Understanding Cost-Effective Strategies for Increasing Technology & Internet Access in Montana Public Libraries

An executive summary prepared for the August 8, 2012 Commission meeting
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The Internet is becoming synonymous with information due to a rapid expansion of technology and Internet accessibility, growth of digital information content, and improvements in Internet-based information search tools. This growth continues to have important impacts on the demands for public library resources and the types of services offered in libraries. As patrons' demands for library services continue to evolve, public libraries must effectively respond by effectively reallocating their resources to maintain their economic vitality and role in providing broad community learning, service, and growing demands for access to technology. Failing to develop efficient and effective resource allocation strategies can make public libraries vulnerable to economic instability, especially in periods when funding availability is scarce. In many Montana communities, budgetary constraints and technological limitations are even more binding.

This report provides a review of information used to identify important challenges and opportunities for increasing the ability of Montana public libraries to increase high-speed Internet access to their patrons. First, an overview of statewide technology and Internet implementation strategies instituted by other states is presented. Next, Internet accessibility standards are identified and are used to provide benchmarks for Montana libraries. A summary of available Montana telecommunication service providers and Federal Communication Commission (FCC) and other relevant rulings applicable to technology use and standards are reviewed. Furthermore, the report offers insights into technology and Internet access costs as well as provides information and recommendations for obtaining financial resources. Lastly, three strategies are proposed, with each outlining actions, cost-saving benefits, and major advantages and disadvantages of implementation.

1. Existing Statewide Strategies

Six existing statewide strategies were identified in the United States: the Maine School and Library Network (MSLN); the Ohio Public Library Information Network (OPLIN); the West Virginia Statewide Library Network (WVSLN); the California Peninsula Libraries Automated Network (CPLAN); the Massachusetts Minuteman Library Network (MLN); and, the Wisconsin BadgerNet (WBN). These statewide networks represent various approaches for improving the ability of public institution to cost-effectively provide technology and Internet services to their patrons. This report reviews background information about each program, its administrative and technical structures, hardware and software resources implemented by the program and its participants, costs and funding opportunities, and challenges related to the administration of the program or by its participants.

Each networks was created to increase public libraries' technology and Internet accessibility and reduce associated costs. The programs have been relatively successful in achieving these goals and it is apparent in libraries' participation in these networks. All networks have over 80% of eligible libraries participate, and the CPLAN, WVSLN, OPLIN, and WBN have a nearly 100% participation rate. Every network except the MLN provides Internet service to its members, although the technical structures differ across networks. Moreover, the networks provide centralized services such as email and website hosting, technical support, and library staff training. The centralization of these services are critical to reducing technology and Internet access costs for individual libraries.

Many existing networks are funded through a combination of state funds, federal E-rate discounts, and fees from participating libraries. However, large costs for infrastructure development and upgrades were funded through one-time grant awards and/or state allocations, which are financed sources such as state tax revenues, lottery collections, and telecommunication services fees. For most networks, the primary challenges is sufficiently meeting the rapidly increasing demand for technology and Internet services in a timely manner. This is especially the case for systems that largely depend on state-level funding, which closely follows the variability of the state and national economy.

2. Technology Service Standards

Effectively maintaining a high level of technology service quality requires an established set of hardware, software, accessibility, and staff standards. There are no widely accepted national standards for telecommunication services and the standards specified by the Administrative Rules of Montana "Human Resources Standards: Access" rule 10.102.1150G are relatively broad. Currently, the Montana State Library provides recommendations of minimum personal computer and printer specifications. However, there are additional considerations that need to be made. First, the continually evolving computer and Internet technologies require that the specifications are subject to annual evaluation and revision. Second, although minimum standards can allow libraries to gauge whether they need to upgrade their current equipment, optimal standards can be more instructive for recommending computer and Internet accessibility specifications that enable patrons to improve information access.

The report presents a synthesis of standards from three sources. The first describes technical specifications and best practices inferred from successful strategies in other states. These best practices can be used to develop an evolving set of quantitative benchmarks for use by Montana public libraries. Next, technical recommendations from other public institutions, including state governments and public universities, are used as information supplements. The last set of standards is based on the Edge Initiative, which was introduced by a coalition of government organizations to develop qualitative public access technology benchmarks for public libraries.

