels. These topics are discussed below.

Economic Development and Broadband Access and Availability

A number of participants are not aware that an important component of the middle mile project is to promote economic development and to assist counties in becoming more competitive in attracting or retaining companies and jobs because of improved access to and reduced cost of broadband. Once they become aware of this issue as a result of participating in a focus group, participants want to know "what is the plan" and "who is in charge" for using broadband deployment and access to promote economic development.

Some participants are unclear how, for example, Gilchrist County will convince a small start-up company to move there with the company's 28 jobs because of high-speed and inexpensive broadband. Participants point out that improved access to broadband with reduced cost is only one of a number of factors that will attract new jobs or related economic development. Other factors include:

- Schools;
- Governmental services;
- Recreation opportunities;
- Tax breaks;
- Accessibility to shopping, entertainment, and other amenities;
- Availability of a trained, knowledgeable, computer literate, and drug-free workforce; and
- Friendly and welcoming community members.

One participant thinks that the availability of high quality affordable broadband in the county or region is only a "qualifier" among a number of other factors that contribute to economic development. Not having good broadband, however, is an immediate disqualifier for attracting/retaining companies and jobs.

Participants recognize that there are a number of "models" that might promote economic development, such as:

- Expanding existing private-sector firms in the county that need more or faster broadband;
- Attracting companies (and jobs) to relocate to their county because of more or faster broadband;

- Making existing county workforce members available for remote (i.e., virtual) hiring with companies outside their county because of more or faster broadband; and
- Promoting new or start-up companies (including Mom and Pop home-based operations) because of the availability of more, faster, and cheaper broadband.

Most, however, are unsure how, exactly, they can promote these (or other) models, what resources are available to assist in the task, and who is responsible for leadership.

There appear to be a large number of players at the federal, state, regional, city, and county levels that have "some involvement" in promoting economic development, but it is not clear who is supposed to do what, specifically, to assist the local counties. When the moderator asked about the role, for example, of the "North Florida Economic Development Partnership," (NFEDP) most participants demonstrate that they are unaware of the organization or what it does.[26] Representatives from local chambers of commerce indicate that more collaboration and coordination among the various economic development agencies is needed. Another participant wants to know who would pay to support the economic development since county and municipal governments are strapped for resources and they have a limited degree to which they can contribute to promoting economic development.

Overall, there is some skepticism about the role that faster and cheaper broadband could play in these rural counties. A number of participants do not understand how to market faster broadband for economic development, but they do know that there are many factors that affect rural economic development other than broadband, and that there is a general lack of resources in the county and in the state. Therefore, the view, as expressed by one participant is, "we'd be better off if they'd just give my institution $50,000 for upgrades."

Disaster Planning and Recovery

At one focus group, a discussion occurred about the degree to which the NFBA network will support disaster planning and recovery. Participants are unclear as to which government agencies and what ISPs have what types of responsibilities for disaster planning and recovery related to broadband. They want to know whether key players include individual anchor institutions, middle mile providers (i.e., NFBA), emergency management offices, ISPs, other federal and state agencies, and/or others. Participants raise questions as to what kinds of redundancy the broadband network will support, how anchor institutions in a particular county will link to and or depend on networks outside their control, and how county governments can insure that someone will maintain broadband connectivity during a disaster such as a hurricane.

Anchor Institution and County Broadband Planning and Development

Typically, as a focus group progresses, participants become increasingly aware that to a large extent *they* are responsible for taking advantage of broadband use and deployment as a result of the NFBA middle mile project. Nonetheless, common questions are who do we go to for assistance in educating our staff, who can help us with connecting to the middle mile

[26] For background information see: http://www.nfedp.com/

deployment, how do we use and deploy the broadband successfully in our organization (or governmental agency), and how do we promote our improved broadband to attract new jobs and for overall economic development.

The study team suggests that broadband deployment, use, and economic development may entail a local *planning process* that could result in a formal written plan. The process may have a number of steps, including:

- Additional broadband needs assessment of anchor and other institutions in their county;
- Broadband diagnostics for their institution/agency to determine the strengths and weaknesses of their existing broadband connection and network;
- Development of countywide vision and goals to leverage broadband use among the various anchor and other institutions and to develop a strategic plan;
- Assessment of broadband needs and services that could be provided to users and clientele;
- Obtaining regular and high quality IT staff assistance to update and maintain the broadband, network, and broadband services;
- Contracting with ISPs for high quality and inexpensive broadband through the middle mile network or elsewhere;
- Determination of how best to deploy broadband to the front door (or to the network) and then to the workstation;
- Accomplishment of future hardware and software upgrades and otherwise sustaining the broadband, services, and applications;
- Marketing and promoting the broadband for economic development; and
- Evaluation to justify/demonstrate accountability and show the impact/outcomes of the high-speed broadband on organizational and community measures.

However, it is unclear if participants have the resources and knowledge to successfully engage in such a process without some outside assistance.

Onsite Diagnostics Findings

Introduction

Each institution has specific issues, which were outlined in individual Summary Onsite Diagnostic Reports provided to each institution,[27] but there are four universal needs for every anchor institution visited during this research:

- Updating the network and technology equipment,
- Education,
- Training, and
- Planning.

[27] To maintain confidentiality of the anchor institutions that participated in this research, these individual reports are not available and all findings detailed in this report are aggregated so that each individual institution's data remains confidential to that institution.

The level of need varies by institution; however, there is a general lack of understanding about what the uses of broadband are and why anchor institutions and rural areas need better Internet connections. The assessment team found that each institution's staff understood the need for regularly updating computer equipment and providing Internet access in general, but institutional decision-makers did not see the importance, availability, and application of more seamless, reliable, and faster connections.

Throughout all the counties in the North Central RACEC and Wakulla County, the greatest need is for education on the importance of broadband, and more specifically (1) how broadband could impact the local economy and community, (2) training on how to use broadband to better meet the needs of the population the anchor institution serves, and (3) the importance of strategic planning in adopting and utilizing broadband effectively, efficiently, and successfully. Without education, training, and planning, the populations in the North Central RACEC and Wakulla County are extremely unlikely to adopt broadband in an efficient and timely manner.

Needs assessment and benchmarking project goals related to the onsite diagnostics portion of the project are the following:

- Describe the existing broadband networks currently deployed in the region's anchor institutions;
- Identify situational factors and issues that impact how anchor institutions deploy their broadband networks; and
- Determine ways that the region's anchor institutions can improve their network deployments to increase connection speeds at the workstation.

The following section reports onsite diagnostics in the context of those goals, with the addition of an introductory section that provides an overview of institutions participating in the diagnostics.

Participants

The onsite diagnostics cover a broad range of anchor institution types that include 14 anchor institutions:

- City or county government (4),
- County health departments (2),
- Emergency management agency (1),
- Higher education institution (1),
- K-12 public school (1),
- Public libraries (2),
- Rural health clinics (2), and
- Workforce board (1).

These anchor institutions provide varying services for the different communities they serve.

Existing Broadband Networks

Connection Speeds

Only two institutions had observed Internet speeds above 10 Mbps: the higher education institution and the K-12 public school (see Figure 37). The majority of anchors have Internet connection speeds in the 1-3 Mbps range. Note that speed tests were not taken at the two public libraries, so data are not available regarding their Internet connection speeds.

With speeds in the 1-3 Mbps range, anchor institutions face difficulties in handling a large amount of incoming data, as would be the case if participating in a health information exchange (HIE),[28] interactive e-government services, simultaneous online testing of an entire school,[29] etc. For example, an average 2-hour movie is about 800 Mbs. With current download speed in the 1-3 Mbps range it would take 45-75 minutes for the file to download.[30] While downloading movies is not a priority for anchor institutions in the NFBA service area, one can assume that the amount of data needed to engage in the services identified above (among others) will be at least, if not more than, the size of an average movie file.

This limited broadband capacity will greatly affect the ability of the anchor institutions' staffs to provide adequate services or expand current services. File sizes only will grow larger in the near future, and, without a concurrent rise in connection speed, the anchor institutions will not be able to handle the amount of data produced by an HIE, for example. Connection speeds in the 50-100 Mbps range could dramatically improve the ability of the anchor institutions to handle large amounts of data and provide effective services for their users.

