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Today, access to the Internet and a basic level of digital literacy are essential for education, employment, communication and partaking in everyday family and civic life. Printed tax forms are being replaced with web-based systems; written job applications are being replaced with online applications; mailed birthday cards are being replaced with smart phone applications and posts to Facebook.

While print materials such as book and magazines will always be resources for life-long learning, entertainment, and formal research, digital content is becoming a primary source for many Montanans. As the public wants and needs exponentially greater access to online resources, and as the demand for more robust infrastructure to meet content needs at libraries grows, the State Library will continue to provide leadership and support to help Montana stay ahead of the curve.

When Montana State Library applied for a federal Broadband Technologies Opportunities Program (BTOP) grant funded by the American Reinvestment and Recovery Act (ARRA) in 2010, we recognized the significant shift happening in the way Montanans were accessing information and the growing pains experienced by libraries and their communities across the state. Through this grant, libraries have received new computers, software, ADA-compliant furniture, network equipment, staff training and upgraded broadband connections. As we approach the conclusion of this program, the State Library is exploring ways to help local libraries not only sustain these efforts, but to meet future demands as digital content evolves.

Montana State Library Mission

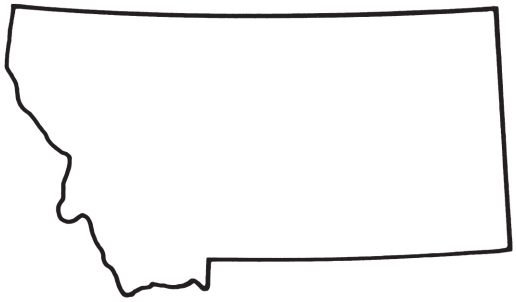
The Montana State Library is committed to strengthen libraries and information services for all Montanans through leadership, advocacy, and service.

To that end, the Montana State Library solicited the following feasibility study and report from Montana State University. This report provides an academic perspective on the economics of public Internet access at libraries, as well as opportunities to re-organize existing resources and potential formation of regional or statewide consortia. It also offers suggestions on the role the State Library could assume to assist libraries. The study is one of many resources the State Library will use in future dialogues with library directors, local governments, and state leadership to determine how we may better meet our communities' information technology needs with limited financial resources.

As you read through this valuable resource, consider how the suggestions within it would impact your community. What would your advice be to your public library? What role could the State Library play in its partnership with public libraries to ensure that Montanans have access to timely, quality information that will help them better achieve their life goals?

Jennie Stapp
State Librarian

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



A Report to the Montana State Library

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Executive Summary

Rapid technological growth and expansions to Internet access and digital information content have made the Internet ubiquitous in American life and the preferred destination for information discovery. This reality has had an unprecedented impact on the demand for public library resources and services.

As demand for library services continues to evolve, public libraries must respond by reallocating resources to maintain their economic vitality and meet growing needs for technology access. Failure to develop efficient, effective resource allocation strategies can make public libraries vulnerable to economic instability, especially in periods with scarce funding availability. 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 allowing Montana public libraries to increase high-speed Internet access to their patrons. First, an overview of statewide technology and Internet implementation strategies in other states is presented. Next, Internet accessibility standards are identified and 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 and provides information and recommendations for obtaining financial resources. Lastly, four strategies are proposed, each outlining actions, cost-saving benefits, and major advantages and disadvantages of implementation.

Existing Statewide Strategies

Six existing statewide strategies were identified: 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 institutions 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 network was created to increase public libraries' technology and Internet accessibility and reduce associated costs. The programs have been relatively successful in achieving these goals, as is apparent in libraries' participation in these networks. Each network has at least an 80% participatation rate, 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 e-mail and website hosting, technical support, and library staff training. The centralization of these services is 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 participation fees. However, major costs for infrastructure development and upgrades are often paid for with one-time grant awards or state allocations, which are financed by state tax revenues, lottery collections, or telecommunication services fees. For most networks, the primary challenge is 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.

Technology Service Standards

Maintaining quality technology services requires established standards for hardware, software, accessibility, and staff. There are currently no widely accepted national standards for telecommunication services, and the standards specified by the Administrative Rules of Montana do not offer specific quantitative measures for public libraries to gauge the quality of their technology services.

The Montana State Library provides recommendations for minimum personal computer and printer specifications, but additional considerations must be made. First, continuously evolving computer and Internet technologies require that specifications be 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 improve patrons' access to information.

The report presents an overview 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 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 recommendations from the Edge Initiative, a coalition of government organizations developing qualitative public-access technology benchmarks for public libraries.

There are a number of key findings. First, continuous monitoring of Internet services demand is critical for a public library. The report provides a table describing recommended minimum and optimal Internet speeds for various numbers of computers, but a good rule of thumb is that bandwidth use consistently exceeding 70% of total capacity warrants an upgrade. Furthermore, technology standardization, timely equipment replacement, and bundled acquisition can reduce financial and time costs associated with maintaining public-access devices. Specific benefits are the ability to reduce maintenance costs, increase library staff's ability to successfully troubleshoot issues, provide widespread technology support training, and diagnose and address technology and Internet access problems quickly.

The Edge Initiative is a pilot program that develops 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 quality technology services, developing strategic partnerships with local governments and businesses to increase technology access, and offering leadership on technology issues in the community. These standards are still evolving.

Summary of Telecommunication Services

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

At the end of 2011, fifty-nine telcos provided middle- and last-mile services in Montana. Public libraries in cities had access to 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 were 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 in towns, and rural and remote areas had an average of 2.7, 2.0, and 1.8 wired telcos, respectively. The most important factor determining the supply of telecommunication services is total population, but other factors have some influence, including population density, average income, the 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 their staff and patrons. Moreover, the three libraries that do not currently offer Internet service do have access to at least one wired ISP. The absence of an Internet connection at these locations likely reflects the prohibitively high costs associated with using those providers' services.

FCC and Other Relevant Rulings

The report describes numerous rulings that could have an impact on or 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 creation of the Office of Native Affairs and Policy.

The FCC developed the National Broadband Plan (NBP) to ensure that every American has access to broadband Internet. Among other recommendations, the plan recommends that the federal government launch a National Digital Literacy Program creating a Digital Literacy Corps, increase the capacity of digital literacy partners, and create an Online Digital Literacy Portal. Part of this initiative is to increase E-rate support to more schools and libraries. The NBP also established the Office of Native Affairs and Policy (ONAP) in 2010 to act as the FCC contact for American Indian, Alaska Native, and Pacific Islander groups. The office cooperates with tribal governments to promote the installation of communications services and technology throughout tribal lands and Native communities and to ensure robust government-to-government consultation with federally-recognized tribal governments. 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 offer competitive grants for the development and implementation of statewide initiatives that identify and track broadband availability and adoption. Over $4.7 billion have been used to fund the installation 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 Internet2 north fiber network route. Internet2 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, Congress mandated the federal E-rate program in 1996 to make telecommunication and information services more affordable to public schools and libraries. The success of the program is unquestionable, despite concerns about its sustainability. In 2012, over $5.24 billion in funds were requested, with $2.44 billion in Priority 1 requests – a 12.5% increase over 2011. Recently, the Universal Service Administration Company (USAC) has made changes to improve the program and provide access to more applicants. In April 2012, USAC launched its new website, enabling users to more easily find and understand online information and tools related to applying to the program. USAC also offers training for schools, libraries, and consortia that participate in the E-rate program.

Technology and Internet Access Costs

The costs of hardware, software, Internet accessibility, and support staff are an ongoing concern for providing long-term, sustainable access to broadband Internet. A major objective of this report was to investigate current costs and identify opportunities for minimizing costs without reducing service quality.

Hardware replacement costs constitute a relatively large ongoing expense for public libraries. At the end of 2011, Montana public libraries had 1,822 computers, with approximately 29% intended solely for library staff use. Libraries serving rural and remote communities account for 43% of those computers. Assuming a five-year hardware replacement cycle and no acquisition of additional computers, Montana libraries replace an average of 368 machines annually – 106 for staff and 262 for public access. In rural and remote locations, libraries replace two to three computers annually; libraries in towns have a replacement rate of five computers, and those in cities replace nineteen computers annually. 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. If libraries do not standardize and 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 fifty 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 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; part-time administrators were paid $11,873. Full- and part-time technology trainers were paid $40,500 and $12,232 annually.

Lastly, broadband Internet access costs represent a large portion of acquisition costs. This report provides information about broadband Internet costs per Mbps to account for differences in access speeds across Montana libraries. Without E-rate discounts, average 2011 costs were $427 per Mbps. Libraries serving cities and towns paid an average of $387 per 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. Libraries with E-rate discounts, however, had substantially lower Internet costs: libraries serving cities and towns paid only $125 per Mbps and rural and remote libraries paid $130 per Mbps.

Funding Opportunities

A complement to identifying Internet and technology access costs is locating funding opportunities for Montana public libraries. 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 provided by federal and state entities through competitive and formula-based grants. Internet access funding opportunities are classified as being of two types: those that assist with providing ongoing Internet services and those that can be used to expand and improve technology infrastructure. The financial opportunity that provides the greatest ongoing 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 participation in

the Grants to States program. Initiatives in the 2013-17 plan can specifically target projects and goals that would substantially increase Internet and technology accessibility in all Montana libraries and develop strategies that would provide long-term sustainability for that accessibility.

Increased competition for federal grants and continuing reduction 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 community anchor institutions, public libraries have numerous opportunities to procure both financial and in-kind assistance through nontraditional 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 nontraditional opportunities can further strengthen libraries' roles as information service providers in their communities. This report offers examples and insights into four nontraditional ways to acquire financing, including multiagency 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.

Cost-Effective Strategies

The strategies and recommendations provided in this report proceed from a synthesis of insights into the needs of Montana public libraries, the successes of strategies implemented by other state and regional library networks, and the opportunities and challenges inherent in developing a sustainable, cost-effective structure for providing high-quality technology services to Montana communities. The research made it clear 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.

The four strategies presented here differ largely in the degree to which participating libraries centralize and integrate their administrative roles. 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.

Centralized Information and Service Resources

Rapid and widespread changes can require substantial start-up funds and significant planning, but even less sizable changes can achieve improved efficiencies and cost savings. One such change would be the 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 financial and time savings through two key interrelated factors: technology standardization and increased centralized support. In this structure, the Montana State Library would facilitate an information exchange related to the acquisition and maintenance of technology and Internet services, assist in the acquisition of standardized technology equipment, and offer information that allows libraries to locate and acquire 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 a 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).

This website would need to be well-maintained and updated frequently. While some information and resources would require little ongoing change, many others would require regular upkeep as regulations and grant sources change. Second, it is important that the website be well-organized, easily accessible, and act as the single source for technology and Internet information and services. That is, the resources provided on the website should not be duplicated elsewhere on the Montana State Library website, which could 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 would the WebJunction tool be underutilized, but those users accessing E-rate webinars from other sources would not have access to additional useful resources that may be available on WebJunction. Users must have access to information from a single web source.

The second leadership role of the Montana State Library would be to encourage and facilitate the acquisition of standardized equipment and software, which would enable libraries to substantially decrease their technology costs and reduce costs associated with searching for new and replacement equipment. Moreover, it would allow the MSL to provide libraries reminders about equipment upgrades. Lastly, standardization would 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 acquire 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, with special focus on the federal E-rate program. The Montana State Library can be a leader in training library administrators to complete the application process effectively and successfully secure funds. Training can include webinars with step-by-step instructions for completing the application, increased collection and clearer presentation of available data, and active discussion forums. Although the MSL has been successful in its efforts to offer many of 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 new resources, but commitment would be minimal. There is evidence that library administrators would be very likely to participate. In a survey of Montana public library administrators, 68% responded that they would be very likely to adopt standardization recommendations provided by the MSL, and 32% responded they were somewhat likely to adopt. When 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.

E-rate consortium

Public libraries that do not apply for federal E-rate discounts have the potential for 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 concerns that the application process is too cumbersome, the payoff is not worth the effort, and increased competition for E-rate funds has lowered the likelihood that a library would receive assistance. The Montana State Library can be a leader in lowering libraries' barriers to applying for E-rate discounts and increase their opportunities for successfully obtaining Internet access cost savings.

One important way in which the Montana State Library can facilitate potentially higher E-rate participation and cost reduction is through a consortial E-rate application structure. This type of network has been successful in reducing costs for libraries in many state and regional networks. In Montana, where discount rates for all 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 E-rate consortium. 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 using MSL personnel to administer the E-rate application process rather than a consulting service may result in substantial cost savings. On average, consulting service fees 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.

For many libraries, participation in an E-rate consortium would depend on whether their fees for the program are lower than the fees incurred by applying independently for the E-rate program or the associated Internet access cost savings. A survey of Montana library directors provides evidence 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 E-rate consortium would depend on the willingness of the Montana State Library to share the costs of the position.

Regional IT Service Structure

The regional hub-and-spoke model uses the preceding centralized information structure as a foundation and increases cost savings by consolidating technology support costs. By dividing Montana libraries into districts and allowing groups of libraries to share the services of technology support professionals, each individual library would substantially reduce the cost burden associated with technology support personnel serving their particular location. Using spatial analysis, twelve potential districts are designated throughout the state, encompassing 88% of all libraries. Only thirteen libraries, located in remote locations, would be excluded because their inclusion would not be cost-effective. Each district would encompass an average of 8 libraries and 133 computers, with district hub libraries serving cities or towns.

Depending on the number of libraries in a district, the hub would employ one or two full-time equivalent (FTE) technology support personnel who would respond to e-mails, phone calls, and site-visit requests for all district libraries. Assuming standardized technology and software, technology personnel could manage all of the computers in a particular district because each library's technology would be nearly identical. Most problems would be solved quickly and without frequent site visits. For particularly complex issues, personnel from nearby districts could assist.

There are approximately 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 twelve hub-and-spoke districts (remote libraries, constituting 65% of all libraries, are excluded), then total technology support is reduced to 16 FTEs 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).

Major advantages of the regional IT structure are substantial cost reductions and increases in the potential quality and response time of technology support. 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 that an on-site support staff provides.

Complete Centralization

While the district hub-and-spoke model provides a degree of regional service centralization, a fully centralized network would include all libraries within a single system. This kind of network would enable libraries to obtain all of their Internet access and technology support services from a single administrative entity, further consolidating costs and 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 Internet access, direct and substantially faster connectivity among libraries and shared resources such as the Montana Shared Catalog

(as local traffic would not be routed through the Internet), and a central server location that can be connected to the Internet2 line, creating in major improvements and flexibility in Internet access speeds. Furthermore, because libraries are on a single network, there would 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 twenty-eight libraries, for which this structure is appropriate, can be part of a pilot group. For these libraries, current total Internet access costs are approximately $86,409 annually; this sum would be $28,983 if all of these libraries received E-rate discounts. Without 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, Internet costs would be $21,888, resulting in a total savings of $7,095 relative to the $28,983 annual access in a decentralized structure.

Although Internet access cost savings are relatively modest, reductions in the need for technology support services would add significant 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 support staff demand. Currently, the twenty-eight 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 would be very likely to join a centralized network structure if 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. Administrators' willingness to participate in a centralized network indicates that this strategy could be a long-term solution for providing cost-effective technology and Internet access to Montana public libraries.