There are a number of key findings. First, it is critical to continually monitor and meet the demand for Internet services in a public library. The report provides a table describing recommended minimum and optimal Internet speeds associated with a particular number of computers, but a rule-of-thumb is that if bandwidth use consistently exceeds 70% of total capacity, an upgrade is warranted. Furthermore, technology standardization, timely equipment replacement (5-year cycle), and bundled acquisition can reduce monetary and time costs associated with maintaining public access devices. A specific benefit is the ability to more quickly diagnose and address technology and Internet access problems, reducing maintenance costs, increasing library staff's ability to successfully troubleshoot issues, and provide widespread technology support training.

The Edge Initiative is a pilot program intended to develop national technology standards to help public libraries evaluate and improve their technology and Internet services. The standards have three key components: increasing libraries' community value by offering high-quality technology services, developing strategic partnerships with local governments and businesses to increase access to technology, and offer leadership on technology-related issues in the community. The standards for achieving these components are still evolving.

3. Summary of Telecommunication Services

Many Montana public libraries are located in rural and remote locations and have limited access to Internet service providers. This report provides a detailed overview of available middle- and last-mile telecommunication service (telco) providers for all Montana public libraries. This includes the type of offered service, download and upload speeds, pricing and potential bundling details, and contact information for each Internet service provider. This information can substantially reduce libraries' search costs and provide an easily accessible resource for locating Internet access services.

At the end of 2011, 59 telcos provided middle- and last-mile services in Montana. Public libraries in urban areas had an average of 11.8 telcos, rural libraries had 7.9 telcos, and libraries in remote areas were served by an average of 7.4 telcos. However, there was a substantially lower number of telcos providing wired service, the least expensive alternative. Libraries in cities were able to choose among an average of 5.8 wired providers, while libraries towns, rural, and remote areas had an average of 2.7, 2.0, and 1.8 telcos, respectively. The most important factor that determines the supply of telecommunication services is total population. However, other factors include population density, average income, presence of military or other federal government services, and proximity to institutions of higher education.

Despite the relatively small number of Internet providers serving Montana public libraries, it is important to note that all but three Montana public libraries offered Internet access to its staff and patrons. Moreover, the three libraries that do not currently offer Internet service have wired service providers that can offer access. However, the absence of an Internet connection at these locations

likely reflects the prohibitively high costs associated with using the providers' services.

4. FCC and Other Relevant Rulings

The report describes numerous rulings that can have important impacts and provide opportunities for Montana public libraries. These rulings include the National Broadband Plan, the Broadband Data Improvement Act, the Internet2 initiative, the USDA Rural Development program, the Universal Service Program for Schools and Libraries (federal E-rate program), and the Office of Native Affairs and Policy.

The National Broadband Plan (NBP) was developed by the FCC to ensure that every American has access to broadband Internet. Among other recommendations, the plan states that the federal government should launch a National Digital Literacy Program that creates a Digital Literacy Corps, increases the capacity of digital literacy partners, and creates an Online Digital Literacy Portal. Part of this initiative is to increase E-rate support to more schools and libraries. Also under the NBP, the Office of Native Affairs and Policy (ONAP) was established in 2010 to promote the deployment and adoption of communications services and technology throughout Tribal Lands and Native communities, to ensure robust government-to-government consultation with federally-recognized tribal governments, and to increase coordination with Native organizations. The ONAP handles consultation and coordination with American Indian tribes and engages in work with commissioners, and various bureaus and offices. Furthermore, the Indian Telecommunication Initiative is intended to increase access to communication services and technologies on tribal lands.

The Broadband Data Improvement Act (BDIA) of 2008 directs the Secretary of Commerce to make available competitive grants to develop and implement statewide initiatives that identify and track the availability and adoption of broadband services. Over $4.7 billion of appropriated funds have been used to fund the deployment of broadband infrastructure across the United States, expand public computer center capacity, and encourage sustainable adoption of broadband service. The majority of Montana's funding has been used to improve technology infrastructure for connecting Montana institutions to the Internet*2* north fiber network route. Internet*2* is part of the United States Unified Community Anchor Network (US UCAN) program, which is focused on providing a dedicated 100-200 Gbps nationwide dark fiber backbone with 3.2 terabits per second (Tbps) total capacity. This high-speed connection would enable advanced networking features such as IPv6 and video multicasting. The north fiber line will cross directly through Montana with optical add/drop facilities in Missoula, Bozeman, Billings, and Miles City. The network is expected to be completed by early-2013.