[28] A health information exchange (HIE) is an interconnected system by which doctor's offices, hospitals, clinics, and other healthcare institutions can securely share patient information with the goals of minimizing healthcare costs and maximizing patient care. The state of Florida is in the process of implementing a statewide HIE as of the writing of this report.

[29] Florida will begin to administer the Florida Comprehensive Assessment Test (FCAT) in this manner, making this issue critical for K-12 public schools.

[30] http://www.t1shopper.com/tools/calculate/downloadcalculator.php

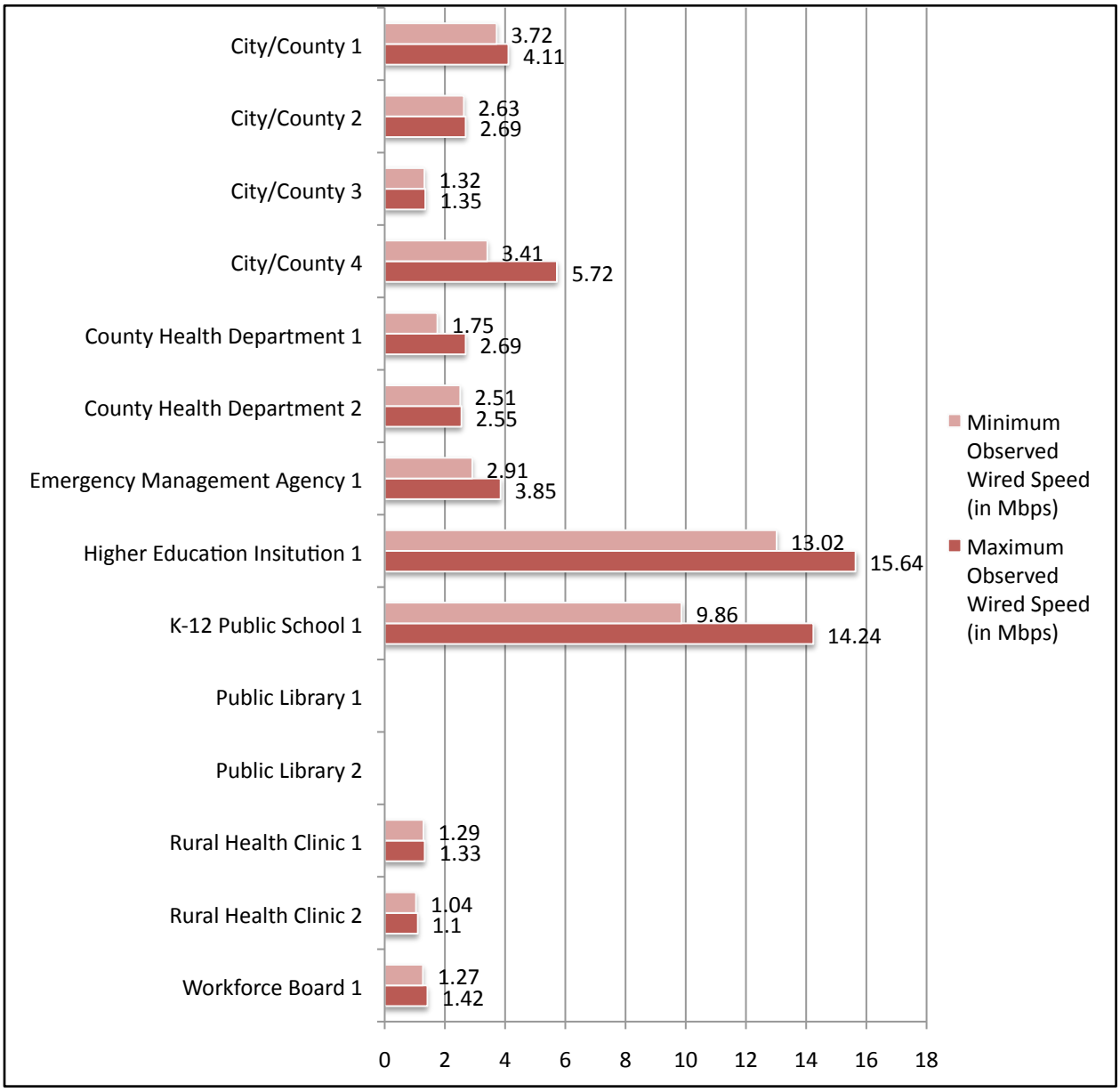


Figure 37. Minimum and Maximum Observed Internet Connection Speeds at Visited Anchor Institutions

Network Reliability

Overall, 86% (n=12) of the anchor institutions report that their networks are reliable (Figure 38), however 79% (n=11) of the anchor institutions indicate some problem with their network. Figure 38 demonstrates that of the 12 institutions reporting reliable networks, 75% (n=9) also indicate some problem(s) with their network, suggesting that, in fact, their networks are *not* reliable. When asked what those network issues are, the majority of anchor institutions cite speed and/or old equipment (36% speed alone, 7% old equipment alone, and 14% both speed and old equipment) (Figure 39). The anchor institutions also report that substantial IT staff time

is spent troubleshooting, although not necessarily troubleshooting networks as much time is spent troubleshooting other technology equipment.