1. Existing Statewide Strategies

Six existing statewide strategies were identified: 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 to improving the ability of public institutions to provide cost-effective technology and Internet services to their patrons. The structure and technical details of these programs offer a foundation for understanding how Montana might implement a similarly successful program.

This report reviews background information about each program, including administrative and technical structure, hardware and software resources implemented by the program and its participants, costs and funding opportunities, and challenges related to the administration of the program.

1.1 Maine School and Library Network

The Maine School and Library Network (MSLN), which began in 1996, was among the first statewide initiatives to provide Internet service to all schools and libraries. The MSLN program was the result of a joint effort by the Maine Library Association, the Maine Educational Media Association, and the Maine Library Commission to urge that the Maine Public Utilities Commission (MPUC) investigate whether the NYNEX Corporation (later Verizon) was overcharging Maine public libraries for telephone and dial-up Internet services. As a result of the investigation, the organizations developed an agreement: NYNEX would provide all public libraries and schools free 56 Kbps dial-up connections, discounted equipment, and free network support. The agreement provided $20 million over five years to connect more than one thousand public schools and libraries to a common network that provided Internet access.

The structure and technical details of these programs offer a foundation for understanding how Montana might implement a similarly successful program.

The University of Maine System Network (UNET) acted as the Internet service provider. In 1999, the Maine Legislature provided the program with a permanent funding source by allowing the MPUC to collect a small fee for intrastate telephone services and allocating these resources to the MSLN program.

The MSLN offers participating members other resources in addition to Internet access, including access to phone, e-mail, and in person technical support; consultation and assistance with applying for the federal E-rate program; a centrally administered relationship with telecommunication carriers; a project manager to help assess existing and future technology needs; and free access to multiple information databases.

1.1.1 Administrative and Technical Structures

The MSLN is governed by the MPUC, which collects funds from telephone users to support the program. However, it is the state librarian and Maine Department of Education commissioner who are responsible for developing relevant policy and representing the interests of the state's public libraries and schools. The project manager assesses

bandwidth use, provides technical coordination, and makes annual budget requests to the MPUC.

The MSLN has a flat network structure: each public library and school connects directly to a UNET node, which provides access to the Internet and to resources provided by other program members. Figure 1 illustrates the flat network structure. Connection speeds range from 56 Kbps to 1.5 Mbps (T1), and the MPUC allocates funds for institutions that exceed a 56 Kbps access capacity to upgrade to a T1 connection.

The flat network has two advantages: aggregation and centralization. Under this structure, Internet traffic from all libraries is routed directly to a UNET server rather than a library system's central library. Consequently, all libraries in the MSLN system have consistent service and average unit Internet costs. Moreover, unlike a hierarchical structure (i.e., branch libraries are connected to an ISP through a central library), a flat network allows all libraries in the system to be fully interconnected.

The MSLN has focused on sustainable solutions, developing training programs that teach library and school administrators to address common technical problems without requesting outside support.

An important disadvantage of a flat network is that all network traffic is routed through the Wide Area Network (WAN; the Internet), creating a delay for traffic from one network participant to another (e.g., an interlibrary loan request between libraries in the same system). A flat network also does not allow traffic to or from a particular library to be prioritized, potentially reducing transfer speeds for high-priority traffic. Because the MSLN is a smaller public library network, this has not become a substantial concern.

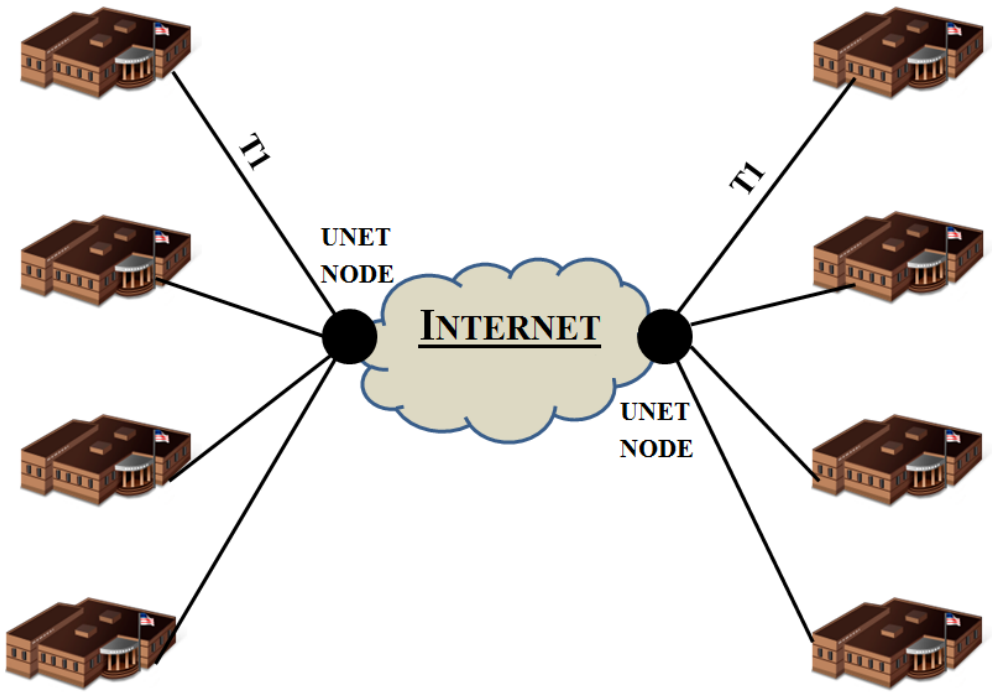
Membership in the MSLN is voluntary but relatively high, with 82% of Maine's 263 libraries participating. The majority of institutions that do not participate obtain Internet service from local ISPs; several libraries do not offer Internet access to its patrons. MSLN members are subject to several restrictions regarding the type of Internet access available to their patrons. Because the MSLN is partially funded through the federal E-rate program (a full description of MSLN funding sources is provided in Section 1.1.3), participating libraries are required to use an OpenDNS filter, which prohibits access to certain categories of websites. Individual libraries can also add websites to the default filter list, but requests to bypass a blocked website must be approved by the MSLN.

1.1.2 Hardware and Software

As discussed above, the MSLN uses a flat network structure to provide Internet and interlibrary network access to participating institutions. The majority (75%) of participating public libraries are connected with a single T1 line (1.5 Mbps capacity). The remaining libraries, whose bandwidth use exceeds the 1.5 Mbps capacity, use two T1 lines (3 Mbps capacity).

Technical support is offered to participating institutions by phone, e-mail, and in person. In person services are provided by a circuit rider who visits libraries and schools to address problems. Visits are prioritized by problem severity and access to local resources that can be used to solve the issue. To minimize burdens placed on the circuit rider, the MSLN has focused on sustainable solutions, developing training programs that teach administrators to address

Figure 1: MSLN Flat Structure



Note: Figure constructed by authors using information from Strege et al. (2010).

common technical problems without requesting outside support.

1.1.3 Costs and Funding Resources

The MSLN offers most participating libraries a substantially lower rate for a high-speed Internet connection than it would be possible to obtain independently. Carriers offer a significant bulk discount to the MSLN because it provides contracts for over 900 T1 connections. The total cost of the MSLN program was $4.4 million in 2007 and approximately $5 million in 2011. About 60% of these costs are financed by the federal E-rate program and 40% comes from fees assessed on intrastate telephone services. In 2011-12, the MPUC will collect approximately 0.3% of intrastate telecommunication service fees.

1.1.4 Challenges

Growing demand for Internet services has pushed the 1.5 Mbps bandwidth capacity to its limit for many Maine public libraries. Consequently, some libraries and schools have opted out of the MSLN and chosen to work with Internet service providers that offer higher bandwidth capacity. If this trend continues, it may reduce the economies of scale advantages that have allowed the MSLN to provide low-cost Internet accessibility to the majority of Maine public schools and libraries.

The Maine Department of Education and the State Library are considering options to increase bandwidth capacity to 100 Mbps in all schools and libraries, but the high number of relatively rural areas across Maine and off-shore island communities make this impracticable under

the existing flat network structure. With the improvement in satellite Internet access, wireless Internet connectivity has been proposed as one possible solution.

1.2 Ohio Public Library Information Network

The Ohio Public Library Information Network (OPLIN) was initially conceived in 1994 to mimic the existing OhioLink and INFOhio programs, which served academic libraries and public schools. The group lobbied the Ohio Library Association (later Ohio Library Council) to encourage the state legislature to fund the network, and OPLIN was created by state law in 1995. A total of $12.85 million was appropriated to fund the initial installation of equipment that would provide connect all central and branch libraries to the network.

Upon its creation, 251 of 252 public library systems became OPLIN members, with each system developing its own Internet access policy. Because two other statewide programs and an established statewide telecommunication network already existed, the transition to a statewide public library network was relatively straightforward. In addition to receiving high-speed Internet service, participating libraries are provided with technical support, quarterly newsletters, the ability to subscribe to OPLIN e-mail list services, and obtain access to 278 research and reference databases that would otherwise be prohibitively expensive for individual libraries.

1.2.1 Administrative and Technical Structures

OPLIN is an independent state agency within the State Library of Ohio. It is a relatively unique statewide program because it coordinates both the installation and management of telecommunication circuits that provide Internet access to public libraries. The network serves numerous purposes. Primarily, OPLIN is an Internet service provider to central public libraries, but OPLIN also provides e-mail services and web hosting capabilities for libraries.

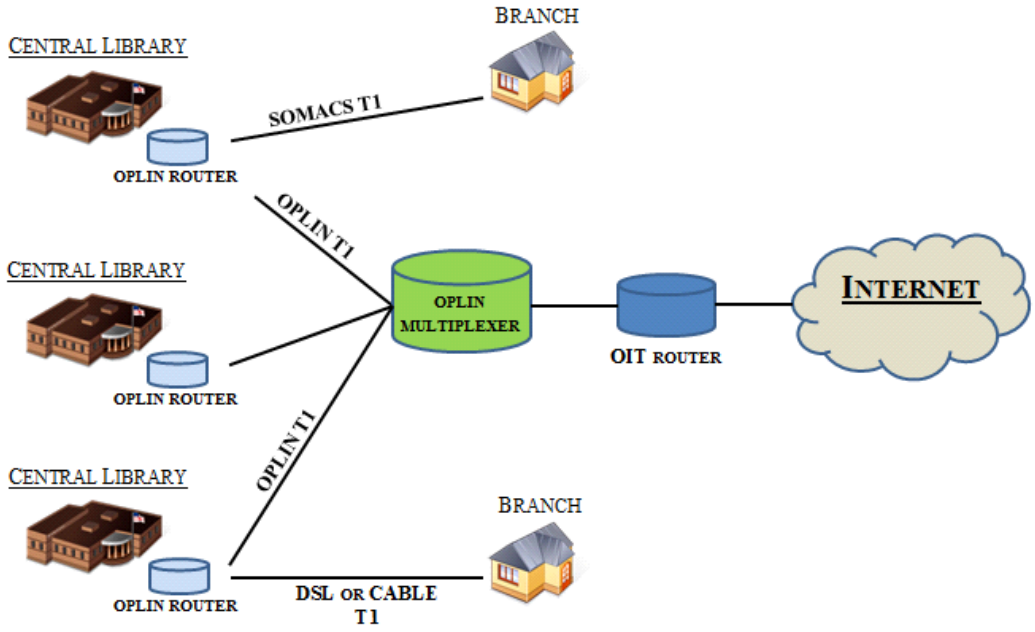
Figure 2 shows the OPLIN hierarchical structure; central libraries act as a bridge between branch libraries and Internet access provided by an OPLIN hub (green). The OPLIN hub

Upon its creation, 251 of 252 public library systems became OPLIN members.

is connected to the Ohio Office of Information (OIT) shared router (blue), which manages Internet traffic associated with OPLIN. Each central library is connected to the OPLIN hub with at least a 1.5 Mbps connection (maintained by OPLIN), but many central libraries have been upgraded to a fiber-optic ethernet connection because their Internet demand exceeded the 1.5 Mbps bandwidth capacity.

Branch libraries obtain Internet access by connecting to an OPLIN router in a central library. These connections are not managed by OPLIN, requiring branch libraries to find the most cost-effective option on their own. All Ohio public libraries can connect using the State of Ohio Multi-Agency Communications System (SOMACS), which offers connectivity for a flat rate regardless of the library's location or the length of the circuit. For libraries located in rural areas or at a significant distance from a central library, SOMACS often provides the lowest cost T1 connection. However, branch libraries can choose other methods to obtain circuits. These include

Figure 2: OPLIN Hierarchical Structure



Note: Figure constructed by authors using information from Strege et al. (2010).

connecting to a central library using a virtual private network (VPN) or purchasing a digital subscriber line (DSL) or TV cable connection. Alternatively, libraries may be able to establish a direct T1 connection with the central library using circuits provided by a local telephone company. This method is likely less costly than a SOMACS connection if the branch is located relatively close to its central library.

Participation in OPLIN is voluntary, but almost all Ohio public libraries are members. The Ohio Legislature charged the OPLIN with helping libraries filter inappropriate content, but allowing libraries to install and maintain filters individually was not cost-effective. Consequently, in January 2012, OPLIN began using OpenDNS, which provides a centralized, statewide filtering strategy. However, OpenDNS also allows individual libraries to change the content being filtered and maintain a level of filtering that is deemed appropriate by each individual library.

Lastly, OPLIN participants must comply with several guidelines and make Internet access, OPLIN resources and databases, and e-government services available to their patrons. Libraries cannot allow patrons to access private e-mail accounts on the OPLIN server, provide services for which the library charges a fee, allow the viewing of inappropriate or obscene materials (according to Ohio state laws), or provide access to OPLIN databases to schools or local governments (which are under the OhioLink and INFOhio programs).

1.2.2 Hardware and Software

OPLIN acquires and installs physical telecommunication circuits to connect central libraries to the OPLIN hub. Central libraries are also provided with financial support to offset recurring costs and

purchase new computer equipment so that each central library has at least two public workstations that provide access to the OPLIN. The OPLIN implements the software Cymphonix to monitor bandwidth use by its central libraries. If Internet use exceeds 70% of total bandwidth capacity, OPLIN works to upgrade the libraries connection to a higher bandwidth tier. Many central libraries currently have a fiber-optic Ethernet connection that allows for incremental bandwidth increases up to 100 Mbps. Data from September 2011, provided by OPLIN system administration, indicate that 62% of the 729 Ohio public central and branch libraries have an Ethernet or DS3 connection with a bandwidth of 3 Mbps or higher; 13.7% have multiple T1 lines, cable or DSL connections; 22% have a T1 line capable of a 1.5 Mbps connection; and 1% have another type of connection, including wireless, satellite, or dial-up.

1.2.3 Costs and Funding Resources

OPLIN provides Internet access to Ohio public libraries at no cost. As an independent agency of the State Library of Ohio, it receives funding from the Ohio State Library through the state's biannual budget. Until 2006, this funding was a line item and needed to be renewed every two years. Currently, OPLIN is part of the permanent Ohio Revised Code, which ensures longer-term funding. In addition to appropriated state funds, OPLIN receives aid from the federal E-rate program.