Lastly, the federal E-rate program was mandated by Congress in 1996 to make telecommunication and information services more affordable to public schools and libraries. The success of the program is unquestionable, even with some concern about its sustainability. In 2012, over $5.24 billion was requested in funds, with $2.44 billion being Priority One requests – a 12.5% increase

from 2011. Recently, the Universal Service Administration Company (USAC) has made changes to improve the program and provide access to more applications. In April of 2012, USAC launched its new website, enabling users to more easily find and understand online information and tools related to applying to the program. Furthermore, the USAC offers training for schools, libraries, and consortia that participate in the E-rate program.

5. Technology and Internet Access Costs

An on-going concern with providing long-term, sustainable access to broadband Internet are hardware, software, accessibility, and technical support staff costs. A predominant objective of this report was to investigate the costs incurred under the current structure and identify opportunities for minimizing costs without reducing the quality of provided service.

Hardware replacement costs constitute a relative large on-going expense for public libraries. At the end of 2011, there were 1,822 total computers in Montana Public Libraries, with approximately 29% dedicated solely for library staff use. Over 43% of all computers are located in libraries serving rural and remote communities. Assuming a 5-year hardware replacement cycle and no acquisition of additional computers, Montana libraries would replace an average of 368 machines per year – 106 for staff and 262 for public access. In rural and remote locations, libraries replace between 2 and 3 computers annually, libraries in towns have a replace rate of 5 computers, and 19 computers in cities. If libraries pay an assumed retail price of $1,185 per computer (based on a Dell machine and monitor with specifications used to purchase systems under the BTOP initiative), total replacement costs for Montana libraries would be $436,085 annually. However, if libraries do not standardize and do not purchase from a single vendor, these costs are likely to be higher.

Software costs also constitute a substantial cost to Montana public libraries. Although much of the software is purchased using heavily discounted prices with www.techsoupforlibraries.org, libraries are limited to purchasing a maximum of 50 licenses per location and the software can only be installed on public access computers. In addition to these expenses, libraries participating in the Montana Shared Catalog and MontanaLibrary2Go program are required to pay annual fees. On average, the overall costs for the general software products and access to the shared catalog and MontanaLibrary2Go are $38,614 for libraries in cities, $8,169 for libraries serving towns, and $3,394 for rural and remote libraries.

Technology support personnel add further expenses to public library budgets. In Montana, 57% of sampled libraries have a full or part-time employee dedicated to providing network administration and technical support. In 2011, the average cost for a full-time network administrator was $54,458 and part-time administrators were paid $11,873. Full- and part-time technology trainers were paid $40,500 and $12,232 annually, respectively.

Lastly, broadband Internet access costs represent a large portion of Internet acquisition costs. This

report provides information about broadband Internet costs per Mbps to account for the differences in access speeds across Montana libraries. Without E-rate discounts, average 2011 costs were $427 per 1 Mbps. Libraries serving cities and towns paid an average of $387 per 1 Mbps, while libraries in rural and remote locations paid in excess of $463. This discrepancy largely reflects differences in the supply of Internet service providers and technological constraints. For libraries that had E-rate discounts, however, Internet costs were substantially lower. Specifically, libraries serving cities and towns paid only $125 per 1 Mbps and rural and remote libraries paid $130 per 1 Mbps.

6. Funding Opportunities

A complement to effectively identifying Internet and technology access costs is locating financial resource opportunities that would allow Montana public libraries to transition and remain sustainable in providing technology services. However, the competition for financial resources has continued to increase, making it more difficult to obtain funding from public and private institutions that have traditionally assisted public libraries. In response to the increasing competition and decreased availability of financial resources, Montana public libraries will need to aggressively continue seeking funding opportunities from both existing and new sources.