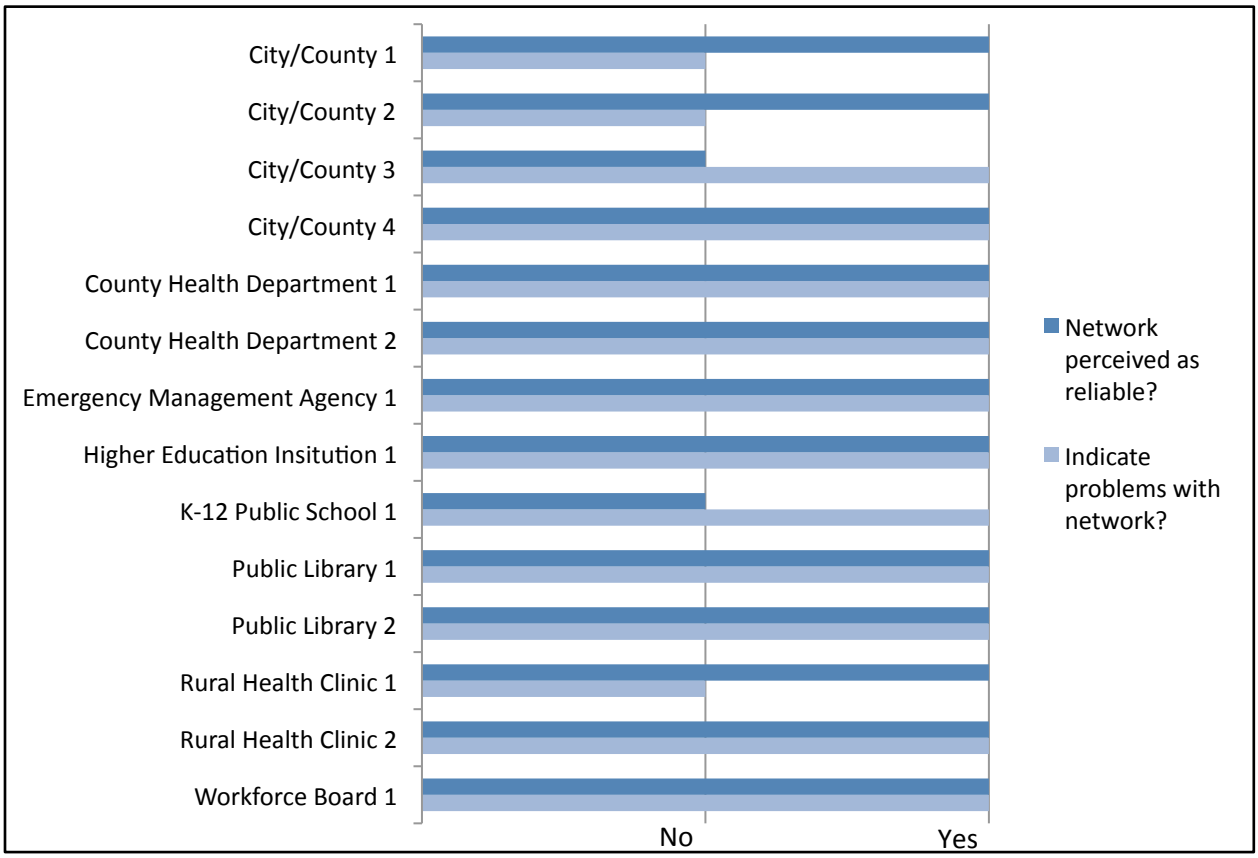


Figure 38. Reported Network Reliability at Visited Anchor Institutions

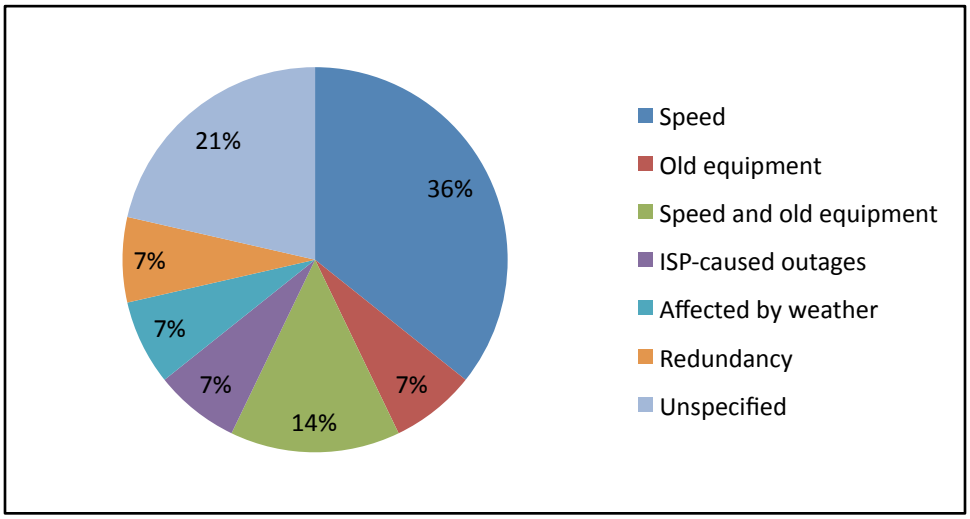


Figure 39. Issues Affecting Network Reliability at Visited Anchor Institutions

Situational Factors and Issues Impacting Anchor Institution Broadband Network Deployment

There are some specific enablers that make the adoption and utilization of broadband more likely at some institutions than others. Even if network maintenance is not a pervasive challenge or an institution outsources this to an IT consultant, the administrators and IT staff at each anchor institution do not seem to fully grasp the practical and enhanced applications of broadband. Most of the IT staff members at the anchor institutions do not participate in developing their own IT plans and budgets; in fact, only two anchor institutions have IT staff, control over their IT budget, and a technology plan, the higher education institution and one public library (for additional detail see Figure 40).

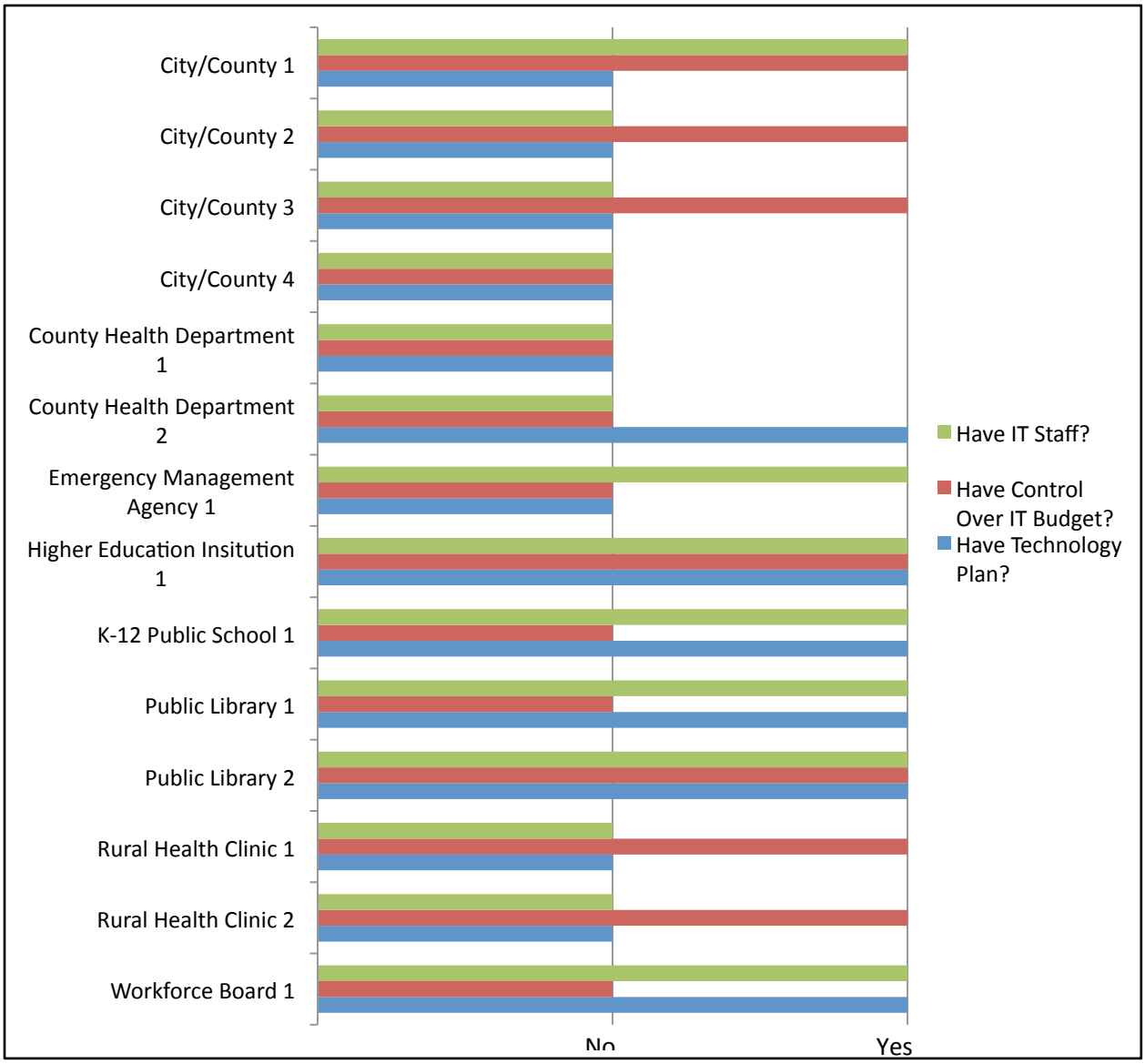


Figure 40. Whether Anchor Institutions Have IT Staff, Control over Their IT Budget, and a Technology Plan

Administrative Leadership

The really critical component for any institution to adopt and use broadband is a commitment from the administration to provide the best technology available. Without a strong and clear commitment from the administration, the situation is unlikely to improve.

Technical Expertise

Institutions that have their own IT staff and a basic understanding of network management are more likely to perceive the need for broadband and how it to use it for the benefit of the institution and its users. Without the technical expertise to conceive of the uses of broadband, there is no perceived need for broadband at all. The phrase heard when asking about network performance was, "It's good enough for what we do." However, the institutions that do have staff and administrators with technical expertise know the network can be better and would like to improve how they use it.

Institutions without dedicated IT staff often defer technology decisions to outside IT consultants, so these decisions may occur without all the available information. Some institutions do not take advantage of available broadband because their IT consultant tells them that they do not need it and that the ISP is just trying to make money off of them. The higher education institution (which has its own dedicated IT department) is more proactive in pursuing and providing support for new software solutions. They are committed to increasing broadband capacity to keep up with students' needs and would like the ISP to improve network reliability.

IT Plan

Technology planning is another area where anchor institutions appear to have little to no control over their own technology arrangements. For example, one board of county commissioners' administrator does not participate in any technology planning because the person noted that no one on staff is competent to design one. They are considering consulting with the current network vendor to develop an IT plan.

The articulation and sharing of a technology plan that outlines usage policies, maintenance routines, troubleshooting procedures, and succession processes supports the autonomy of the end users and eases the burden on dedicated IT staff. Minor problems are handled at the point of use and IT professionals can manage larger security and troubleshooting issues.

Institution/Service Area Size

In many smaller service areas, the institution reflects the service area needs by maintaining a very limited offering and/or understanding of the benefits of increased broadband capability. This is chiefly a result of lack of exposure to technology, and in one case results in non-use of a wireless Internet network that, although unsecured, the institution could improve and maintain to provide broader access to all citizens of the town.