The majority of the budget (approximately 60%) is spent on purchasing and maintaining Internet connectivity for public libraries and a large portion of the remaining funds (approximately 30%) is used to provide database access. The fastest-growing expense for OPLIN is the charge for using the OIT router, which manages OPLIN participants' Internet traffic. A summary of the 2011 fiscal year balance sheet is shown in Table 1.

Table 1: OPLIN FY 2011 Balance Sheet

	Amount
Revenues	
State funds	$3,702,150
E-rate discount	$1,383,066
Website kits	$18,000
Expenditures	
Internet access	$3,111,409
Databases	$1,550,000
Administration	$450,000
Filtering costs	$81,000
E-rate support	$45,000

Funds appropriated by the state legislature are typically used to offset the primary expenses incurred by OPLIN to provide Internet and database services. When OPLIN is able to secure additional funds through grants, the program often uses the additional resources to upgrade computer technology in libraries and its core network.

For $450 per month, branch libraries can connect to an OPLIN router in a central library using circuits provided by SOMACS. If a branch library is able to secure an alternative, less expensive way to connect to an OPLIN router (discussed above in Section 1.2.1), then the library can do so without additional OPLIN fees.

1.2.4 Challenges

Increasing demands for Internet access and cuts in the state budget (on which OPLIN depends for the majority of its funding) are creating challenges for the program to cost-effectively continue providing and upgrading Internet access in public libraries. Feedback from program directors indicates that the program is relatively successful, but more

bandwidth will be an increasingly pressing concern in the near future. Furthermore, a report describing the 2007 OPLIN focus group study indicated that patrons had little knowledge of or had significant difficulties accessing databases provided by OPLIN. Moreover, the report found that many library administrators did not have the technical expertise to answer patrons' questions regarding database access and technical troubleshooting. The study recommended investing resources to provide technology training to public library personnel to make them more effective at responding to patron questions and maintaining technology services.

1.3 West Virginia Statewide Library Network

The West Virginia Statewide Library Network (WVSLN) is an example of how a statewide program can provide widespread high-speed Internet access to financially constrained, primarily rural public libraries. The impetus for the Statewide Library Network was a federal grant to connect West Virginia public libraries using a 56 Kbps network. In 1994, the West Virginia Network (WVNET), which was established in 1975, was the Internet service provider used to create an intrastate network for West Virginia public libraries. In just five years, 177 of 180 public libraries were part of this network.

By the late 1990s, it became evident that the 56 Kbps bandwidth was not going to be sufficient to meet the growing demand for Internet services. As a result, the Library Network 2000 Project used state funds to upgrade and standardize the technology in every public library; in 2002, Verizon funded a $1.6 million Digital Bridge Project to upgrade all 56 Kbps connections to 1.5 Mbps. By 2009, all 177 libraries in the WVSLN operated with a 1.5 Mbps connection.

1.3.1 Administrative and Technical Structures

From its inception, the WVSLN was structured as a centralized system. The West Virginia Department of Administration manages a statewide contract for telecommunication services; all public libraries in the WVSLN operate under this contract. Each library is connected directly to a WVSLN node, which directs traffic from the library. If the traffic is directed to the Internet, then the node sends it

The WVSLN is an example of how a statewide program can provide widespread high-speed Internet access to financially constrained, primarily rural public libraries.

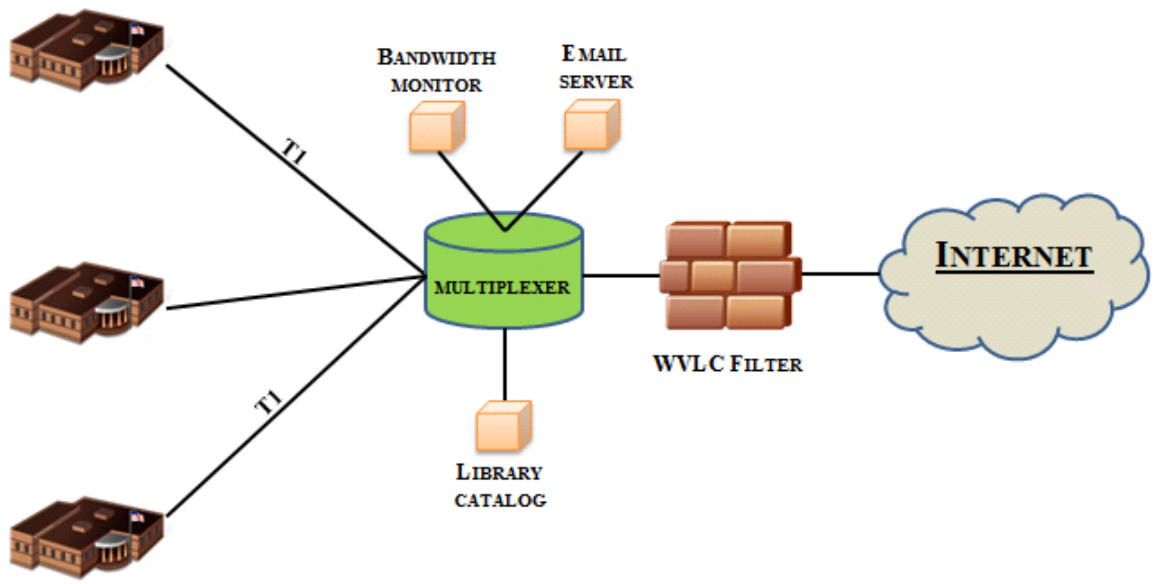
to the WVNET; otherwise, it dispatches the traffic to its location in the WVSLN. Traffic directed to the Internet must, however, first pass through a filter shared by multiple West Virginia agencies. Because the filter is shared, costs are distributed across a larger number of participants, eliminating the need for individual libraries to obtain filter hardware or software to satisfy federal E-rate requirements.

Although participation in the WVSLN is voluntary, the program has actively encouraged and recruited public libraries to join the network. This helped aggregate demand, standardize hardware and software, and centralize E-rate support. The WVSLN also includes academic and nonpublic libraries to further take advantage of economies of scale from participant aggregation.

1.3.2 Hardware and Software

All public libraries participating in the WVSLN are connected with at least a 1.5 Mbps bandwidth

Figure 3: WVSLN Centralized Structure



Note: Figure constructed by authors using information from Strege et al. (2010).

capability. Furthermore, all public libraries are provided with an e-mail server, computer software and hardware maintenance, equipment parts and services, and technical support. Program administrators also distribute information about current Internet-related threats (e.g., viruses) and useful tips about hardware and software installation and maintenance. Numerous computer labs host training for public library personnel.

The WVSLN provides e-mail and phone technical support as well as widespread local services. The program divides the state into eleven regions and assign a technician to serve libraries in each region. Moreover, technicians can provide additional help when a particularly serious problem occurs in a nearby region. The program has also standardized hardware equipment across participating libraries, allowing the WVSLN to troubleshoot a majority of problems quickly and cost-effectively.

1.3.3 Costs and Funding Resources

The WVSLN provides its various Internet and support services at no cost to the library. This has been possible because of historically strong support from the state legislature and the program's success in financing a majority of operating expenses from state funds. The West Virginia Library Commission, which manages the WVSLN, lobbies the state legislature to obtain funding on a per capita basis. The negotiated rate was $4.52 per person in 2011 ($8,181,440 total), rising to $4.62 per person in 2012, which constitutes approximately half of each fiscal year's budget. A large portion of state funding is derived from West Virginia lottery revenues. Other expenses are financed through federal and state grants and federal E-rate discounts (average discounts for West Virginia libraries are approximately 75% of total costs). Much of the initial technological and

structural development of the WVSLN was funded through grants and one-time allocations.

1.3.4 Challenges

The WVSLN's dependence on funding from the state legislature makes the program vulnerable to economic downturns. Furthermore, although the WVLC has been successful in securing external funds to upgrade and expand the network, the program may not be able to maintain its schedule of maintenance and upgrades, especially in the state's numerous rural communities if large grant opportunities cannot be secured in the future.

1.4 California Peninsula Libraries Automated Network

The Peninsula Library System (PLS) was established in 1971 to serve the San Mateo county public libraries and the San Mateo Community College (SMCC). Since its inception, all public libraries in the California Peninsula area have participated in the program. In 1982, the PLS automated its libraries' circulation system, created a shared library catalog, and was renamed the Peninsula Library Automated Network (PLAN). Due to growing bandwidth limitations, the network considered ways to expand its telecommunication capacity, leading to the decision to move its infrastructure to SMCC. As a result, PLAN was eligible to use the Internet2 program, which is a research and education consortium that provides high-performance telecommunication networks to universities and other community anchor institutions.

In 2007, however, PLAN was again faced with the challenge of insufficient bandwidth capacity due to rapid increases in Internet demand at public libraries. PLAN was able to establish a contract with AT&T to construct a fiber-optic network that could be used by all of the participating public libraries. AT&T not only offered PLAN the lowest monthly rates for using the high-speed network, but the company waived the construction fees because it had identified San Francisco as a tactically important area for expanding its Internet services. As a result, by 2009, all public libraries in PLAN were connected with a fiber-optic circuit with a 10 Mbps bandwidth capacity.

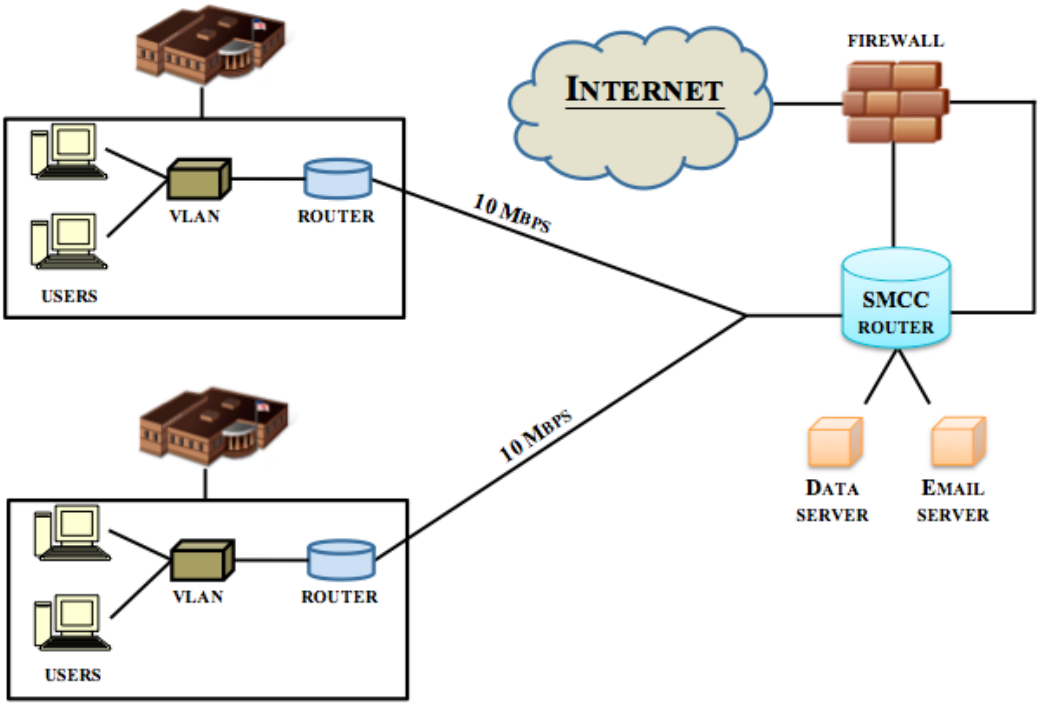
A VLAN allows patron and public library administrator traffic to be separated, increasing security and improving traffic prioritization.

1.4.1 Administrative and Technical Structures

The California PLAN is a modified hub-and-spoke network, evolving from a traditional hub-and-spoke structure in which public libraries used the SMCC as the hub. After the 2009 fiber-optic upgrade, the traditional structure was modified by the installation of a virtual local area network (VLAN) system. A VLAN allows patron and public library administrator traffic to be separated, increasing security and improving traffic prioritization. Without virtualization, separation would require two separate network lines and circuits, one for patron use and another for public library administrators. The VLAN performs the same function using software rather than additional hardware and directs both sets of traffic using a single circuit.

Figure 4 illustrates the modified hub-and-spoke network structure. Traffic from each library is directed to the SMCC hub using a high-

Figure 4: CPLAN Modified Hub-and-Spoke Structure



Note: Figure constructed by authors using information from Strege et al. (2010).

performance connection. The infrastructure headquarters maintains various data-handling servers, including those that provide network-wide e-mail and web hosting capabilities. Traffic from public libraries is routed through a firewall and based on its destination (i.e., Internet or intralibrary) and is directed accordingly.

1.4.2 Hardware and Software

PLAN is a centralized system offering high-performance connectivity. Fiber-optic connections offer high bandwidth capacity, but libraries can purchase bandwidth commensurate with their Internet access demands. If an increase in bandwidth is required, no additional hardware is necessary.

PLAN offers a centralized technical support center responsible for overseeing network performance and hosting services; they also provide e-mail and telephone support. The support team is particularly knowledgeable because its members worked closely with AT&T engineers during the transition period in 2008-09. The PLAN support department also organizes training sessions and provides a central source for negotiating prices for hardware and software upgrades.

1.4.3 Costs and Funding Resources

Public libraries participating in PLAN are responsible for financing the program, and funds are collected from local property taxes. Occasionally, the program secures support from state funds, the federal Library Services and Technology

Act (LSTA), or other local opportunities. The Peninsula Library System also applies for and receives an average 50% federal E-rate discount.

Network maintenance costs comprise approximately 40% of the total Peninsula State Library budget, and these costs are shared across libraries. In 2011, the Peninsula Library System budget was a proposed $2.6 million. Costs for using traditional and fiber-optic circuits (as of the initial contract) are presented in Table 2.

1.4.4 Challenges

Unlike many other statewide systems, PLAN can adjust its bandwidth capacity to fulfill demand. However, the program's transition and upgrade stages provide important lessons about challenges for networks with more constrained resources. Prior to the system-wide upgrades to high-performance fiber-optic system with a more efficient network structure, PLAN did not have a prioritized traffic network. High- and low-priority network traffic were treated equally, and high-priority traffic was delayed when bandwidth capacity reached its limit. PLAN solved the problem by implementing a hierarchical quality-of-service approach, which prioritizes network traffic.

Another challenge faced by PLAN during the 2007 upgrade phase was related to its negotiations with the county and municipal governments that owned most of the public library buildings. Because major network upgrades (e.g., fiber optics) require new cabling to be installed in library buildings, numerous groups were required to coordinate the replacement efforts. Delays resulting from poor coordination among various involved groups can be lengthy and incur significant monetary costs.