This report provides information about financial opportunities from both traditional and alternative sources. Traditional funding opportunities are those that are provided by federal and state entities, and are competitive and formula-based grants. Internet access funding opportunities are classified as being of two types: those that assist with providing on-going Internet services and those that can be used to expand and improve the technology infrastructure. The financial opportunity that provides the greatest on-going support is the federal E-rate program. Because discounts are assigned based on the size of the discount rate and postmark date, Montana public libraries have the opportunity to be competitive for obtaining Internet access discounts.

Opportunities for other funds include the Connect American Fund, the Grants to States program, the Native American Library Services program, and the Community Connect Program. It is important to note that 2012 marks the conclusion of Montana's current five-year in the Grants to States program. Initiatives in the 2013-2017 plan can specifically target projects and goals that would: (a) substantially increase Internet and technology accessibility in all Montana libraries, and (b) develop strategies that would provide long-term sustainability of that accessibility.

Increased competition for federal grants and continuing contraction of financial opportunities requires public libraries to develop new, innovative means to acquire resources for improving and sustaining their technology and Internet access services. As a community anchor institution, public libraries have numerous opportunities to procure both financial and in-kind assistance through non-traditional sources. However, this requires that library administrators consider alternatives that are "outside the box." In addition to providing financial assistance, proactively seeking and taking advantage of non-traditional opportunities can further strengthen libraries' roles as

information service providers in their communities. This report offers examples and insights into four non-traditional ways to acquire financing. These include multi-agency cooperatives, digital literacy initiatives, partnerships with higher education providers, and collaboration with community organizations. Moreover, the report's appendix offers an extensive list of private granting organization that have funded Montana-based projects.

7. Cost-Effective Strategies

The strategies and recommendations provided in this report were formed from a synthesis of insights about the needs of Montana public libraries, the successes of strategies implemented by other state and regional library networks, and the opportunities and challenges of developing a sustainable, cost-effective structure for providing high-quality technology services to Montana communities. The research made it evident that improvements in Internet accessibility and increases in cost savings are largely inseparable from an efficient, cost-effective system for acquiring, maintaining, and providing technology services.

Four strategies are provided and differ primarily in the degree of administrative centralization and integration among participating libraries. The key factor underlying all of the strategies, however, is that the aggregation of knowledge and costs will result in the greatest efficiency, effectiveness, and savings.

7.1 Centralized Information and Service Resources

Rapid and widespread changes can require substantial start-up funds and significant planning. However, efficiencies and cost savings can be achieved with the adoption of less sizable changes. One such change would be a development of a central information and service resource provider that focuses on improving technology and Internet access throughout Montana public libraries. The centralization of knowledge and service resources can generate substantial savings, both monetary and time, through two key interrelated factors: standardization of technology and increase in centralized support. In this structure, the Montana State Library would take on three critical leadership roles: facilitate an information exchange related to the acquisition and maintenance of technology and Internet services, facilitate the acquisition of standardized technology equipment, and offer resources that assist libraries with locating and successful obtaining financial resources.

Communication with library administrators indicated that there is a deficit of readily available, current information resources that can be used to make decisions about technology services. A critical role of the Montana State Library would be as central, one-stop facilitator of information related to the technology and Internet services. The MSL can significantly improve libraries' ability to acquire the sought after information by developing a focused, interactive website that

centralizes the numerous pieces of information and services that are currently offered by the MSL as well as other resources (e.g., information provided in this report; resources offered by the State Information Technology Services Division; and additional outside sources).

There are two factors that can significantly aid in the use of this resource by stakeholders. First, the website would need to be well maintained and continually updated. While some information and resources would require little ongoing change, many others will require regular upkeep. Second, it is important that the website is well-organized, easily accessible, and is the single source for technology and Internet related information and services. That is, the resources provided on the website should not be duplicated elsewhere on the Montana State Library website, which can cannibalize the use of the website. For example, if some users know that they can navigate to E-rate training webinars from the MSL website, other users navigate using the Montana Public Library E-rate blog, and a third set of users reaches the webinars using WebJunction, then not only will the WebJunction tool be underutilized, but those users accessing E-rate webinars from other sources will not have access to additional useful resources that may be available on WebJunction. The converse is also the case.