Funding

Funding is the overwhelming barrier facing these institutions. This factor is exacerbated at locations in which funding relies on public revenue, as well as any possible grants received. The impact of this reliance creates a lack of suitable technology upgrade schedules, as well as a resulting acceptance on the part of staff to settle for providing inferior service quality.

Institutions utilize some funding programs inconsistently, such as E-rate and the RHCPP. A library consortium serving multiple counties needs to retain an ISP that is an E-rate discount vendor, so while the network performance may be affordable, it clearly does not serve the basic needs of library users efficiently and effectively. The RHCPP supports eligible healthcare agencies to fund their broadband connection expenses (up to 50% of eligible telecommunications expenses including broadband connections and dedicated Internet access), and this can be a funding source to implement and possibly sustain the extensive healthcare initiatives in which many rural agencies would like to participate. Education and training would provide funding awareness and skills to obtain and implement these types of funds.

Many of the institutions do not have a separate IT budget or even a line item in the budget. Technology is purchased on an "as needed" basis. For example:

- The technology budget for the emergency management agency constitutes a portion of the Emergency Management Department budget, and ultimately, the Board of County Commissioners makes budgetary decisions; the IT Director can "advise" on costs and needs but there is no guarantee that the Board of County Commissioners will take that advice;
- At the public libraries, multi-county consortia share technology staffs and state library funding limited technology budgets, which contributes to resourceful local troubleshooting but also masks critical issues from the attention of decision-makers; for example, staff rely upon flash drives to back up workstation hard drives at one particular location which saves money in the short-term but may result in a loss of data over time;
- The K-12 public school's technology budget is a portion of the annual school district budget, property taxes dictate the parameters of that budget, and these taxes fluctuate year-to-year making multi-year planning and budgeting very difficult;
- The county health departments develop their own budgets, but they must make technology requests through a complex bureaucratic structure; additionally, providing an HIE would challenge both health departments without further exposure to technology requirements and benefits of this type of service.

One anchor does wield control over its IT budget, which is a higher education institution. Here, the IT department generally honors and purchases software that faculty request, and they provide software implementation and training. They purchase hardware more gradually as the IT department attempts to maximize the warranty period and use the equipment to the end of its life.

Ways That Anchor Institutions Can Improve Their Network Deployments

Meeting the above needs is critical to the ability of these institutions to adopt and fully utilize broadband. A number of specific enablers also are critical to successful broadband implementation, including a dedicated and knowledgeable IT staff,[31] an administrative structure that allows for changes in ISPs, and available resources for technology. Conversely, if an anchor institution does not possess these enablers, then it is highly unlikely that the anchor will expend the time, effort, and money for broadband Internet, regardless of whether newer, faster, and cheaper connections become available.

Education

Anchor institutions do not feel in control of their technology options. Many of the IT staff members in rural anchor institutions do not realize the benefits that could result from improved network connectivity, nor do they possess the skills to improve their systems. The general answer participants gave when asked about their network reliability is, "It's good enough for what we do," but much of their time is spent troubleshooting the network; for example:

- At a workforce development office, the IT Director spends about half his time dealing with network problems,
- The school IT technician spends the majority of her day assisting teachers and staff members with network problems, and
- The IT Director at the emergency management agency described spending "quite a bit of time," on keeping the network running.

Overall, despite what anchor institutions said about their networks being "good enough," their staffs seem to spend considerable time troubleshooting or otherwise maintaining the network. Also, the emergency management agency indicated concern that their T-1 connection will not be effective enough to deal with an emergency.

Clearly, educating IT and administrative staff to manage their specific technical needs proactively with dedicated technology plans is as important as implementing broadband itself. This would provide these professionals with the ability to gain institutional support for their mandates to deliver and effectively manage high quality Internet connectivity. This also would give them the capacity to supervise the work of third party vendors rather than follow the recommendations of technology consultants without the knowledge to make informed decisions.

There is also a need to educate the service populations on the applications and uses of broadband at these anchor institutions. For example:

- Communities expect the staff at rural public libraries to have a high level of technology and technical expertise, but libraries currently struggle to meet rising demand;

[31] Dedicated IT staff refers to IT staff assigned to one specific institution, as opposed to staff who are shared among multiple institutions in a consortium or other arrangement.

- The workforce board estimates that it can provide only 30% of its services without a connection to the Internet, suggesting that they require a fast, reliable network to maintain service provision and that a better Internet connection could improve services for the entire community;
- With state educators transitioning the Florida Comprehensive Assessment Test (FCAT) to an online-only format, school networks will need better connections than are currently available;
- Municipal governments could benefit greatly from developing their own municipal networks if the local demand were high enough;
- Small, rural municipalities require a greater understanding of network basics and capabilities in order to maximize the benefits and sustainability of the technology they already have in place; notably, one town does not utilize its wireless capability as it was unaware of the existence of the wireless Internet on the own network until the diagnostics team arrived; and
- One rural health clinic has no plan in place for integrating electronic or telemedicine practices in spite of the fact that wireless capability already has improved service delivery in the emergency room in the community.

Service populations must understand what kinds of new and improved services they could receive with faster, more reliable broadband Internet at local anchor institutions, as this is one way to generate support for building/subscribing to such networks at anchor institutions.

Anchor institutions also need education on the importance of network security and clear security protocols. There is a lack of understanding or appreciation of what could happen if someone used an existing account to hack the network. Most places lack documentation providing security policies and procedures, which adds to the confusion and lax security. For example:

- The emergency management agency does not have password-protected workstations, and the only malware protection is software that is not licensed for updates (so is likely to be out-of-date);
- The public libraries have some systems in place designed to keep the network secure without too much visibility, but viruses are a real threat and can ruin an entire network so ensuring that the average library user understands the need for security goes a long way in the libraries' ability to provide cost-effective services;
- The workforce board has to comply with network security requirements through the Department of Management Services, which provides the clearest enunciation of security protocols and procedures, and there is a Staff Development Day for recently hired staff to instruct them in security requirements;
- The K-12 public school has a Network Acceptable Use Policy, but there is some confusion with passwords: there is no written password policy but staff members change passwords every 60 days and IT staff verbally encourage staff and teachers to use a pass phrase not just a password; and
- One municipality would benefit from training on electronic public records maintenance and organization, as they have suffered from legal action regarding information

transparency and could use a proactive, organized system that would provide security and legal compliance.

Most institutions do not scan network traffic routinely or search actively for network vulnerabilities with the exception of the higher education institution which checks its network annually through an outside consultant. The higher education institution is the exception in providing a clear and documented process for password protection which requires permission levels and routine password changes.

The majority of institutions receive grant money for their services and networks. The institutions that rely heavily on state financial support, such as the county health departments and K-12 public schools, do not have much control over their networks or decision-making about ISP procurement. In fact, there is little understanding about where the Internet at these institutions comes from or if changing to an ISP not on the state contract is possible. While broadband applications like telemedicine and HIEs are revolutionizing healthcare treatment, cumbersome bureaucratic structure restricts the rural county health departments visited for this research. Educating the institutions that normally do not receive grant money about the availability of these types of funding opportunities could help alleviate some of the financial constraints which all currently face.

The most critical education need is for broadband applications. People in the community and in the anchor institutions do not understand or perceive what broadband can bring to their communities. The dominant attitude towards technology at all the institutions is positive. Every institution that the assessment team visited was open to broadband or new technology; however, they did not grasp the practical or enhanced applications possible with faster, more reliable broadband Internet. Without this understanding, most of the institutions are unable to justify the time and cost of rethinking their networks and providing better connectivity.

Training

There is a general need in all the anchor institutions to better train the IT staff and the general institution staff. The level of training required is unique to each institution but can be categorized into levels of low, medium, and high to help organize and develop training programs:

- ***Low level***: The academic institutions and larger library systems generally are maintain their networks well and the training opportunities fall mainly in the area of increasing staff skill sets to better assist end users' functionality with the software features.
- ***Medium level***: One municipality has below average Internet access and virtually no routine planning, budgeting, or maintenance of the network. While this is a rudimentary system, the town officials emphasize that their community does not demand much more than simple Internet access. The need here is to educate the community about what broadband can do for them and their quality of life.
- ***High level***: The county health departments exhibit a strong need for staff training to adopt technology geared toward end-user services given the fear of deployment without such support. Training would need to be ongoing and onsite in most cases, as there is a

high level of discomfort with their computer literacy. Staff see themselves delivering both health and computer information to end-users.