Table 2: Monthly Circuit Use Costs by Speed

	Monthly Cost
Traditional circuits	
3 Mbps	$1,110
Fiber-optic circuits	
5 Mbps	$1,025
10 Mbps	$1,225
1 Gbps	$2,575

1.5 Massachusetts Minuteman Library Network

The Minuteman Library Network (MLN) was the outcome of a 1982 meeting of public library directors to discuss the need for a shared, automated, and centralized library database. The network was incorporated as a nonprofit organization in 1983 and includes public libraries serving the Metrowest region of Massachusetts. The consortium currently includes thirty-five public library systems (fifty-four total locations) and seven college libraries. The mission of the MLN is to provide libraries with economical technologies and efficient resource sharing. The network provides numerous services to participants, including Internet connectivity, support, and training.

In 2010, the Massachusetts Broadband Institute received a $45.4 million federal stimulus grant to expand broadband access to western and north central areas of the state. The funds were used in part to fund the construction of fiber-optic connections to community anchor institutions, including public libraries. In July 2010, the MLN received an additional $30,000 grant from the Massachusetts Board of Library Commissioners to transfer all of the network's existing telecommunications from T1 lines to either cable or fiber-optic circuits.

1.5.1 Administrative and Technical Structures

The MLN underwent a major transition in 2011, when the network's connection structure and Internet access providers changed. As shown in Figure 5 (top), prior to 2011, the MLN had a traditional hub-and-spoke structure: public libraries connected to the central MLN router using T1 circuits (evolving from 56 Kbps frame relays in the early- to mid-1990s). The router would then aggregate libraries' traffic, apply appropriate filters, and direct Internet and integrated library system requests as necessary.

However, aging circuitry and rapid increases in Internet demand made the T1 circuits too unreliable and slow. In 2010, the MLN decided that each library would be responsible for independently accessing the Internet. A virtual private network (VPN) was created to allow libraries to connect to the MLN. This structure is shown in Figure 5 (bottom).

The VPN can separate patron traffic and library personnel traffic, increasing security and prioritization. Because individual libraries could purchase faster Internet access for a much lower cost than paying for a T1 circuit, the transition resulted in an annual savings of approximately $200,000 across the network. The MLN would no longer offer Internet access to its member libraries, but would continue to provide an integrated library system, centralized finance management (public libraries pay member fees to the MLN, and the MLN then pays ISPs that provide Internet service to individual libraries), and technical support.

1.5.2 Hardware and Software

The MLN uses an automated system (Millennium software by Innovative Interfaces Inc.) for circulation tracking, request and fine management, interlibrary loans, and database management. In 2011, the MLN began using Air Pac (Innovative Interfaces Inc.) to allow patrons to search MLN's catalog using cellular phones. The Air Pac software is also capable of sending announcements to patrons' cellular phones about the status of library items.

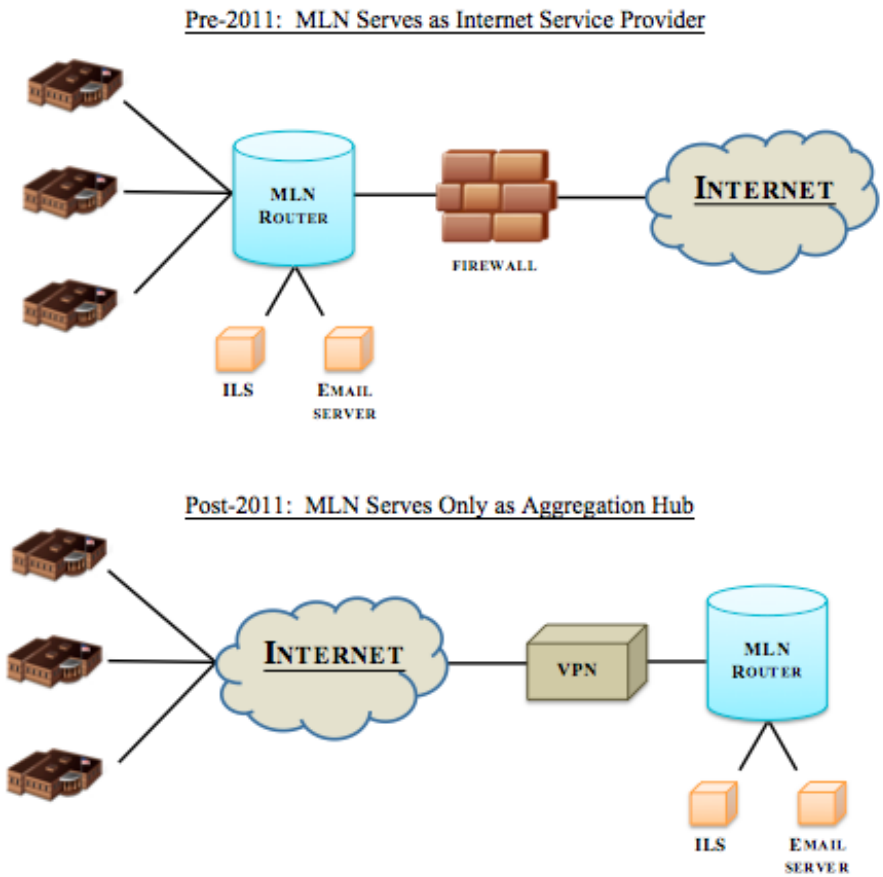
The MLN Central Site staff, who manage the network and its services, offer technical support and host training opportunities. The MLN's Innovative and New Technology Working Group hosts in person and virtual training sessions for library personnel. The MLN also monitors bandwidth use and provides statistical reports to member libraries. Unlike other programs, the MLN does not filter or control access to materials, leaving that responsibility to individual libraries.

The MLN Central Site staff, who manage the network and its services, offer technical support and host training opportunities.

1.5.3 Costs and Funding Resources

The MLN is funded primarily by its members, but also receives funding from the Massachusetts Board of Library Commissioners (MBLC). Prior to 2011, when the MLN stopped providing Internet access to its members, the program also applied for federal E-rate discounts. In 2010, member libraries financed 83% of the network's costs, the MBLC contributed 12%, and E-rate discounts accounted for the remaining 5%. In 2010, the funds were directed to pay for $182,905 in telecommunication expenditures, of which shared Internet costs were $30,846. Capital expenditures vary depending

Figure 5: MLN Transition from ISP to Shared Resources Only Structure



Note: Figure constructed by authors.

on needs and financing from additional grant funds. For example, between 2006 and 2010, the network's capital expenditures ranged from $10,241 (in 2010) to $207,887 (in 2008).

As of 2011, the MLN decided to stop pursuing federal E-rate discounts; its members had voted that the MLN should not enforce filter restrictions because each library had a separate connection to the Internet. Without E-rate discounts, libraries pay approximately 90% of the MLN's annual expenditures. The proposed 2012 MLN budget was $1,747,495. The network uses a formula to calculate each library's cost share. Specifically, 35% of the budget is shared equally among all participating libraries, 35% is allocated based on a library's use of the network (60% is determined by the number of licenses a library owns to use the MLN and 40% is based on the library's annual circulation), and the remaining 30% is new acquisitions.

1.5.4 Challenges

The MLN faces issues that are very similar to many of the other programs. Increased Internet demand and scarce resources to expand bandwidth capacity are the primary challenges encountered by many public libraries in the network.

1.6 Wisconsin BadgerNet

In 1993, a Governor's Blue Ribbon Telecommunication Task Force was charged with developing a vision for a statewide telecommunication infrastructure in Wisconsin. They recommended the creation of the Wisconsin BadgerNet (WBN). The 1995 state legislature adopted the recommendation and created a complementary Technology for Educational Achievement (TEACH) program, which is instrumental in providing funding for WBN participants (see Section 1.6.3).

The WBN serves state and some local government agencies, universities and technical colleges, tribal nations, and most of Wisconsin's primary school districts and public libraries. When the initial contract to develop the BadgerNet was established, Ameritech (now AT&T) was required to work with all local phone companies to ensure complete statewide availability. The result was a network that reaches over 2,400 locations across Wisconsin. WBN participation is mandatory for state government agencies; although public library participation is voluntary, most participate.

As participation in the WBN grew, limited bandwidth capacity led the Wisconsin Department of Administration to establish a 5-year, $116.7 million contract with a consortium of telecommunication providers to deliver high-performance service throughout the BadgerNet. These upgrades were completed in September 2006.

1.6.1 Administrative and Technical Structures

The WBN is unusual in that it provides comprehensive service to almost every public library in the state and does not require that some libraries obtain their own local access connections. As shown in Figure 6, the network is a hub-and-spoke structure in which the state's seventeen regional library systems manage wide area networks (WANs) for its member libraries. Each of the seven regional WANs is connected to one of four WBN routers, which are located throughout the state.

All connections are standardized using a high-performance 10/100 Ethernet port, which has two advantages. First, an Ethernet connection allows member libraries to easily connect their equipment to the network and troubleshoot problems. More importantly, libraries can easily alter their bandwidth capacities from 1.5 Mbps to 100 Mbps, as necessary.

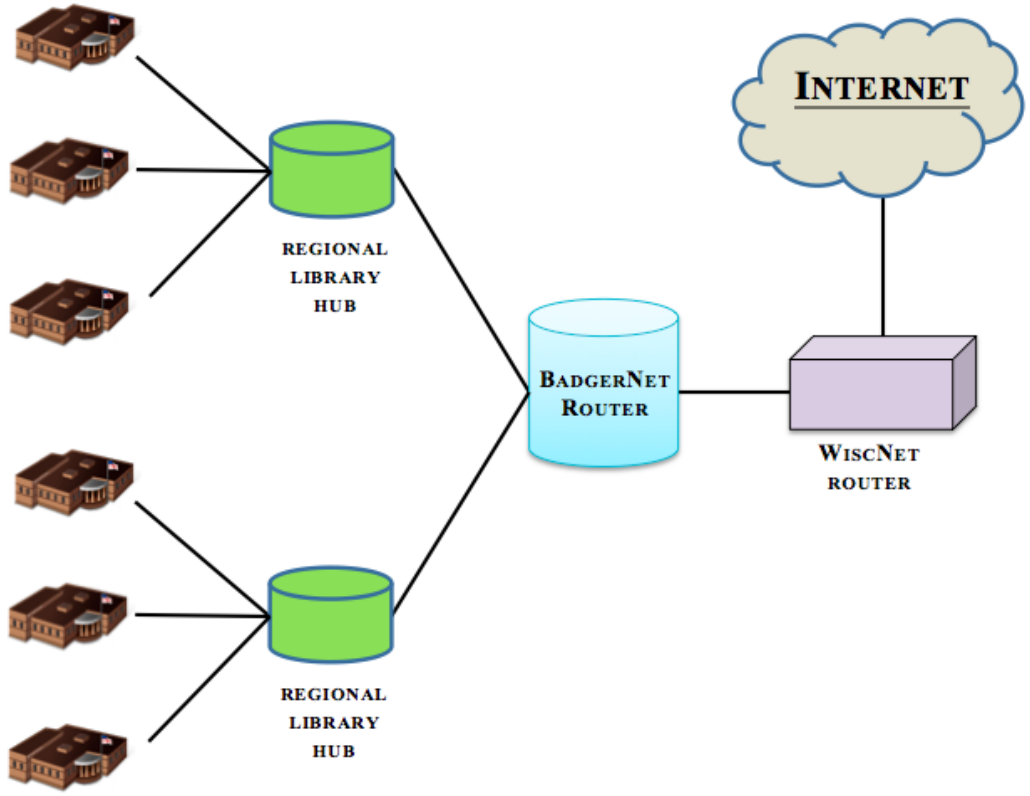
> Regional library systems, which are network hubs, are typically the first point of contact for troubleshooting problems.

The BadgerNet itself, however, does not provide access to the Internet. The majority of WBN members use WiscNet, which initially provided Internet access to universities in the state, but expanded to include public schools and libraries. For most of the state's public libraries, the BadgerNet and WiscNet are complementary – the former providing the infrastructure to direct telecommunication services from and to a library and the latter to transfer information from and to the Internet. Consequently, over 95% of public libraries that use the BadgerNet also use WiscNet services.

1.6.2 Hardware and Software

All libraries in the WBN have at least a 1.5 Mbps connection. The program offers access to bandwidth monitoring software that allows libraries to better understand their daily bandwidth use. Hardware and software support is provided

Figure 6: WBN Hub-and-Spoke Structure



Note: Figure constructed by authors using information from Strege et al. (2010).

from several sources, including a twenty-four-hour help desk service. The seventeen regional library systems, which are network hubs, are typically the first point of contact for troubleshooting problems. These regional library systems also provide consulting services and centralized hardware and software purchasing, which allows the group to negotiate lower prices.

1.6.3 Costs and Funding Resources

The WBN has been able to renegotiate contracts with its telecommunication vendors every five years, which provides substantial price stability over the five-year period despite outside economic factors. Libraries' costs for BadgerNet use are highly subsidized through the TEACH program. For example, the full cost of a 3 Mbps connection in 2011 was approximately $900 per month. Public libraries paid only $100 per month thanks to subsidies from the TEACH program. Furthermore, WBN rates do not vary across library locations or based on the distance between a library and a regional hub, ensuring that libraries in even the most remote locations can afford service.

Financial support for the TEACH program comes primarily from the state's universal service fund and from federal E-rate discounts. The TEACH program pays telecommunication carriers an average of $24 million annually. Approximately 70% of those costs are from the universal service

fund, which is collected from intrastate telephone service surcharges. The remaining 30% are from federal E-rate discounts.

Public libraries must also pay to access the Internet using WiscNet. These charges are calculated based on the percentage of state aid received by a library, rather than requested bandwidth capacity. Consequently, libraries can increase bandwidth without incurring higher fees from WiscNet. In 2011, the average WiscNet fee was $450 per year. For 90% of libraries, this fee was paid for by their regional library system.

1.6.4 Challenges

Despite the WBN's success adjusting for increased Internet demand and bandwidth capacity, libraries in the WBN are constrained by the costs associated with increasing bandwidth. Scarcer resources and a high request rate have resulted in substantial shortages in the TEACH program budget, which led the program to stop granting bandwidth increase requests in early 2011.

A second challenge is the WBN's flat rate structure, which allows all libraries (regardless of location) to pay the same fee for a particular bandwidth. Although this helps rural libraries afford Internet access, libraries in urban areas can obtain lower rates for the same service. As Internet service providers expand geographically and improve their systems, the WBN may need to restructure their fee schedule to continue providing incentives for libraries to remain in the network.

2. Technology Services Standards

Maintaining a high level of technology service quality requires an established set of standards for hardware, software, accessibility, and staff. There are currently 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 broad and do not offer specific quantitative measures for public libraries to gauge the quality of their technology services.

The Montana State Library provides recommendations of minimum personal computer and printer specifications, but additional considerations need to be made. First, continuously evolving computer and Internet technologies require that specifications be 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 improve patrons' access to information.

This report presents an overview of standards from three sources. The first describes technical specifications and best practices inferred from successful strategies described in Section 1 above. These best practices can be used to develop a set of quantitative benchmarks for Montana public libraries. The second set of standards comes from information and recommendations gathered from other public institutions, including state governments and public universities. The last set is based on recommendations from the Edge Initiative, a coalition of government organizations developing qualitative public-access technology benchmarks for public libraries.