The second leadership role of the Montana State Library would be to encourage and facilitate the acquisition of standardized equipment and software. This will enable libraries to substantially decrease their technology costs and reduce costs associated with searching for new and replacement equipment. Moreover, it will allow MSL to provide reminders about equipment upgrades to libraries. Lastly, standardization will substantially improve and lower costs associated with technical support burdens. For example, MSL can provide targeted technical support information and training, because troubleshooting solutions for typical issues would be nearly identical.

In addition to providing information and training related to technology equipment, the MSL would also offer information and training for public library administrators to locate and successfully obtain funding. For example, the MSL website can include a navigable list (with search capabilities) of granting agencies and opportunities, and offer training for writing successful grant proposals. Special focus is encouraged to continue to be placed on the federal E-rate program. The Montana State Library can continue being a leader in training library administrators to be more efficient and effective in completing the application process and successfully securing funds. This can include training webinars with step-by-step instructions for completing the application, increased collection and clearer presentation of available data, and an active discussion forums. Although the MSL has been successful in its efforts to offer many these services to its stakeholders, it is encouraged to continue this leadership by developing a centralized, targeted platform for delivering these services from a single source.

Perhaps the most important advantage of the proposed information and services centralization structure is the preservation of independence for Montana public libraries. That is, the structure would provide a relatively low-cost investment and low entry barrier for public libraries. Each library would be encouraged to use the introduced resources, but the commitment would be

minimal. However, there is evidence that library administrators would be very likely to participate. In a survey of Montana public library administrators, 68% responded that they will be very likely to adopt standardization recommendations provided by the MSL, and 32% responded they were somewhat likely to adopt. When the library administrators were asked the likelihood of adoption if it implied a reduction in their library's overall costs, 82% responded that they would be very likely to adopt MSL's recommendations.

7.2 Consortial E-rate Structure

Public libraries that do not apply for federal E-rate discounts may be able to capture substantial Internet access cost savings. For example, libraries that do not currently participate in the E-rate program have the potential of reducing realized Internet access costs by an average of 69%, with higher discounts (an average of 71%) in libraries serving rural and remote locations. However, among the reasons that public library administrators decide not to apply for the federal E-rate program are the concerns that the application process is too cumbersome, the payoff is not worth the efforts, and increased competition for E-rate funds has lowered the likelihood of a library to receive assistance. The Montana State Library can be a leader in lowering libraries' barriers to applying for E-rate discounts and increase their opportunities of successfully obtaining Internet access cost savings.

One important way in which the Montana State Library can facilitate potentially higher E-rate participation and a reduction in costs is through a consortial E-rate application structure. A consortium-based E-rate application structure has been successful in reducing costs for libraries in many state- and region-wide networks, and in Montana, where discount rates for libraries are high and can significantly reduce Internet access costs, similar benefits may be possible. Although applying for consortium E-rate discounts is a lengthy and rigorous process, the Montana State Library can facilitate two options for administering the consortial E-rate structure. One option is outsourcing the work to a third-party consulting firm, such as the one procured under BTOP funds. A second option is to establish a new position (or restructure an existing position) in the Montana State Library, which would largely be responsible for applying to the federal E-rate program on behalf of participating libraries.

Existing data indicate that there can be substantial cost savings from using MSL personnel to administer the E-rate application process rather than a consulting service. On average, the fees associated with a consulting service would constitute approximately 53% of the total E-rate discount a library receives. The average cost appropriated for an MSL employee would constitute an 18% E-rate discount reduction. If all libraries participate in the E-rate consortium and an MSL employee administers the program, each library is estimated to save an average of $1,244 in Internet access fees. Furthermore, for many libraries, participation in a consortial E-rate structure will depend on whether their fees into the program are lower than the fees associated with independently applying for the E-rate program and/or the associated Internet access cost savings.

A survey of Montana library directors provides evidence, however, that the time and costs of independently applying for E-rate discounts are likely to be higher than the fees for consortial E-rate participation. Ultimately, the success of using an MSL employee to administer the consortial E-rate structure will depend on the willingness of the Montana State Library to share the costs of the position.