Institutions fortunate enough to have dedicated IT staff rely on that staff to deal with problems that the general staff could fix themselves, if they possessed an elementary level of technology training.

The provision of documented procedures for troubleshooting would minimize the time IT staffs spend on minor troubleshooting issues so that the call to the IT staff or consultant becomes the last step in a well-defined process. For example, one of the libraries established a triage-type system for regular employees to deal with minor issues. This approach allows regular (i.e., non-IT) employees to gain experience in dealing with network problems and build a level of comfort with the system, ultimately giving employees more confidence in using technology. Confidence in using technology is critical for broadband adoption and utilization. For example, one of the county health departments has a state-of-the-art video conferencing center, but they do not use it, largely because the staff is unfamiliar with the technology and afraid of damaging expensive equipment.

Institutions that do not have a dedicated IT staff rely on outside IT consultants for support. This factor impacts the type of equipment and software the institution uses as well as the connection. Often the IT consultant is a trusted partner and the anchor institution follows his recommendations somewhat blindly. If the consultant tells the administration something different from what the vendor or ISP is saying, the administration normally defers to the advice of the consultant. One institution proposed the idea of using their network vendor to provide technology planning for them, in lieu of providing training for staff to create a plan in house. Basic training on network systems and technology terminology could help administrators without IT personnel make more informed decisions and better understand the need for broadband.

The general attitude toward technology is positive among all the anchor institutions' staffs. Each expressed that there was a considerable amount of support for technology training for employees to enhance their productivity and ability to perform their duties. The main barriers here are constraints of time and money:

- The emergency management agency evaluates new employees' technology knowledge and a candidate's computer and technology skills are a major factor in their hiring process, but there is no in-house training of any kind;
- The workforce development board also evaluates new employee's technology knowledge but does not provide regular additional training;
- One of the public libraries has a part-time employee who comes in once a week and provides computer literacy classes and this model could be of real use for other public libraries;
- The K-12 public school once had a monthly, half-day training session, but discontinued it due to teacher complaints about the training cutting into their lesson planning time.

- Some libraries participate in regional multi-type library consortia, and many rely upon the training programs these organizations provide, rather than planning or providing for it themselves.

Planning

Integral to any education or training program is planning, and only six of the 14 visited anchor institutions have a technology plan (see Figure 40 above). The diagnostics team could not to assess the quality of those plans as most institutions that have a plan were unable to provide a copy to the assessment team. While categories each institution's education and training needs would fit within certain categories, planning is where each institution can tailor a program to meet its particular situation. In many cases, this step is missing in the technology adoption and implementation process; thus, education and training suffer.

The institutions that do have dedicated technology plans generally have better connections, equipment, and more technology-savvy staff members. The higher education institution has a technology plan; it is not available to the assessment team but, the team sees that many items in a technology plan are in place such as routine network security monitoring and critical activity and maintenance schedules. Also, the higher education institution has an IT department with several dedicated, knowledgeable IT staff, and the fastest observed Internet connection of all 14 visited anchor institutions (see Figure 37 above). The K-12 public school has a dedicated IT plan as part of the requirements for E-rate, as well as the second-fastest observed Internet connection speed.

In contrast, the emergency management agency does not have a dedicated technology plan (note that they are in the middle of writing a disaster recovery plan that has an IT portion, but there will not be a dedicated IT plan), and they have an observed Internet connection speed around 3 Mbps. The workforce development board also does not have a dedicated IT plan, but it is included in the section of the Administrative Plan that outlines IT policy. The connection speed at the workforce board is the second-slowest of the 14 anchor institutions (1.27 minimum speed, second only to the 1.04 Mbps minimum speed observed at one of the rural health clinics). They do, however, possess the best network security, although upgrading of equipment is inconsistent and lacks routine.

The public libraries have plans developed in conjunction with their consortia and to comply with E-rate requirements[32] (both libraries visited were the main branch in their consortium so they do have the expertise to develop an institution-specific plan). Likewise, in the case of the county government, managing their own plan is not an imperative as long as they can outsource the task and continue to deliver results to the agencies they service. They recognize that they need some type of remediation as their service continues to slow down as they increase their use of a GIS mapping system. Also, one rural health clinic's lack of a separate technology plan creates hesitancy to implement elements of a HIE as the administrators fear the financial burden of its sustainability.

[32] Note that, as of July 2011, the E-rate program will *no longer* require a technology plan as part of the application process so the degree to which public libraries and schools will maintain and update their technology plans without a carrot such as the E-rate discount is unknown.

Lack of an IT plan (or having only a partial IT plan) results in inconsistent performance from the network, as well as confusion among employees, administration, and public users over technology policies. Having a dedicated IT plan significantly affects an institution's ability to provide technology-based services. The exception is noted in the municipality visited, in which the existence of one talented but heavily-stretched employee is serving their needs effectively. They would struggle to manage the loss of this individual without some succession plan, which currently they lack. In general, the research finds that municipalities and county administrative organizations provide a wide array of community services but lack plans, in part because there are no state or federal agency IT regulations or requirements. The E-rate application process (which affects public schools and libraries) has required a plan for an organization to qualify, so the K-12 public school and public libraries visited do have plans, even if written as part of a consortium, but since the federal government eliminated this requirement for future years, there is a question of whether public schools and libraries will continue to maintain and update their technology plans.

Summary of Onsite Diagnostics Findings

The preliminary findings from the onsite diagnostics suggest that for broadband adoption to occur successfully in these rural settings, a significant level of effort on training, planning, community awareness, and local development work will be necessary. This development work includes addressing a range of local and situational factors to better enable broadband adoption and to minimize barriers that inhibit broadband adoption and growth. If viewed as a core competency, broadband management increases in importance as judged by the number and expertise of personnel designated to manage it, as evidenced at upper level academic institutions and larger, better funded municipalities.

Integrating Survey, Focus Group, and Diagnostics Findings

Respondents and Participants

City/county governments are the most prevalent participants in this research overall, along with libraries and schools/school districts. The number one participant group for both focus groups and diagnostics and the number two for surveys is city/county governments. Libraries are the second-highest participating group for the focus groups and the third for surveys and diagnostics (tied with rural health clinics). And while schools/school districts rank fifth for focus group and diagnostics participants, they return the largest percentage of surveys (Table 7).

Table 7: Percent of Survey Respondents/Focus Group Participants/Diagnostics Participants by Anchor Institution Type

	Survey		Focus Groups		Diagnostics	
Anchor Institution Type	**n**	**%**	**n**	**%**	**n**	**%**
City/county government	29	26.4%	19	37.3%	5	35.7%
Higher education	2	1.8%	1	2.0%	1	7.1%
Hospital	4	3.6%	2	3.9%	0	0.0%
Law Enforcement	4	3.6%	0	0.0%	0	0.0%
Library	20	18.2%	17	33.3%	2	14.3%
Rural health clinic	13	11.8%	4	7.8%	2	14.3%
School/school district	30	27.3%	3	5.9%	1	7.1%
Other	8	7.3%	5	9.8%	3	21.4%

The research plan called for survey response from all NFBA counties and focus group and diagnostic participation from institutions representing all areas of the region. This goal was achieved (Table 8). However, the focus groups and diagnostics find that geographical location (i.e., county) is less of an indicator that an institution will adopt broadband than the existence of an influential individual in that county who champions adoption and the ability of anchors in that county to hire staffers with the necessary technical skills. These issues appear to trump more traditional metrics such as population density or income and education level. In addition, the interplay of these issues is important—for example, one county that has a strong broadband advocate on the Board of County Commissioners has a lack of technically skilled people meaning that having a strong advocate (an enabler) may not be enough given other barriers to adoption (in this case, the lack of technically skilled staff).