2.1 Lessons from Existing Strategies

Successes and challenges from existing networks and quantitative information about public-access technology in public libraries across the United States can be used to develop relevant and viable standards for Montana public libraries. The benchmarks are grouped into three broad categories: Internet accessibility, public-access devices and software, and information technology support. A discussion of standards within each category follows, and a summary of the benchmarks is presented in Table 4.

2.1.1 Internet Accessibility

A public library's capacity to effectively access the Internet is rapidly becoming an integral part of the management and planning process; the successes of other library networks offer a set of important benchmarks. One similarity across the library networks is that public libraries are connected with at least a 1.5 Mbps circuit. However, although this connection is a typical lower threshold, many libraries are finding that bandwidth capacity is insufficient at this speed. Therefore, many libraries transition to a 3 Mbps or faster connection.

An important factor in understanding a library's need for additional bandwidth is monitoring, which provides important information about a library's ability to satisfy patrons' digital access demands and indicates whether upgrades are necessary. A rule of thumb used in existing library systems is the 70% mark – if bandwidth use is consistently above 70% of maximum capacity, an upgrade is recommended. An alternative rule was developed by the State Library of Kansas. Their connectivity matrix provides recommendations for optimal bandwidth availability based on the number of

Table 3: State Library of Kansas Internet Connectivity Matrix

Total Computers	**Minimum**		**Short-term Optimum**		**Long-term Optimum**
	Download	*Upload*	*Download*	*Upload*	*Download/Upload*
1-5	1.5	1.50	2.7	1.50	≥1,000
6-10	4.1	1.50	5.0	1.64	≥1,000
11-15	6.2	2.05	7.5	2.46	≥1,000
16-25	10.4	3.42	12.4	4.11	≥1,000
26-40	13.0	4.28	15.6	5.13	≥1,000
41-55	17.8	5.88	21.4	7.06	≥1,000
56-100	32.4	10.69	38.9	12.83	≥1,000
101-150	48.6	16.04	58.3	19.25	≥1,000
151-200	54.0	17.82	64.8	21.38	≥1,000
>200	108.0	35.64	129.6	42.77	≥1,000

Notes: Table replicated by authors. Total number of Internet-connected computers. Connectivity speeds are in Mbps per connection. Long-term optimum is expected to be reached in 2020.

workstations accessing the Internet. The matrix, replicated in Table 3, indicates that bandwidth requirements increase exponentially with number of computers. Lastly, the Center for Technology in Learning at SRI International developed the School 2.0 eToolkit, which includes a bandwidth calculator that allows schools and community organizations to determine optimal bandwidth requirements based on the current use of their Internet-accessible devices. The calculator can be accessed at http://etoolkit.org/etoolkit/bandwidth_calculator/index.

Successes and challenges from existing networks and quantitative information about public-access technology in public libraries across the United States can be used to develop relevant and viable standards for Montana public libraries.

Another benchmark for managing staff and patron Internet accessibility is hierarchical traffic prioritization and quality of service (QoS). When all Internet traffic is treated with the same priority, more important traffic (e.g., staff requests to a shared catalog) may be delayed because other traffic (e.g., requests sent to a printer) is using bandwidth capacity. By prioritizing traffic, higher-priority requests are always placed at the front of the queue, improving the overall quality of the digital technology experience. One way to provide traffic prioritization is by using virtual private networks (VPNs) or virtual local area networks (VLANs), which allow for a separation of staff and patron traffic and can be used to create rules that assign varying priority levels based on request type.

2.1.2 Public-access Devices and Software

Acquiring and maintaining public-access devices and software can often be substantially costly. A consortium of public libraries can significantly reduce these costs through standardization. Within a library network, standardized equipment can reduce the costs of acquiring new equipment,

reduce maintenance costs (a single IT support staff can repair devices in any library), and increase the ability of library staff to troubleshoot problems (all staff can be provided with training about common IT problems, without the need to provide specialized training for various types of public-access devices).

Timely replacement and upgrades are also important for allowing library patrons and staff to effectively access Internet content. Other successful library networks have hardware upgrade cycles of three to five years. Moreover, existing hardware must be able to support software and peripheral devices (e.g., printers and scanners) released within the most recent five years.

2.1.3 Information Technology Support

To maintain Internet access for patrons and library staff, technical problems must be addressed quickly and efficiently. The public library networks discussed in Section 1 provide centralized, easily accessible e-mail and phone support for their members. In addition, each network has at least one technician capable of troubleshooting more serious problems.

Continuing technology education for library staff is also ubiquitous across the public library networks. This training helps library personnel successfully troubleshoot most common problems and describe more serious issues to IT support professionals. This expedites repairs and minimizes maintenance costs.

2.2 Recommendations from Other Institutions

Multiple state governments and public institutions have developed standards for procuring, maintaining, and replacing computer hardware. These standards range from loosely defined guidelines to detailed technical specifications. Tables 5, 6, and 7 provide a summary of standards from the state government of Missouri, the University of Florida, and Virginia Commonwealth University. Table 8 summarizes the standards and associated indicators.

2.3 Edge Benchmarks

The Edge Initiative was launched in March 2011 to develop a set of national access technology standards that can help public libraries evaluate and improve their technology services. In summer 2012, a number of public libraries will be participating in a pilot program to evaluate the existing benchmarks and provide feedback on adding and improving standards.

The Edge Initiative provides public libraries with a point of reference for evaluating their ability to provide high-quality technology and Internet services.

Currently, the Edge benchmarks are separated into three broad categories: community value, engaging the community and decision makers, and organizational management. Each category includes standards and associated indicators to be used by libraries to assess and improve their technology services. The Edge Initiative provides public libraries with a point of reference for evaluating their ability to provide high-quality computer and Internet services, the degree to which their external communications and partnerships can add value to the library's technology, and how well the library is able to build patrons' digital literacy skills to improve human capital.

2.3.1 Community Value

This category offers benchmarks that help public libraries provide staffing, support, and services that enable patrons to take advantage of the opportunities made available by library technologies. The Edge Initiative recommends that library personnel provide training and assistance to patrons in an effort to improve digital literacy. Public libraries are encouraged to provide access to relevant digital content and resources that allow patrons to create original digital content. Public libraries should offer digital content that meets the community's demands for seeking employment and entrepreneurial opportunities, government and legal services, educational support, and health and wellness information.

2.3.2 Engaging the Community

Benchmarks for engaging the community and decision makers encourage public libraries to increase awareness of the library within the community and develop a positive perception about libraries' role as innovative and inspirational value-adding resources. Libraries are assessed on their ability to be leaders actively engaging in community planning and digital development efforts, which increases the library's value within the community. This role can be achieved by leveraging strategic relationships with community partners to improve public-access technology resources and services to community members. Furthermore, libraries are encouraged to share their technology expertise and best practices with other local, regional, and national providers to promote continuous improvement in digital accessibility.

2.3.3 Organizational Management

As a central, recognizable low-cost provider of information services, public libraries must strive to ensure equitable access to opportunities through technologies, regardless of ability, skill, personal technology, or available time. To achieve this goal, libraries must integrate technology into their planning and policy development and maintain a staff that can provide help to patrons trying to use technology. Libraries are encouraged to have an ample supply of technology equipment and telecommunication bandwidth to meet patron demand and, more generally, successfully manage their technology resources to maximize the quality of digital service provided to the community. An important aspect of such management is to provide sufficient opportunities for patrons with unique needs and disabilities.

Table 4: Summary of Benchmark Indicators from Existing Strategies and Public Library Survey Data

Category	Benchmark
Internet access speeds	• Most common speed is 1.5 Mbps. • Many libraries find 1.5 Mbps to be insufficient – switch to 3 Mbps or faster. • Critical to monitor bandwidth use. • Increase bandwidth if use consistently exceeds 70% of capacity. • Quality of Service (QoS) and traffic prioritization is critical, especially if capacity is constrained. • VLANs or VPNs can be software-based solutions for prioritizing traffic and increasing security.
Public-access devices & software	• Hardware and software standardization is key to reducing acquisition and maintenance costs. • Hardware must be able to support content released within the most recent five years. • Upgrades should occur every three to five years. • Shared software resources can reduce acquisition costs and improve quality of experience for library staff and patrons.
IT support	• Access to centralized e-mail and phone support is important. • Capable technicians are necessary for more serious problems. • Continuing training sessions for library staff are critical for expediting the troubleshooting process.

Note: Table constructed by authors.

Table 5: Summary of Missouri State Government Hardware Procurement Strategies

Develop basic strategy:	Determine the reasons and drivers for acquiring computers and associated equipment. These reasons should match the technology needs identified by your organization.
Standardization and bulk purchasing:	• Vendors provide greater discounts for larger volumes of identical machines. • Minimizing system and peripheral variability minimizes costs and increases maintenance efficiencies. • Plan for the future and consider the logistics of replacing older machines to maximize bulk buying opportunities. • Consider developing a standardized replacement cycle that occurs every three to five years.
Vendor considerations:	Consider vendors that have exhibited stability and reliability. If a vendor fails to maintain a cost-competitive structure, consider switching or renegotiating existing contracts.
System images:	Determine how long vendors maintain an image of the machine purchased to ensure that the vendor will be able to supply a standardized specification if supplementary machines must be purchased.
Warranty considerations:	Most standard warranties are for three years. Avoid acquiring equipment that has no or shorter warranty time.
Benefits to standardization:	• Deployment of managed build images to a large number of computers. • Strong vendor relationships. • Consistent support structure. • Faster replacement and maintenance of defective systems. • Cost savings and ability to purchase a greater quantity of devices. • Ability to use vendor-proprietary management and support services.

Note: Table is constructed by authors using information from the Missouri Office of Administration (March 29, 2004).

Table 6: Summary of University of Florida Hardware Procurement Strategies

Processor:	Choose the fastest available or within 10% of the fastest. Either AMD or Intel processors are acceptable. For laptops, processors should be chosen to maintain the longest battery life.
RAM (memory):	The minimum amount of RAM should be one-half of the total RAM that an average computer can hold. Increases in RAM provide the cost-effective improvements.
Hard Disk:	Choose the largest possible size.
Monitor:	If budgets permit, acquire flat-screen LCD monitors. These monitors are higher quality and use less space and electricity than CRT monitors.
UPS:	Uninterrupted Power Supplies (UPS) provide protection from minor power interruptions and allow users to save information in case of a longer power outage.
Warranty:	The minimum warranty should be three years. Avoid warranties less than that time.

Note: Table is constructed by authors using information from the Department of Mechanical & Aerospace Engineering, University of Florida (February 15, 2006).

Table 7: Summary of Virginia Commonwealth University Hardware Standards

	Mid-level Desktop	**Top-level Desktop**	**Mid-level Laptop**
Operating System	Win 32- or 64-bit	Win 32- or 64-bit	Win 32-bit
Processor	Intel Core 2 Quad (2.66GHz, 4M)	Intel Core i7 Quad (2.80GHz, 8M)	Intel Core i5 (2.53GHz, 3M)
RAM	4GB	4GB	4GB
Monitor	19” LCD	20” LCD	14.1” LCD
Video card	Integrated	256MB ATI Radeon	Integrated
Hard drive	250GB	250GB	250GB
CD/DVD	16x DVD/RW	16x DVD/RW	8x DVD/RW
Power supply	Standard	Standard	9 cell battery
Warranty	4 yr	4 yr	4 yr

Note: Table is constructed by authors using information from the VCU Technology Services (July 18, 2010).

Table 8: Summary of Edge Initiative Benchmarks and Assessment Indicators

	Benchmark	Indicator
Community Value	1. Provide patrons with assistance and training in digital literacy.	1.1 Provide monthly scheduled and structured digital literacy training. 1.2 Offer individual assistance for improving digital literacy.
	2. Provide access to relevant digital content and enable creation of original digital content.	2.1 Provide appropriate office, photo, web development, and other licensed software on public-access computers. 2.2 Monitor service delivery of Internet content and perform regular software updates.
	3. Provide technology to meet the needs of job seekers and entrepreneurs.	3.1 Provide software, training, continuing education classes, and other relevant resources to assist job seekers. 3.2 Survey patrons about their use of public-access technology to assist in job seeking or entrepreneurial activities.
	4. Provide technology to meet the demand for government and legal services.	4.1 Support the use of public-access technology for eGovernment and legal purposes. 4.2 Survey patrons about their use of public-access technology to assist in using available Internet-accessible government and legal services.
	5. Provide technology to meet the demand for educational support.	5.1 Support the use of public-access technology for children, teenagers, and adults pursuing formal educational opportunities. 5.2 Survey patrons about their use of public-access technology to assist in using available Internet-accessible educational services.
	6. Provide technology to meet the demand for health and wellness information.	6.1 Support the use of public-access technology for seeking health and wellness information. 6.2 Survey patrons about their use of public-access technology to assist in locating health and wellness information.

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	Benchmark	Indicator
Engaging the Community	7. Create a leadership role in community planning and digital inclusion efforts, advancing the library's value in the community.	7.1 Encourage administrators to maintain ongoing relationships with community leaders. 7.2 Gather feedback from community about technology service needs in public libraries.
	8. Develop strategic relationships with community partners to maximize technology resources and provided services.	8.1 Form mutually beneficial partnerships that increase the library's value in the community, reduce duplication of services, and aid in planning. 8.2 Engage in technology outreach activities.
	9. Share expertise and best practices about public-access technology locally, regionally, and nationally.	9.1 Participate in community and share public-access technology knowledge, tools, and resources.
Organizational Management	10. Integrate public-access technology into planning and policies.	10.1 Develop technology management polices for hardware replacement, software upgrades, network security, and patron privacy.
	11. Provide staff with sufficient technology knowledge to successfully help patrons.	11.1 Allocate staff time to technology-related learning activities. 11.2 Train staff responsible for assisting patrons with technology.
	12. Provide sufficient technology and Internet bandwidth capacity to meet demand.	12.1 Offer sufficient per capita number of public-access computers. 12.2 Offer sufficient bandwidth capacity to meet demand. 12.3 Provide patrons adequate time to complete technology-related tasks. 12.4 Offer peripheral equipment such as printers, scanners, and headphones.

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	Benchmark	Indicator
Organizational Management	13. Manage technology resources to maximize quality.	13.1 Manage Internet connectivity by tracking use statistics and monitoring connection problems. 13.2 Minimize the number and duration of out-of-service devices and develop strategy for backing up information. 13.3 Maintain sufficient statistics about device and Internet use for planning purposes.
	14. Ensure availability of public-access technology for patrons with unique needs and disabilities.	14.1 Implement universal design for public-access technology services. 14.2 Provide staff training for recognizing and serving patrons with unique needs.

Note: Table constructed by authors using Edge Initiative beta benchmarks, updated March 22, 2012. Current benchmarks can be obtained from the Edge Initiative website: http://www.libraryedge.org/

3. Summary of Telecommunication Service Providers

This section details information on middle-mile and last-mile telecommunication service providers (telcos), including the supply of telecommunication services to Montana and a detailed list of telcos providing service to each public library and branch by type of Internet accessibility. The primary data source for this analysis is the December 31, 2011, disclosure of services on Federal Communications Commission (FCC) Form 477, which telcos must complete if they meet any of the following criteria:

1. Facilities-based provider of broadband connections to end-user locations.
2. Provider of wired or fixed wireless local exchange telephone service.
3. Provider of interconnected Voice over Internet Protocol (interconnected VoIP) service.
4. Facilities-based provider of mobile telephony service.