7.3 Regional IT Service Structure

The regional hub-and-spoke model uses the preceding structure as a foundation and increases cost-savings through a consolidation of technology support costs. The underlying strategy is to designate libraries into districts throughout Montana, allowing groups of libraries to share the services of technology support professionals. In so doing, each individual library will substantially reduce the cost burden associated with technology support personnel that serve their particular location. Using spatial analysis, 12 potential districts are designated throughout the state, encompassing 88% of all libraries. Only 13 libraries, which are located in remote locations, would be excluded, because their inclusion would make the strategy not cost-effective. Each district would encompass an average of 8 libraries and an average of 133 computers, with district hubs being libraries that serve cities or towns.

Depending on the number of libraries in a district, the hub will employ 1 or 2 full-time equivalent (FTE) technology support personnel. These individuals will serve to respond to emails, phone calls, and site-visit requests for all libraries in the district. Under the assumption that technology and software are standardized, the technology personnel would be able to manage all of the computers in a particular district. That is, because technology in each library would be nearly identical, most problems would be solved quickly and without frequent site visits. For particularly complex issues, personnel from nearby districts may be used to assist with the problem.

Currently, there are 1,666 computers and an estimated 36.2 FTE technology support personnel employed in Montana libraries (excluding school-community libraries, where technology support is often provided by the school). The associated salary and fringe benefits are an estimated $1,687,846 annually. The degree of realized cost savings depends on the number of libraries included in the hub-and-spoke structure, with more libraries leading to greater cost savings. If only libraries serving cities, towns, and rural areas are included in the 12 hub-and-spoke districts (remote libraries, constituting 65% of all libraries, are excluded), the total technology support FTEs are reduced to 16 and cost savings are $307,322 ($8,536 average per library) annually. Growing the structure to include the remote libraries would result in 21.8 FTE support personnel and an annual savings of $508,030 ($4,884 average per library).

The substantial reduction in costs and increase in the potential quality and response time of technology support are major advantages of the regional IT structure. Without aggregating and sharing costs, substantial cost reductions cannot be realized. The primary drawback of this strategy is the potential loss of autonomy and personal service, which comes from an on-site support staff.

7.4 Complete Centralization

While the district hub-and-spoke model provides a degree of regional service centralization, a fully centralized network would encompass all libraries within a single structure. Moreover, this system will enable libraries to obtain all Internet access and technology support services from a single administrative entity. This further consolidates services and aggregates costs, resulting in the most cost-effective approach to obtaining technology and Internet services.

Technical advantages of the network include a prioritization of network traffic resulting in faster access to the Internet, direct and substantially faster connectivity among libraries and shared resources such as the Montana Shared Catalog (as local traffic will not be routed through the Internet), and a central server location that can be connected to the Internet2 line, resulting in major improvements and flexibility of Internet access speeds. Furthermore, because libraries are on a single network, there will be substantial reductions in Internet access and technology support costs.

Currently, technological limitations do not allow for all Montana libraries to cost-effectively participate in a fully centralized structure. However, a sample of 28 libraries, for whom this structure is appropriate, can be part of a pilot group. For these libraries, current total Internet access costs are approximately $86,409 annually ($28,983, if all of these libraries received E-rate discounts). Annual Internet access costs in a fully centralized network would be approximately $67,636, a $18,773 per year savings. If E-rate discounts applied, the savings would be $7,095.

Although the Internet access cost savings are relatively modest, reductions in the need for technology support services would significant add to cost reductions. In centralized systems, the cost savings would result from benefits such as automated outage monitoring, around-the-clock support, and a reduction in the demand for support staff. Currently, the 28 libraries that would be part of the pilot program have 18.4 FTE support personnel, costing $918,171 annually. Under the proposed centralized structure, only 7.1 FTEs would be necessary, resulting in a $540,216 annual savings ($19,293 annual savings per library). Total savings from Internet access and support personnel cost reductions would be between $559,651 and $547,973, depending on the number of libraries receiving E-rate discounts.

In a survey of Montana public library administrators, 77% responded that they will be very likely to join a centralized network structure when participation reduced their overall technology and Internet access costs, and 23% responded they were somewhat likely to join. No administrators responded that their library's participation would be unlikely.