Table 8: Percent of Survey Respondents/Focus Group Participants/Diagnostics Institutions by County

	Survey		Focus Groups		Diagnostics	
County	**n**	**%**	**n**	**%**	**n**	**%**
Baker	9	8.2%	4	8.0%	1	7.1%
Bradford	6	5.5%	7	14.0%	2	14.2%
Bradford/Union*	0	0.0%	1	2.0%	0	0.0%
Columbia	12	10.9%	5	10.0%	1	7.1%
Dixie	4	3.6%	2	4.0%	0	0.0%
Gilchrist	4	3.6%	2	4.0%	1	7.1%
Hamilton	9	8.2%	1	2.0%	1	7.1%
Jefferson	1	0.9%	3	6.0%	0	0.0%
Lafayette	1	0.9%	2	4.0%	0	0.0%
Levy	10	9.1%	6	12.0%	2	14.2%
Madison	6	5.5%	2	4.0%	2	14.2%
Putnam	17	15.5%	4	8.0%	1	7.1%
Suwannee	15	13.6%	1	2.0%	1	7.1%
Taylor	6	5.5%	4	8.0%	1	7.1%
Union	6	5.5%	0	0.0%	0	0.0%
Wakulla	4	3.6%	2	4.0%	1	7.1%
Wakulla/Jefferson/ Franklin*	0	0.0%	4	8.0%	0	0.0%

*Several focus group participants work for institutions in multiple counties

Connection Speed

Both the surveys and diagnostics measure workstation speed. Survey respondents used a free speed test[33] to measure speeds at a staff and a public workstation, while the diagnostic visits measured end-to-end speed (the speed of the connection from the ISP network server to the institution's workstation). This means that the "*total* traffic carrying capability of a link or path in a network,"[34] or the best-case speed was measured. Even so, top speed results for the two methods (staff workstation downstream speeds from the survey and maximum observed speed from the diagnostics) are similar, with the majority of workstations at all anchors in the NFBA service area having connection speeds of 5 Mbps or less. In fact, over a quarter of workstations in the survey and a third of workstations in the diagnostics had dial-up level speeds of less than 1.5 Mbps (Table 9). Also, the diagnostics find that the interviewees at the majority of institutions visited are not aware of the advertised speed of their connections, which means they are less likely to work with their ISPs to achieve faster speeds as they do not know what is the fastest possible speed on their connection.

Table 9: Advertised and Measured Speeds (Survey) and Maximum and Minimum Observed Speeds (Diagnostics)

	<1.5 Mbps	**1.5 Mbps**	**1.6-5 Mbps**	**5.1-10 Mbps**	**10.1-20 Mbps**	**>20 Mbps**
Surveys						
Advertised Speed	5.1%	13.3%	32.7%	21.4%	14.3%	13.3%
Downstream at Staff Workstation	26.0%	3.9%	37.7%	15.6%	9.1%	7.8%
Upstream at Staff Workstation	59.3%	3.7%	19.8%	8.6%	2.5%	6.2%
Diagnostics						
Maximum Observed Speed	33.3%	0.0%	41.7%	8.3%	16.7%	0.0%
Minimum Observed Speed	33.3%	0.0%	50.0%	8.3%	8.3%	0.0%

Internet Connectivity Cost

The focus group and diagnostics findings suggest that Internet connectivity cost is a key factor in broadband adoption for rural Florida anchor institutions. Although the majority of institutions responding to the survey (62.7%) pay less than $5,000 per year for connectivity, another 34% pay between $5,000 and $50,000 (see Figure 21 above). These costs may be a ceiling for many anchor institutions. The focus group participant who says that whatever the monthly cost is for the connection, it is too expensive is not alone—28.3% of survey respondents say that they cannot afford faster Internet.

Adequacy of Current Broadband to Meet Staff and User Needs

While 65.9% of survey respondents report that their Internet speed is adequate to meet *staff* needs most of the time and 55.8% say that it is adequate for meeting *public* needs most of

[33] http://speedtest.net

[34] Bauer, S., Clark, D., & Lehr, W. (2010). *Understanding broadband speed measurements*. Cambridge, MA: Massachusetts Institute of Technology, p. 9. Available at: http://mitas.csail.mit.edu/papers/Bauer_Clark_Lehr_Broadband_Speed_Measurements.pdf

the time, a fairly high number of respondents report that it is only adequate to meet staff and public needs sometimes (19.3% and 25.6%, respectively; see Figures 12 and 13 above). It is clear this topic cannot be discussed in isolation from the issues of cost and the availability of high-speed broadband. As one focus group participant says, "What can we provide our customers? Well does it matter? What can we afford?" The lack of good broadband is especially important where it is an existential issue—the focus group participant and diagnostic representative from an emergency management center note that they "could be shut down real easy" in the event of an emergency or a natural disaster and be completely unable to provide services and emergency coordination. These participants also note that they would like to subscribe to a second ISP as a backup but they cannot because their part of the county only has one provider.

The availability problem affects a number of study participants. Almost a quarter of survey respondents report that they are not planning to increase their connection speed because they already have the maximum speed available. One focus group participant notes that his institution has "get by Internet." Another participant from a library says that the library cannot bring in wireless because of poor connection speeds. That participant also notes that the library's connection routinely fails during peak usage hours and can be down for hours. The healthcare focus group participants and diagnostic representatives all note that they can provide only basic services without an Internet connection and in fact they cannot really access files and records without it. In the survey, a rural health clinic with multiple offices notes that it "will need to be able to 'connect' with other medical providers in the area to meet EMR [electronic medical record] requirements" but will need access to faster Internet in order to do so.

Staff Training and Public Education Needs

While survey respondents report that their staffs are extremely or very comfortable with basic computer, basic Internet, and advanced Internet skills (such as searching for information and getting online), the story is the opposite for basic and advanced broadband skills (such as what they are and their uses) and basic and advanced wireless skills (such as configuring a network; see Figure 8 above). The situation for computer and Internet skills of the end users of anchor institution respondents is even worse, with a fairly low percentage of respondents reporting that their public users are comfortable with even basic skill sets such as basic Internet and computer skills, including basic email skills (see Figure 9 above). Despite these low levels of computer and Internet skills, the largest percentage of institutions reports no plans for staff or public training in the next year (see Figures 10 and 11 above).

Information from the focus groups and diagnostics adds context to these survey results. The institution's mission and main service area have strong impacts on the degree to which it emphasizes technology. The educational focus of libraries, K-12 schools, and higher education institutions means that they usually have an IT person, have an administration that wants to emphasize technology use, are part of larger professional organizations that provide technology training and planning, and are more likely to have staff that are well educated and hold at least a minimal level of experience with technology. The non-educationally focused institutions (such as city/county governments, health clinics, and law enforcement) typically do not have an IT person, or must share one with numerous other institutions, do not have an administration that

views technology as particularly important, are not supported with technology training and planning services from their professional organizations; and do not tend to have staff that hold even a minimal level of experience or familiarity with technology. For example, one focus group participant notes that sharing IT personnel with other county departments is problematic because simple problems can quickly snowball to paralyze all kinds of operations.

Meanwhile, several factors can inhibit training of both staffs and public users of anchor institutions. During diagnostics sessions at a school and a health clinic, the network administrators report that long time staff members are normally the most resistant to taking training. A focus group participant notes that easily available online asynchronous training for staff members would be extremely helpful. However, the financial situations of rural anchor institutions is a factor in this area as well, with representatives suggesting that any training programs would have to be cost-effective, by which they generally mean free of charge to the institutions. Rural libraries are equipped best to provide training through their professional organizations, such as the Northeast Florida Library Information Network (NEFLIN) and the American Library Association (ALA).

Barriers and Enablers

One of the key findings from the focus groups is a set of barriers and enablers that limit or contribute to anchor institutions' success in obtaining, deploying, managing, and applying broadband. Figure 36 (above) details the full sets of barriers and enablers; in this section these factors have been collapsed into five categories:

- Resources;
- Broadband and technical knowledge (including trained IT staff and patron training);
- Access to broadband (including access to competitive ISPs and ISP pricing issues);
- Out-of-date network hardware and software; and
- Equipment.

The following section integrates survey, focus group, and diagnostics findings to bring context to these situational factors.

Resources

Survey respondents report that the majority of institutions are self-funding, with some receiving outside funding from county or regional entities, the state, and/or the federal government (see Figure 23 above). Regardless of funding source, one focus group participant speaks for most when he says, "we can't afford much of anything that we need." Funding is a complicated issue, especially for public institutions such as schools, libraries, and first responders. Unless city and county governments raise taxes, the only way for public anchors to get more money or to use the money they have for more broadband is for funding agencies to move it from another line in the budget—and this will create other consequences down the line such as layoffs. Diagnostics interviewees echoed this sentiment as well; administrators constantly attempt to balance their budgets in order to keep staff and maintain services. Once they achieve that balance, they are not very willing to make changes.