While the FCC provides a list of telcos servicing Montana, they do not provide a disaggregated list of basic telco information, such as Internet download and upload speeds and pricing. This report collects these data for all 113 public libraries and branches within Montana. Each telco's service area was verified using http://www.broadbandmap.gov, which is maintained by the National Telecommunications and Information Administration (NTIA) in collaboration with the FCC. Appendix II lists contact information, types of services, speeds offered, and pricing and bundling deals for public institutions/businesses for each telco in Montana.

3.1 Aggregate Statistics

As of December 31, 2011, there were fifty-nine telcos operating in Montana that met at least one of the Form 477 filing criteria. Table 9 displays summary statistics on the supply of telecommunication service providers across Montana. The average Montana library system has access to 8.0 telcos. This aggregate statistic is representative of approximately 41% of Montana libraries. Library systems in cities have access to more telcos than those in rural areas (11.8 vs. 7.9). Libraries in remote locations have access to even fewer telcos (7.4), and there are an average of only 2.2 wired telcos (that is, the least expensive service option) per library system. This reflects the remote isolation of many libraries and a lack of population sufficient to entice telco entrance. Disaggregating the average number of telcos per library system by urbanicity demonstrates inequality in the number of available telcos per library system. There are 5.8 wired telcos in city areas, 2.7 in town areas, 2.0 in rural areas, and 1.8 in remote locations.

> Libraries serving remote communities have access to an average of only 2.2 wired telcos.

The scarcity of telcos serving rural and remote library service areas has not been significantly detrimental to the number of libraries able to obtain Internet access. At the end of 2011, only 3 of 113 libraries in Montana – East Glacier, Dodson, and Saco – were without Internet access, even though all three libraries have access to a wired telco provider (e.g., DSL or T1 Internet access). The continued absence of Internet service in those libraries may reflect prohibitively high costs for

Table 9: Summary Statistics Describing the Supply of Telecommunication Service Providers

	All	City	Town	Rural	Remote
Average Number of Providers per Library	8.0	11.8	8.7	7.9	7.4
Average Number of Wired Providers per Library	2.2	5.8	2.7	2.0	1.8
Average Number of Mobile Providers per Library	2.8	3.0	3.0	2.9	2.6
Average Number of Satellite Providers per Library	3.0	3.0	3.0	3.0	3.0
Number of libraries without Internet access	32	1	6	2	23
Number of Libraries without Internet access and require Satellite Internet	0	0	0	0	0
Percentage of Libraries with Local Area Network	49.6%	75.0%	66.7%	77.8%	37.1%
Number of Libraries	113	4	30	9	70

Note: Figure constructed by authors using information from the Federal Communications Commission (2011).

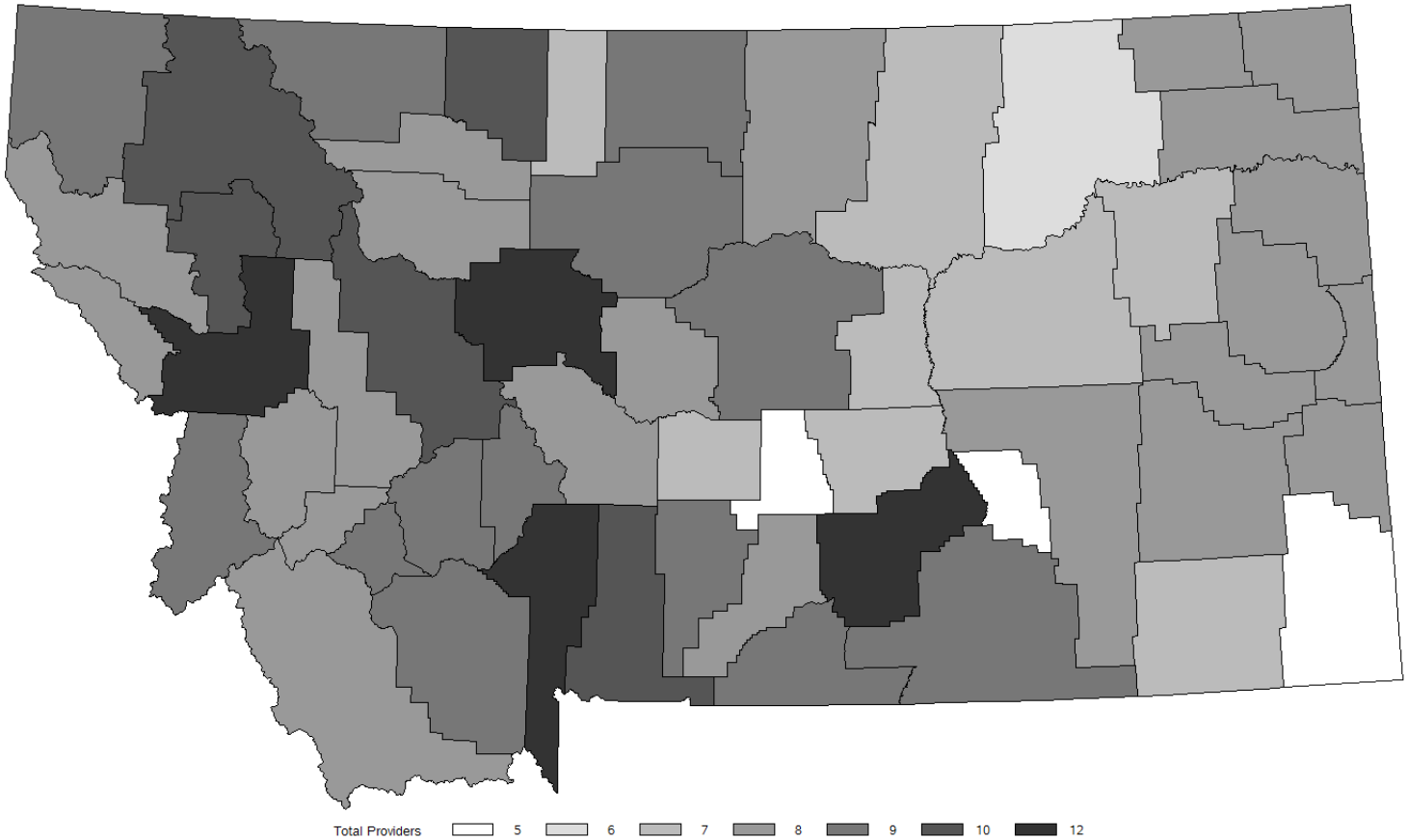
smaller, less funded libraries, or it may indicate that information about wired telco providers is not readily available to library decision makers. Table 9 presents aggregate Internet accessibility statistics and shows that approximately 70% of Montana libraries in city, town, and rural areas have installed local area networks (LANs), while only 37% of libraries in remote areas have done so.

One of the most important determinants of the number of telcos in a given service area is population, but other influences exist, including population density, average income, the presence of a military installation, and proximity to large public institutions. Figures 7 and 8 show the number of telco and wired telco providers for all Montana counties at the end of 2011; the number of providers ranges from five to twelve. Both figures demonstrate some spatial relationship among counties with a higher number of telcos and the Internet2 projected line (due east through Lewis and Clark county, down to Gallatin county, and then turning east through the south-central counties of Montana). However, due to recent expansion of high-speed Internet infrastructure (e.g., burying cable) in remote and rural locations, these graphs will quickly become inaccurate.

3.2 Available Telcos in Library Service Areas

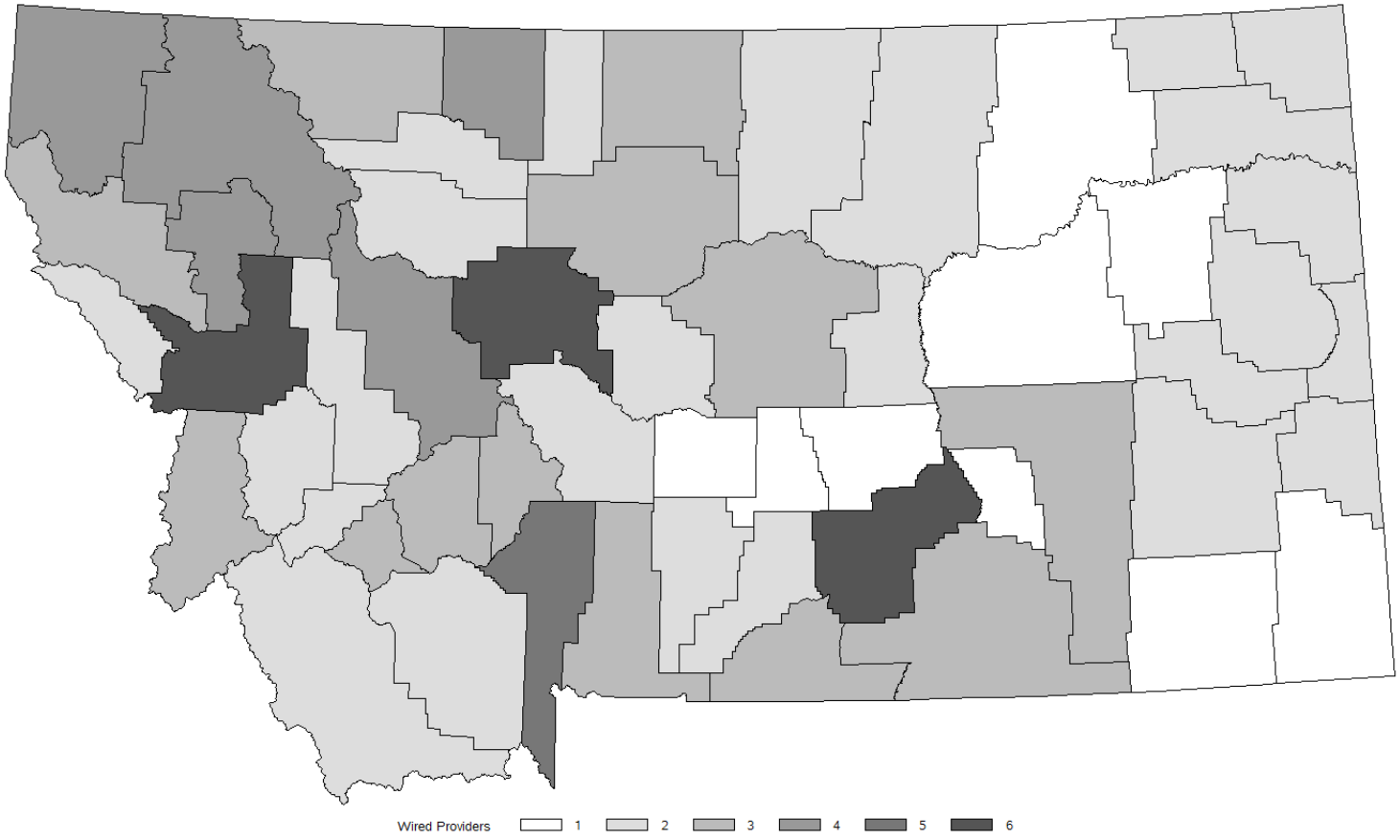
Appendix I contains a list of telcos used by each library in Montana. Service area validation procedures were conducted for each telco, but public library staff should seek information about telcos in their local areas. In particular, given the new Ronan Telephone Company high-speed middle-mile fiber network that is nearing completion, broadband expansion is imminent in numerous locations. Information on each telco – including contact information, pricing, and availability – is available in Appendix II.

Figure 7: Number of Telecommunication Service Providers per County in Montana



Note: Figure constructed by authors using information from the Federal Communications Commission (2011).

Figure 8: Number of Wired Telecommunication Service Providers per County in Montana



Note: Figure constructed by authors using information from the Federal Communications Commission (2011).

4. FCC Rulings

This section outlines Federal Communications Commission (FCC) rulings pertinent to high-speed broadband Internet accessibility, particularly as it may apply to rural and remote communities. This information comes from the annual Federal-State Joint Conference on Advanced Telecommunications Services, rulings associated with the E-rate program, and other FCC reports. A summary of FCC rulings pertinent to Montana libraries is available in Table 11.

4.1 Universal Service Program for Schools and Libraries (E-rate)

The Universal Service Program for Schools and Libraries, also known as the E-rate program, makes telecommunications and information services more affordable for U.S. schools and libraries. In 1996, Congress mandated that the FCC use the Universal Service Fund (USF) to provide eligible institutions with discounted rates for certain technologies and services, including telephone and Internet service. The program is administered by the Schools and Libraries Division of the Universal Service Administrative Company (USAC), which reports to the FCC. In October 2011 funds were reallocated from a program focused on expanding rural telephone services to one that finances broadband Internet access in rural areas without any ISPs. The funds are also used to subsidize the development of 4G coverage in underserved locations.

To qualify for federal E-rate funds, a school or library must develop a technology plan that explains how the funded technology will be used to achieve educational goals, specific curriculum reforms, or library service improvements.[1] The school or library then requests services in accordance with specific FCC rules and state and local procurement laws, which vendors bid to provide. After selecting a vendor, the school or library files an application with USAC. Upon USAC approval, the vendor provides the eligible services to the school or library at discounted prices. Generally, the USF reimburses the vendor for the amount of the discount.

> Funds are prioritized based on type of service requested, with telecommunication and Internet access services funded first.

Funds are prioritized based on type of service requested. Telecommunication and Internet access services are known collectively as Priority 1. They are considered primary and therefore funded first. Internal connections and their basic maintenance are considered Priority 2. They are funded after telecommunication and Internet access services, beginning with the applicants at the highest discount levels.

USAC reported that schools and libraries requested $5.24 billion in discount funding for FY2012. Almost half of these requests are for Priority 1 funding ($2.44 billion), an increase of 12.5% from FY2011. This estimate is based on 46,838 applications postmarked by March 20, 2012, the close of the application filing window. In May 2012, the FCC announced a FY2012 E-rate program cap of $2.34 billion, a 2.1% inflation-adjusted increase from FY2011's $2.29

[1] Beginning with Funding Year (FY) 2011, schools and libraries applying for Priority 2 services (internal connections and basic maintenance) must prepare a technology plan. Before FY2011, technology plans were required for all eligible services other than basic telephone service. In general, technology plans should not cover more than three years.

billion cap. Some Montana library directors have stated that they are uninterested in applying for these discounts because they believe that there are no funds available. However, the program will continue to be funded indefinitely and applications are prioritized by discount rate and postmark date.

4.2 National Broadband Plan

In 2009, Congress directed the FCC to develop a National Broadband Plan (NBP) that would ensure broadband access capability for every American. The NBP's explicit long-term goal for libraries states that every community should have affordable access to broadband service of at least 1 Gbps through anchor institutions such as schools, hospitals, and government buildings. Congress required that the plan include a detailed strategy to achieve affordability and maximize broadband use to advance national purposes such as civic participation, community development, education, and economic growth.

The plan also provides specific recommendations on behalf of libraries, recommending that the federal government launch a National Digital Literacy Program that creates a Digital Literacy Corps, increase the capacity of digital literacy partners, and create an Online Digital Literacy Portal (Recommendation 9.3). Congress should consider providing additional public funds to the Institute of Museum and Library Services (IMLS) to improve connectivity, upgrade hardware, and train personnel in libraries and other community-based organizations. Additionally, the Office of Management and Budget (OMB) – consulting with the IMLS – should develop guidelines to ensure that librarians and other community organization staff have training to help patrons use next-generation e-government applications.

To increase broadband connectivity in schools and libraries, the NBP also recommends that the FCC initiate a rulemaking to set goals for minimum broadband connectivity and prioritize funds accordingly (Recommendation 11.15). The FCC should also provide E-rate support to more schools and libraries (Recommendation 11.16) and give those institutions more flexibility to purchase the lowest cost broadband solutions (Recommendation 11.17). As a solution to problems stemming from state laws, Congress should also consider amending the Communications Act to help Tribal libraries overcome barriers to E-rate eligibility (Recommendation 11.22).

4.3 Broadband Data Improvement Act

The Broadband Data Improvement Act (BDIA) of 2008 requires the FCC to compile a list of geographical areas not served by providers of advanced telecommunications capability and determine the population, population density, and average per capita income for each area when census data are available. The BDIA also directs the Secretary of Commerce to offer competitive grants to develop and implement statewide initiatives that identify and track the availability and adoption of broadband services within each state and create a page on the Department of Commerce website that aggregates relevant information made available to the public by grant recipients. The FCC provides eligible entities electronic access to aggregate data (subject to exception) collected by the FCC from broadband service providers.

The American Recovery and Reinvestment Act (ARRA) provided a total of $7.2 billion to the Department of Commerce's National Telecommunications and Information Administration (NTIA)

Table 10: State Broadband Initiative Grant Awardees in Montana

	Total Award	Type
Communication Service for the Deaf, Inc.	$14,988,657	Sustainable Adoption
Montana Department of Commerce	$6,084,826	Broadband Data & Development
Montana State Library	$1,829,473	Public Computer Centers
Ronan Telephone Company	$13,796,640	Infrastructure
University Corporation for Advanced Internet Development	$62,540,162	Infrastructure

Note: Table constructed by authors using information from the U.S. Department of Commerce (2011).

and the Department of Agriculture's Rural Utilities Service (RUS) to fund projects that would expand access to and adoption of broadband services across the United States. The NTIA used $4.7 billion of that funding for grants in the Broadband Technology Opportunities Program (BTOP) and the State Broadband Initiative (SBI), which will help improve broadband infrastructure in the United States, expand public computer center capacity, and encourage sustainable adoption of broadband service. The BDIA has not indicated that BTOP or SBI grants will be renewed once the initial funding is spent. Montana communities have received five of these grants (see Table 10). The majority of Montana's funding has been used on infrastructure to connect Montana to the Internet2 north fiber network route from Seattle to Chicago (discussed below).

As part of its considerations, the BDIA collects and examines data on the extent of broadband service capability in other countries to determine whether advanced telecommunications capability is being deployed to all Americans on a reasonable and timely basis (see Section 706 Report). To fulfill this mandate, the BDIA requires the FCC to compare the extent of broadband service capability (including data transmission speeds and price for broadband service capability) in a total of seventy-five communities in a geographically diverse selection of at least twenty-five foreign countries.

The program directs the FCC to choose international communities comparable to U.S. communities with respect to population size, population density, topography, and demographic profile. Congress has also mandated that the FCC identify a number of specific similarities and differences in each community, including their market structures, the number of competitors, the number of facilities-based providers, the types of technologies deployed by such providers, the applications and services those technologies enable, the regulatory model under which broadband service capability is provided, the types of applications and services used, business and residential use of such services, and other media available to consumers.

Reported speeds for some smaller international cities are roughly comparable to speeds in many U.S. cities.

In 2010, the International Bureau released the first International Broadband Data Report (IBDR), with an update in May 2011. The revised report provides data on broadband service plans and pricing in thirty-eight countries, including information on bundle pricing and advertised monthly

recurring charges and nonrecurring charges such as connection and modem fees. The results suggest that broadband adoption in a given community is positively correlated with size of the population, population density, and higher income. The analysis, however, does not detect a statistically significant relationship between a community's average education level and broadband adoption. The data on average actual download speeds reported by consumers in U.S. and foreign cities show that some large European and Asian cities exhibit a significant edge over comparable U.S. cities in reported download speeds. Reported speeds for some smaller international cities, however, are roughly comparable to speeds in many U.S. cities.

4.3.1 Internet2

As discussed above, Montana is part of the United States Unified Community Anchor Network (US UCAN) program, which is sponsored by the University Corporation for Advanced Internet Development. US UCAN (also known as Internet2) is a large-scale, public-private partnership to interconnect more than thirty existing research and education networks throughout all fifty states. The project is creating a dedicated 100-200 Gbps nationwide dark fiber backbone with 3.2 terabits per second (Tbps) total capacity that would enable advanced networking features such as IPv6 and video multicasting. The project plans to connect approximately 200,000 community anchors – including colleges, universities, libraries, major veterans' and other health care facilities, and public safety entities – into virtual communities with shared goals and objectives. Additional benefits will be provided to American Indian tribes, vulnerable populations, and government entities.

Figure 9 shows the proposed network topology. The northern Internet2 fiber line will cross directly through Montana; optical add/drop facilities will be located in Missoula, Bozeman, Billings, and Miles City.

As of July 2011, UCAN had upgraded and activated more than 10,000 miles of its proposed 16,312-mile fiber network. The first coast-to-coast links, from New York City to Sunnyvale, Calif., are now installed and operational. As shown in Figure 10, Montana is not yet linked to the northern route that will connect Seattle to Chicago. The entire network is expected to be completed by early 2013.

The completed network will be capable of supporting connectivity for all 200,000 U.S. community anchor institutions, enabling these institutions to provide their communities with telemedicine, distance learning, and other advanced applications not possible with consumer-grade Internet services. Access to these services would create new economic opportunities across the United States. The capacity can also be easily partitioned, enabling simultaneous support of logical networks for such diverse needs as GENI and national interconnect of public safety wireless networks.

4.4 USDA Rural Development

The U.S. Department of Agriculture's (USDA) Rural Development is committed to developing rural communities to succeed in the twenty-first century. One of the platforms for creating economic growth in these communities is the expansion of access to high-speed broadband networks. Through the American Recovery and Reinvestment Act, Congress provided $2.5 billion to the USDA's Rural Utilities Service (RUS),

Figure 9: Internet2 Planned 100 Gigabit Infrastructure Topology

Note: Downloaded from http://Internet2.edu/network on June 12, 2012.

a division of Rural Development, to facilitate broadband access in rural communities. The RUS has used these resources to provide loans and grants that will help rural Americans access broadband services. To date, they have provided $895 million to support fifty-five broadband projects in twenty-nine states and territories.

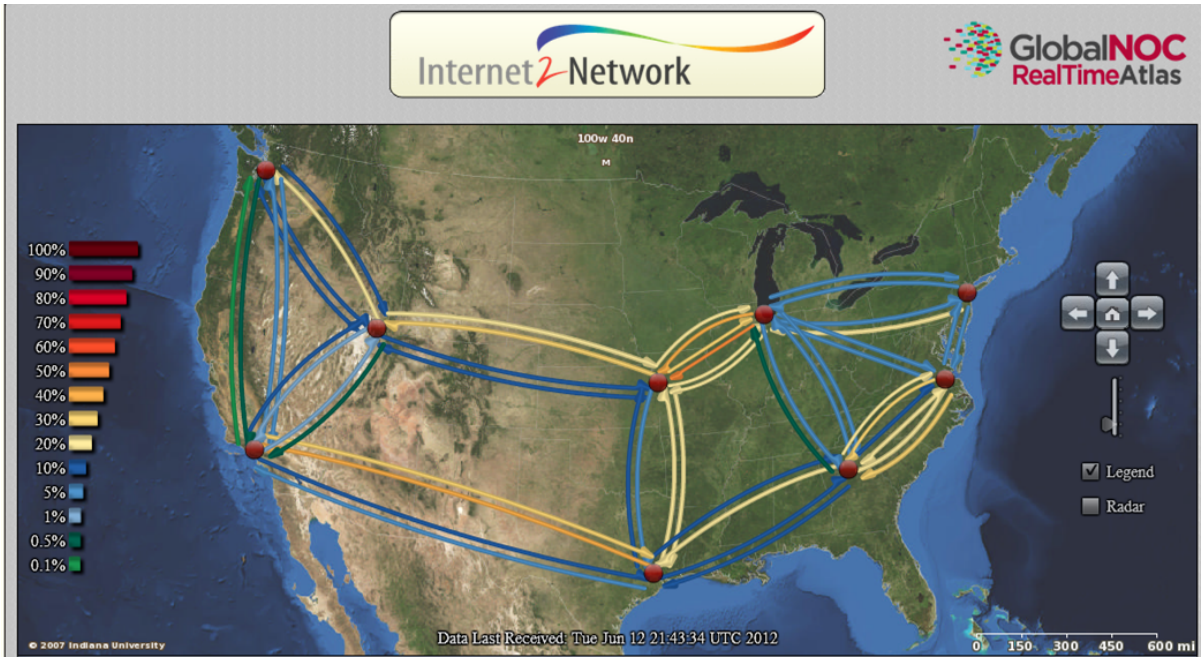
USDA Rural Development is currently accepting applications through the Community Connect program for grants to build broadband infrastructure in remote rural communities. To receive money for network expansions, telecommunications companies are required to enter a bidding competition. Awardees are also required to establish community centers offering free public broadband access.

4.5 Connect America Fund

The Connect America Fund (CAF) is an FCC program that brings broadband Internet access to the 18 million underserved Americans. The CAF will help facilitate intercarrier compensation reforms and make broadband available to homes, businesses, and community anchor institutions in remote areas that do not, or would not otherwise, have broadband. The program relies on incentive-based, market-driven policies, including competitive bidding, to distribute universal service funds efficiently and effectively.

There are two distinct phases of the CAF. Beginning in early 2012, the first phase will spur immediate broadband build-out by providing

Figure 10: Internet2 Network Utilization



Note: Downloaded from http://www.Internet2.edu/network on June 12, 2012.

funding for price cap carriers to extend robust, scalable broadband to hundreds of thousands of underserved Americans. Carriers that elect to receive this additional support must provide broadband with actual speeds of at least 4 Mbps downstream and 1 Mbps upstream with latency suitable for real-time applications and services such as VoIP, and with monthly usage capacity reasonably comparable to that of residential terrestrial fixed broadband offerings in urban areas.

The second phase consists of a forward-looking broadband cost model and competitive bidding to support the development of networks providing both voice and broadband service over five years. In this phase, the CAF will distribute up to $1.8 billion annually to areas without unsubsidized broadband competitors. It is expected that the model and competitive bidding mechanism will be adopted by December 2012, and disbursements will begin in 2013 and continue through 2017. Funding is provided by changes to the Universal Service Fund, allowing phone companies to raise prices to recoup lost revenue.

4.6 Net Neutrality

Current FCC policy advocates for network neutrality ("Net Neutrality," sometimes referred to as "Open Internet"), which prevents the government or ISPs from restricting consumers' access to networks that participate in the Internet. Information consumers are free to choose the content they wish to access, create, or share with others without interference or constraint from telecommunications companies or content providers.

The FCC has three basic net neutrality rules:

1. *Transparency*: Broadband providers must disclose information regarding their network

management practices, performance, and the commercial terms of their broadband services.

2. *No Blocking*: Fixed broadband providers (such as DSL, cable modem, or fixed wireless providers) may not block lawful content, applications, services, or nonharmful devices. Mobile broadband providers may not block lawful websites or applications that compete with their voice or video telephony services.
3. *No Unreasonable Discrimination*: Fixed broadband providers may not unreasonably discriminate in transmitting lawful network traffic over a consumer's broadband Internet access service.

The FCC adopted these net neutrality rules to empower consumers and entrepreneurs, protect free expression, promote competition, increase certainty in the marketplace, ensure that the Internet remains a powerful platform for innovation and job creation, and spur investment in U.S. broadband networks. The enforcement of these rules, however, has been called into question.

In a 2010 lawsuit, *Comcast v. FCC*, a federal appeals court ruled that the FCC had overstepped its authority by requiring companies to give broadband users equal access to all Internet content. In a second incident, the FCC banned ISPs from blocking legal traffic on their networks in December 2010, while allowing these providers to reasonably manage their networks and charge consumers fees based on usage. This policy was overturned by Congress, which indicated that the FCC's rules needlessly imposed government regulation on the Internet.

The FCC again attempted to impose restrictions on ISPs by requiring fixed and mobile broadband providers to reveal their network-management practices, performance and characteristics, and commercial terms of broadband service. Some critics have asserted that the disclosure requirements were too broad and burdensome and could subject broadband providers to endless litigation. The rules also prohibit fixed broadband providers like Comcast and Verizon from unreasonably discriminating in transmitting lawful network traffic or blocking lawful content, applications, services, or nonharmful devices on their networks. Mobile broadband companies must not block lawful web sites or applications that compete with their voice or video telephony services. These rules are still in effect, but the potential exists for them to be overturned.

4.7 Office of Native Affairs and Policy

One of the recommendations of the NBP was the creation of the Office of Native Affairs and Policy (ONAP), which was established in

ONAP cooperates with tribal governments to encourage technology adoption in Native communities. Several Montana reservations are underserved with respect to telecommunications access.

2010, to act as the FCC contact for American Indian, Alaska Native, and Pacific Islander groups. The office cooperates with tribal governments to encourage technology adoption in Native communities. Several Montana reservations are underserved with respect to telecommunications access. For example, the Crow and Blackfeet reservations only have wired broadband access and the Northern Cheyenne reservation only has wireless broadband.

ONAP develops recommendations and proposes policies to increase access to communications services and technologies on tribal lands. The office also works with various government agencies, private organizations, and the communications industries to design and implement FCC policies regarding tribal nations and Native communities. In particular, ONAP plans and executes the FCC's *Indian Telecommunications Initiatives* and provides expert advice and assistance regarding telecommunications issues relevant to tribal governments.

In 2011, the FCC wrote two recommendations to help strengthen and expand broadband and other communications services in Native communities. The first was a notice of inquiry on improving communications services for tribal nations that, among other things, solicited comments on greater broadband distribution. The second was a notice of proposed rulemaking on ways to expand the efficient use of communications frequencies over tribal lands. The FCC has not yet posted its findings from these recommendations.