During the diagnostic session at the offices of a town whose only source of income is water and sewer fees, the topic came up of the town council purchasing a broadband connection that could serve as a source of revenue by selling connections to the residents. However, the town faces large constraints in this type of plan, due to a lack of familiarity with technology planning and a lack of skills necessary for setting up and maintaining such a network. In addition, marketing the need for fast Internet connections to the town residents appears to be a problem. Another diagnostic location pointed out a utilization barrier—while staff members request new equipment, they do not request any formalized training for new applications. In both cases, the real barrier is not lack of fuding or lack of training; it is lack of demand from the service population.

Broadband and Technical Knowledge

The surveys, focus groups, and diagnostics visits reveal a lack of technical knowledge among anchor institutions' staffs. Some institutions rely on outside IT consultants to bridge this gap. However, the consultants' knowledge may not be transferred to the institution. For example, the office manager for a board of county commissioners that relies on an outside technology consultant has no idea whether their connection is close to being maxed out or not. The staff only becomes aware of network capacity issues when the network crashes or is slow; they have no idea of the amount of bandwidth they have or the amount they need and relying on the outside IT consultant likely means this will remain true in the future.

Access to Broadband

Although 70% of survey respondents report an interest in increasing their connection speed, only 7.1% plan to do so (see Figure 28 above). The survey does indicate some of the problems related to this, including a lack of funding to support an increase and institutions already subscribing to the top available speed. The diagnostic visits reveal another problem in this area—the majority of visited institutions have only one option for an ISP. A rural health clinic had brought in a new ISP, but it was a replacement for an ISP that had stopped serving their area. A library system must use multiple ISPs across the system because there is not one that is available across all of the counties that the library system serves. The best-case scenario with regard to ISP availability that is found by the diagnostics is a town that has only two ISPs available and subscribes to both for redundancy.

Out-of-Date Network Hardware and Software

The survey reveals a number of concerns related to network hardware. Slightly over a quarter of reporting institutions do not have Wi-Fi networks and only 29% of those institutions are planning on adding a network within the next year (see Figure 30 above). Respondents also report issues that could inhibit better networks. For example, almost 60% report that technical issues are an obstacle to obtaining broadband or increasing speed, and over half of staff workstations are three years old or older. Only 21.4% of diagnostics sites report no network problems. The most frequently reported problem is network slowness, with complications such as old equipment and reduced speed during peak usage hours. Other issues include ISP-caused outages and weather-related performance issues. One rural health clinic has a T-1 connection at

the front door, ten workstations, and a wireless connection and firewall and anti-virus software, all of which combine to degrade the performance of its network. Because of all these strains on the network, the clinic has a limited number of Wi-Fi access points and cannot take advantage of new telemedicine applications being developed for mobile devices such as tablets. The clinic would benefit from an upgraded connection, but this is also a good example of a situation where a lack of connection speed is exacerbated by network configuration problems—a speed upgrade alone will not enable them to use the portable telemedicine applications without concurrent improvements to the network configuration.

Equipment

During the diagnostics visits, project team members asked institutional representatives how often they upgrade their hardware; the most common answers are whenever they can afford it and whenever something breaks. Institutions that have IT staff also report that they select software and equipment based on personal experience. This suggests a lack of short- and long-term planning and may explain the survey results showing a large percentage of older workstations. Also, staff members devote a considerable amount of their time to network and equipment troubleshooting. Three diagnostics participants report devoting 4-5 hours per month to troubleshooting, but most say this is a big problem, with estimates including 10% of staff time, 30 minutes per day, half of staff time, and most of the IT staff time.

Summary of Integrated Findings

The integration of the survey, focus group, and diagnostics data provides context for the findings of each method by combining the data in areas that multiple methods covered. The integrated analysis supports several findings from the individual methods. The majority of workstation connections measured have a relatively slow top speed of 5 Mbps. And, almost 20% of institutions report that their connections are not always adequate to meet staff needs (with over 25% reporting this situation for public needs). However, the majority of institutions pay less than $5,000 per year for their connections, but most would be unable to pay more for better and faster connections, despite the inadequacy of their current connections for meeting staff and public needs all of the time. In order to exploit any expanded broadband connections, many institutions will need to have better-trained staffs, but currently they are not planning on offering broadband-related training opportunities. Finally, survey and diagnostics findings confirm the barriers and enablers identified from the focus groups (such as resource- and equipment-related problems and lack of access to broadband).

CONCLUSIONS AND RECOMMENDATIONS

Recommendations

Although the findings from this research could lead to innumerable recommendations, this report focuses on two key recommendations, as the project team believes these to be both important and accomplishable. First, it is clear from this research that building the middle mile network, in and of itself, will not guarantee anchor institution adoption of higher-speed broadband. Any effort to build out broadband in the NFBA service area must include a massive

community awareness and instruction effort. The community awareness effort is necessary to explain to people what broadband is, why it is important, and how it matters to their daily lives in order to get them interested in broadband to begin. Then, instruction is necessary to teach them how to use broadband effectively to increase productivity (at work and home), open the door to new opportunities, and better their lives. As part of this project, the Information institute developed two online, self-paced tutorials related to broadband—"Importance of Broadband" and "Regional Broadband Planning." These tutorials are available at http://tutorials.ii.fsu.edu.[35]

Second, the NFBA (or another entity in this region) should undertake to complete a comprehensive list of all broadband-related projects occurring in this region. This is necessary first to know what is going on that may impact adoption and use of the middle mile network and second to position the region better to seek and obtain additional funding to continue broadband build-out and adoption efforts in the region. Without such a listing, there might be duplication of efforts, which can dissuade funding agencies from providing additional dollars to help increase broadband awareness, availability, and use in the community.

Areas for Future Research

As with the emphasis on two, out of many possible, recommendations above, there are nearly infinite possibilities for areas of future research building off this project. The Information Institute can provide a more comprehensive listing upon request, but for this report, the project team focuses on four main areas for future research: community impacts and outcomes, subscribership, community-based broadband planning, and comparison of anchor institution and residential broadband adoption. Each is discussed briefly below.

Community Impacts and Outcomes

Findings from this study, as well as studies by the University of Texas Telecommunications & Information Policy Institute (TIPI),[36] indicate that funding infrastructure projects does not automatically guarantee increased broadband adoption and utilization. Factors that can influence adoption and utilization (such as the enablers and barriers discussed above), and measures of whether and to what degree they occur, are needed in order to demonstrate the success of BTOP-funded projects such as the NFBA Ubiquitous Middle Mile Project. Basic evaluation metrics such as anchor institutions and homes passed by the new network do not measure the success of the projects in increasing broadband adoption and utilization, just broadband availability. The readiness of anchor institutions for exploiting middle mile investments is a particular concern since these infrastructure projects have received significant federal investment and since they represent a unique dimension in terms of ownership, structure,

[35] As of this report, "Importance of Broadband" is up and running. "Regional Broadband Planning" will be available in a few weeks after it is finalized.

[36] Cunningham, C., & Strover, S. (2009). Rural communities in the networked environment. In P. Golding & G. Murdock (Eds.), *Unpacking Digital Dynamics* (pp. 59-80). New York: Hampton; Oden, M., & Strover, S. (2004) *2004 update: Links to the future*. Washington, D.C.: Appalachian Regional Commission; see also Strover, S., & Oden, M. (2002). *Links to the future: The role of information and telecommunications technology in Appalachian economic development*. Washington, D.C: Appalachian Regional Commission; and LaRose, R., Gregg, J., Strover, S., Straubhaar, J., and Inagaki, N. (2008). *Closing the rural broadband gap: Final technical report*. Washington, D.C.: U.S. Department of Agriculture.

and genesis, compared to extant telecommunications infrastructure. Whether and to what extent anchor institutions are prepared to take advantage of new infrastructure remains to be seen, and can be understood only through research that investigates why some anchor institutions adopt and others do not, the degree to which this is so, whether and to what extent a BTOP (or other) broadband network project actually results in anchor adoption (as well as home adoption), and other issues.

Subscribership

As mentioned previously, just building the network does not guarantee subscribership, especially in economically depressed areas—such as the North Central RACEC and Wakulla County—where people and institutions seem to perceive other needs as more pressing than the need for higher speed broadband Internet. Even for the anchor institutions, bringing a broadband connection to their front door is just the first step. This research finds that inefficient and poorly designed network configurations severely compromise the speed and quality of many anchor institutions' broadband services at the workstation level; also, many staff members do not know the speed or quality of their front door broadband connections and do not understand the ways in which speed to the workstation can be degraded. Additional considerations that impact broadband adoption and use include educational and income levels, with broadband adoption more likely as education and income levels rise.[37] This is particularly concerning for the north central Florida region, in which education and income levels are not on par with state (or national) averages. Understanding (and mitigating) these factors may prove invaluable to broadband build-out projects that otherwise may build a network that no one (or few people) ultimately utilizes.

Rural communities' readiness to exploit middle mile investments is a particular concern, especially since these infrastructure projects have received significant federal investment and since they represent a unique dimension in terms of ownership, structure, and genesis, compared to extant telecommunications infrastructure. Whether and to what extent rural communities are prepared to take advantage of new infrastructure remains to be seen. One area for future research would be to further investigate factors that spur broadband adoption and develop a model to help determine areas more likely to have a larger number of new or upgraded subscribers to broadband Internet. Such research would be of value to the NFBA and other ISPs as they determine which areas are more likely to see profitable returns on infrastructure investments.

Community-Based Broadband Planning

One of the findings from this needs assessment is the need for increased community awareness and community-based broadband planning in the NFBA region to better exploit and leverage the existing high-speed broadband existing now and that will soon be available to a greater extent in the near future. The Information Institute sees the potential for future research to pilot test a community-based broadband planning effort in a community in the NFBA region

[37] Horrigan, J. B. (2010). *Broadband adoption and use in America: OBI working paper series no. 1*. Washington, D.C.: Federal Communications Commission.

and fine-tune that approach for future use in rural regions of Florida. From this research, the Information Institute has developed a draft community-based broadband planning model (Figure 41) that outlines what steps a community needs to undertake to plan for communitywide broadband deployment and adoption.

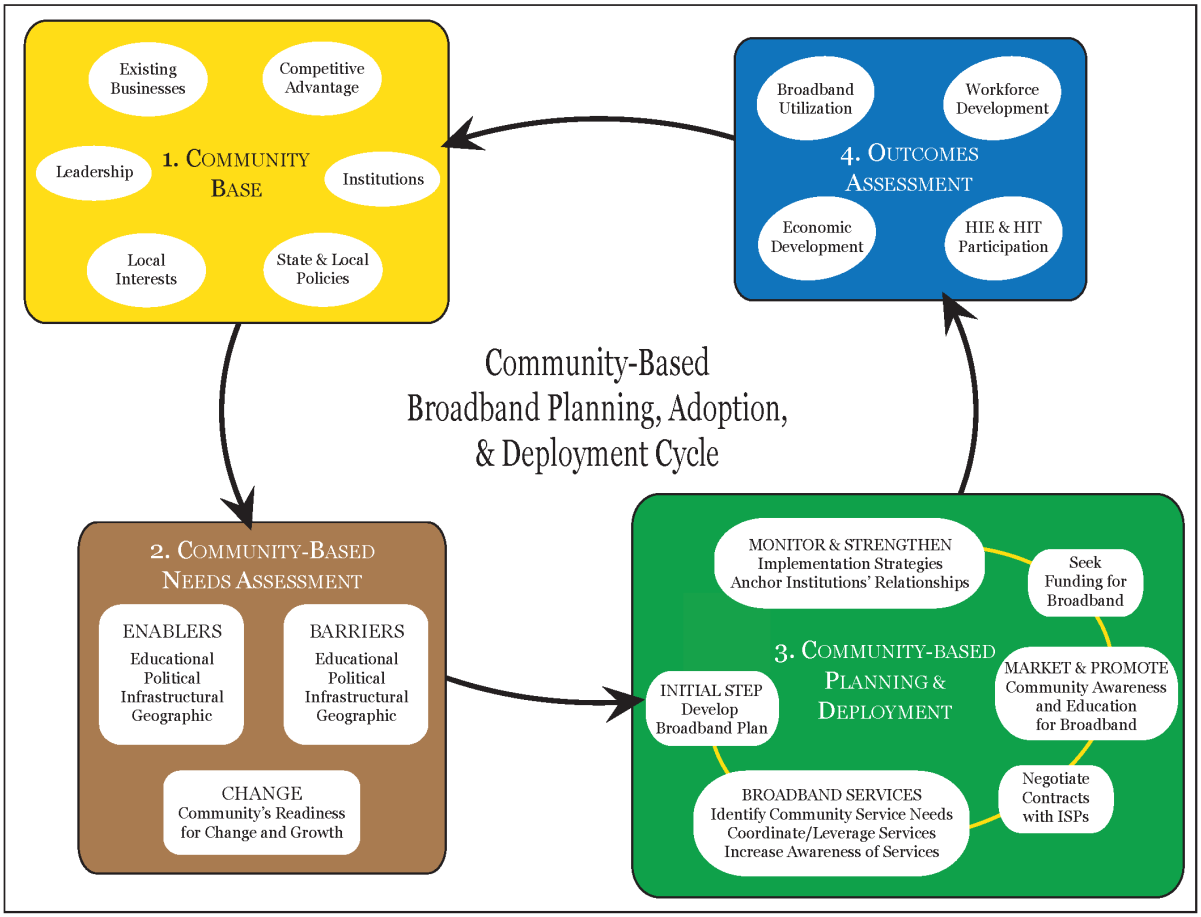


Figure 41. Community-Based Broadband Planning Model

The goals of a community-based broadband planning effort following the above model would be to increase community awareness of the importance and uses of high-speed broadband, demonstrate specific high-speed broadband applications, leverage existing broadband skills and knowledge within the community, encourage anchor institutions and residents to subscribe to or upgrade their broadband connections, and develop and implement a community-based broadband plan. Also, such a pilot test would enable refinement of the model through application in a real-world setting. Ultimately, the success of a community-based broadband planning effort would be the degree to which the community members that participated could better exploit the available and forthcoming high-speed broadband for a range of activities; that anchor institutions could use broadband to transform the way in which they operated; and the degree to which local government officials and others could improve residents' quality of life and the economic viability of their communities. Clearly, those rural communities in Florida that *could* accomplish

these goals would be much more attractive as places to live, places to work, and places to attract others from communities that do not have such access to and use of high-speed broadband.

Anchor Institution vs. Residential Broadband Adoption

Connect Florida's 2011 Residential Broadband Adoption Survey (a telephone survey of residential subscribers) covers some different and some similar territory as the NFBA survey.[38] The Connect Florida survey is similar in its overall goals of measuring technology adoption and usage, asking questions about barriers to technology adoption, Internet cost, type of service, advertised download speed and comparison to actual speed, and reasons for subscribing to broadband. However, many of these data points cannot be compared directly to the NFBA results because the questions were worded differently on the two surveys.

While the study here focuses on anchor institutions, a valuable area for future research would be to integrate data regarding anchor institution broadband adoption and end user home broadband adoption rates. Such research might enable NFBA and other entities to better understand what make some communities more like to adopt broadband *as a whole* (i.e., anchor institutions and residential subscribers) versus other communities.

Conclusions

Overall, this project concludes that building the middle mile broadband network will not, in and of itself, solve access issues in the North Central RACEC and Wakulla County. There are several key barriers and enablers to adoption that must be addressed in addition to building the network, such as:

- Awareness levels of what broadband is and why it is important (among anchor institution staff, funding agencies, administrators, and end users;
- Technical expertise of staff (both general staff and IT staff);
- Funding and other resources available to upgrade broadband and expand broadband-enabled services; and
- General attitudes toward and levels of acceptance of technology and how it can enhance a community and its residents, among others.

In order for the new middle mile network to be successful in attaining subscribers and expanding broadband adoption in the region, these factors cannot be ignored. Rather, they must be addressed and confronted in order to facilitate a situation in which anchor institutions *and residents* of these counties want and are able to adopt high-speed broadband and then use it to better their services and lives.

[38] Connected Nation provided a data file to the Information Institute for analysis, but attempts to analyze that data in comparison to data gathered for the NFBA needs assessment largely were unsuccessful due to variations in the data points.