Table 11: Summary of FCC Rulings Pertinent to Montana Libraries

FCC Ruling/Initiative:	National Broadband Plan
Year started:	2009
Purpose:	For all Americans to access to broadband by 2020.
Relevant rulings/requirements:	The FCC should provide E-rate support for internal connections to more schools and libraries. The FCC should give schools and libraries more flexibility to purchase the lowest-cost broadband solutions.
Goals related to libraries:	Every American community should have affordable access to at least 1 gigabit per second broadband service to anchor institutions such as schools, hospitals and government buildings.
Link to initiative website:	http://broadband.gov/plan
FCC Ruling/Initiative:	Broadband Data Improvement Act and Internet2
Year started:	2008
Purpose:	Improve broadband availability and quality.
Relevant rulings/requirements:	(1) to compile a list of geographical areas that are not served by any provider of advanced telecommunications capability; (2) when census data are available, to determine the population, population density, and average per capita income for each area; and (3) to make international comparisons.
Goals related to libraries:	Interconnect 200,000 community anchors, such as public libraries.
Link to initiative website:	http://govtrack.us/congress/bills/110/s1492
FCC Ruling/Initiative:	USDA Rural Utilities Service
Year started:	2008
Purpose:	Part of the 2008 Farm Bill, joint effort by the FCC, USDA, and NTIA. A comprehensive rural broadband strategy.
Relevant rulings/requirements:	USDA is currently accepting applications through the Community Connect Broadband program for grants to provide broadband service to residents of remote and rural communities.
Goals related to libraries:	The CAF will help make broadband available to homes, businesses, and community anchor institutions in areas that do not, or would not otherwise, have broadband. The CAF will also help facilitate intercarrier compensation (ICC) reforms.
Link to initiative website:	http://www.rurdev.usda.gov

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FCC Ruling/Initiative:	Connect America Fund
Year started:	2011
Purpose:	Reallocated spending from telephones to high-speed Internet. Phone companies allowed to raise prices in order to recoup lost revenue.
Relevant rulings/requirements:	To receive grant funds for network expansions into designated areas, telcos must enter a bidding competition.
Goals related to libraries:	As more broadband capabilities enter rural areas, libraries will have cheaper and faster connecting Internet access capabilities.
Link to initiative website:	http://www.fcc.gov/encyclopedia/connecting-america

FCC Ruling/Initiative:	Net Neutrality
Year started:	2011
Purpose:	Prevent restrictions on content, sites, platforms, types of equipment that may be attached, and modes of communication by the government or Internet Service Providers.
Relevant rulings/requirements:	The FCC's rules banned Internet service providers from blocking traffic on their networks, while allowing providers to reasonably manage their networks and charge consumers based on usage – this was overturned by Congress.
Goals related to libraries:	Requires fixed and mobile broadband providers to reveal their network-management practices, performance and characteristics, and commercial terms of their broadband service. Prohibits fixed broadband providers from unreasonably discriminating in transmitting lawful network traffic.
Link to initiative website:	http://www.fcc.gov/guides/open-Internet

FCC Ruling/Initiative:	Universal Service Program for Schools and Libraries (E-Rate)
Year started:	1996
Purpose:	FCC provides discounted telecommunication and Internet to schools and libraries administered by the Universal Service Administrative Company (USAC).
Relevant rulings/requirements:	Eligibility: schools and libraries must meet statutory eligibility criteria, may not resell any services provided under section 254, must make a bona fide request for the services, and must use the services for educational purposes.
Goals related to libraries:	Libraries may obtain discounts ranging from 20%-90% depending on eligibility.
Link to initiative website:	http://usac.org/sl

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FCC Ruling/Initiative:	Office of Native Affairs and Policy
Year started:	2010
Purpose:	Deployment and adoption of communications services/technology.
Relevant rulings/requirements:	Several Montana reservations are underserved. Currently, Crow and Blackfeet only have wired broadband and Northern Cheyenne pnly has wireless broadband.
Goals related to libraries:	
Link to initiative website:	http://transition.fcc.gov/indians

Note: Table constructed by authors.

5. Internet Access Costs

Internet speed and the ability to access the Web are determined by multiple factors, including access to hardware and software and Internet connectivity. Furthermore, libraries require technology support personnel to maintain local area networks and Internet connectivity. The following section reviews each of these four components affecting technology and Internet access.

5.1 Hardware Costs

In 2011, Montana public libraries had 1,822 computers, with approximately 29% intended solely for staff use (see Table 12). Libraries serving rural and remote communities accounted for 43% of these computers. Despite this surprisingly high percentage, Montana has a relatively large number of rural and remote community libraries, and so the number of computers at any given library is quite small, averaging only nine computers versus ninety-five in city libraries and twenty-nine in town libraries.

Assuming a five-year hardware replacement cycle and no acquisition of additional computers, the above statistics imply that Montana libraries are replacing around 368 computers annually, including 106 staff computers and 262 PACs. In rural and remote locations, each library replaces at most two or three computers annually; libraries in towns replace five computers and those in cities replace nineteen computers annually.[2] Furthermore, Montana public library directors who did not receive BTOP funding to purchase hardware have indicated that they have upgraded computers through retail computing outlets or built computers in-house using individual components. For these libraries, it is impossible to establish average costs or generalize about current configurations.

Hardware configurations and pricing can be obtained for forty-three Montana Public Libraries that participated in the BTOP program because the MSL purchased hardware through established contracts from the Western States Contracting Alliance (WSCA). While there were approximately sixty-eight separate computer-related items purchased under the BTOP program (e.g., desktop PCs, monitors, routers, printers, scanners, carts, projectors, desks, chairs, etc.), this report focuses on the largest line items: desktop PCs, monitors, and laptops (approximately 66% of BTOP hardware costs). The BTOP program helped purchase approximately 255 desktops, 286 monitors, 196 laptops.

For desktops and laptops, Table 13 provides a snapshot of the current preferred configurations and prices. These computer configurations are determined by WSCA's directors. It should be noted that all hardware comes with standard three-year, next-business-day, on-site service after remote diagnosis.

The BTOP program helped purchase standard desktops from Dell for approximately $794 and standard laptops from Dell for approximately $1,189 (both are 2010 pricing). Using these prices as a guide and assuming that approximately 364 desktop computers are replaced every year (on a five-year replacement rate), annual hardware costs for all Montana libraries are $344,460, or $946 per computer. If 20% of computers are laptops, annual hardware costs for all Montana libraries increase by $17,783, or $244 in additional costs per computer.

[2] Given the infrequency with which 60% of Montana public libraries purchase hardware, estimates of current hardware configurations and prices will quickly be outdated and irrelevant.

Table 12: Number of Computers and Computers Requiring Replacement in Montana Libraries

	All Libraries	City	Town	Rural	Remote
	Number of Computers				
Staff Computers	531	97	251	20	163
PACs	1292	189	528	117	475
Total	1840	286	761	137	638
	Number of Computers Requiring Replacement				
Staff Computers	106	19	50	4	33
PACs	262	38	106	23	95
Total	368	57	156	27	128
Rotation Schedule	5 years	5 years	5 years	5 years	5 years
Number of Libraries	112	3	29	9	71

Note: Table constructed by authors using information from the Institute of Museum and Library Services (2011b).

It should be noted that these estimates are the lower bound and assume that all libraries use state term contracts in order to obtain discounted hardware. MSL 2012 survey data indicate that only 38% of sampled Montana libraries use state term contracts to purchase hardware. Of those, half are in remote locations. Assuming that 62% of libraries pay retail price for hardware, this implies that hardware costs rise to $436,085, or an additional $406 per computer.

WSCA computer contracts are competitively solicited contracts designed to reduce the costs of acquiring computer equipment.

5.1.1 Western States Contracting Alliance

The Western States Contracting Alliance (WSCA) is a fifteen-state government consortium that negotiates cost-effective acquisition of quality products and services through volume-discounted contracting.[3] All governmental entities within WSCA states as well as authorized governmental entities in non-WSCA states may use the approved agreements. Cooperative purchasing benefits states as well as cities, counties, public schools, and institutions of higher education. The current Montana WSCA director is:

Marvin Eicholtz
General Services Division
Department of Administration
P.O. Box 200110
Helena MT 59620-0110
Phone: (406) 444-3119
Fax: (406) 444-3039
meicholtz@mt.gov

WSCA computer contracts are competitively solicited contracts with manufacturers of personal computer equipment and related devices that specifically permit manufacturers and contracting entities to arrange for "better than a single unit price" for volume purchases, which can range from 2 to 1,000 units. State libraries may, for instance,

[3] See www.aboutwsca.org for more information.

Table 13: MSL BTOP Hardware Purchase Specifications

	Standard Laptop	**Standard Desktop**
Model (Dell)	Latitude E6420	Optiplex 990
Operating System	Windows 7 Professional	Windows 7 Professional
Processor	Core i5-2520M or Core i5-33xxM	Core i5-2400 or Core i5-34xx
RAM	4 GB, DDR3	4 GB, DDR3
Wireless	Integrated 802.11a/g/n	n/a
Hard Drive	250 GB SATA hard drive 7200 rpm	250 GB SATA hard drive 7200 rpm
Network	Integrated Intel Gigabit Ethernet	Integrated Intel Gigabit Ethernet
Optical Drive	DVD +/- RW	DVD +/- RW
Display	14" WXGA TFT or WLED HD	n/a
Case	n/a	Desktop, SFF, etc
Video	Intel HD Graphics	Intel HD Graphics
USB	Two USB 2.0 ports	Six USB 2.0 ports
Warranty	Three year next working day	Three year next working day on site
Energy-Star	Energy Star 5.0 compliant	Energy Star 5.0 compliant
EPEAT	EPEAT silver level	EPEAT silver level

Note: Table constructed by authors using information from www.wnpsp.com/21.html.

establish a standardized configuration of computer equipment and then encourage or require purchase of that standard configuration in order to reduce costs.

The WSCA directors authorized the creation of a WSCA Premium Savings Package pricing (WNPSP) mechanism within the contract. The WNPSP team is a group of state representatives (both procurement and technology representatives) who define packages (configurations) that might serve as a "state standard" or otherwise widely used configuration. Establishing a standard package allows manufacturers to reduce their costs and offer lower pricing for volume purchases. Packages are currently redefined or updated every six months, such that new pricing is available on May 1 and November 1 of each year. Table 13 and Table 14 provide current configurations and prices. Updated prices are available online at www.wnpsp.com/20. Generally, the price structure allows for a percentage discount off of current retail pricing for specific units/models.

Examples of current contractors and lead state contract numbers are:

Ace Computer (B27157)
Apple Computer, Inc. (B27158)
CTL Corporation (B27159)
Dell Marketing L.P. (B27160)
Grace Global Corp (B27163)
Hewlett Packard Company (B27164)
Howard Computers (B27165)
IBM Corp. (B27166)
Lenovo (United States) Inc. (B27168)
Lexmark International Inc. (B27169)
Oracle (B27175)
Panasonic Computer (B27172)
Toshiba America (B27176)
Transource Computer (B27177)
Xerox Corp (B27178)

Table 14: Summary of WSCA/NASPO Premium Savings Packages

	Performance Desktop	**Education Desktop PC - AMD**	**Education Desktop PC - Intel**
Model (Dell)	Optiplex 990	Optiplex 580	Optiplex 990
Operating System	Windows 7 Professional	Windows 7 Professional	Windows 7 Professional
Processor	Core i7-2600 or Core i7-37xx	AMD Athlon II X2 B24 or A6-xx APU	Core i3-2100 or Core i3-32xx
RAM	4 GB (2x2GB), DD3 two open slots	4 GB (2x1GB), DDR3 two open slots	4 GB (2x1GB), DDR3 two open slots
Wireless	n/a	n/a	n/a
Hard Drive	250 GB SATA hard drive 7200 rpm	250 GB SATA hard drive 7200 rpm	250 GB SATA hard drive 7200 rpm
Network	Integrated Intel Gigabit Ethernet	Integrated Ethernet 10/100/1000	Integrated Ethernet 10/100/1000
Optical Drive	DVD +/- RW	DVD +/- RW	DVD +/- RW
Display	n/a	n/a	n/a
Case	Tower case	Desktop case	Desktop case
Video	PCI Express x-16 512 MB discrete dual video	Integrated video	Integrated video
USB	Six USB 2.0 ports	Six USB 2.0 ports	Six USB 2.0 ports
Warranty	Three year next working day on site	Three year next working day on site	Three year next working day on site
Energy-Star	Energy Star 5.0 compliant	Energy Star 5.0 compliant	Energy Star 5.0 compliant
EPEAT	EPEAT silver level	EPEAT silver level	EPEAT silver level
Price (Dell)	**$1,000**	**$513**	**$681**

	Laptop	**Ultra-Light Laptop**
Model (Dell)	Latitude E652Desktop Replacement0	Latitude E6320
Operating System	Windows 7 Professional	Windows 7 Professional
Processor	Core i7-2620M or Core i7-35xxM	Core i5-2520M or Core i5-33xxM
RAM	4 GB, DDR3	4 GB, DDR3
Wireless	Integrated 802.11a/g/n	Integrated 802.11a/g/n
Hard Drive	250 GB SATA hard drive 7200 rpm	250 GB SATA hard drive 7200 rpm
Network	Integrated Intel Gigabit Ethernet	Integrated Intel Gigabit Ethernet
Optical Drive	DVD +/- RW	Specify if included
Display	15” WLED HD	13.3” WLED HD
Case	n/a	n/a
Video	512 MB discrete graphics	128 MB graphics (specify if discrete)
USB	Two USB 2.0 ports	Two USB 2.0 ports
Warranty	Three year next working day	Three year next working day
Energy-Star	Energy Star 5.0 compliant	Energy Star 5.0 compliant
EPEAT	EPEAT silver level	EPEAT silver level
Price (Dell)	**$1,284**	**$1,150**

Note: Table constructed by authors using May-October 2012 information from www.wnpsp.com/21.html.

5.2 Software Costs

Costs associated with software vary by the number of software titles a library has purchased and whether the computer is available to the public or is for staff use. Many software makers provide education or government discounts for libraries, with some requiring bulk purchase. Some software makers provide deeper discounts for public-access computers.[4]

Table 15 provides a list of the most frequently used software titles and their list prices by library's urbanicity. Although Table 15 provides prices of commonly used commercial software, it is important to note that using these prices directly would likely overstate software costs for libraries because many licenses do not require annual renewal.

Table 16 uses data provided by the MSL to estimate annual software costs per library system. The software are divided into three categories: Montana Shared Catalog, MontanaLibrary2Go, and other library-system-specific software. Overall, software costs are approximately $7,155 per year per library system, but these costs vary considerably across library systems serving different population sizes. Public libraries serving cities spend approximately $38,614, those serving towns spend $8,169, and rural and remote locations spend $3,394 on software.

A majority of software costs are associated with the most heavily used software: the Montana Shared Catalog and MontanaLibrary2Go. Libraries serving cities incur an average of $32,881 in costs for those tools, town libraries spend $6,776, and libraries in rural and remote locations pay $2,438. Although differences in costs across locations exist, the expenses are likely lower for libraries because the MSC and MontanaLibrary2Go services are based on a cost-sharing structure. These services provide an example of a consortial approach to providing important services to libraries for which acquiring independently these resources might have been prohibitively expensive.

5.3 Technology Support Personnel Costs

Information technology (IT) costs are divided into network administration/IT support and technology training. The MSL cost data for 2011 are divided into full- and part-time positions and notes whether an intergovernmental agency agreement exists between the local public library and a school/city/county government agency for technology support services.

Table 17 displays the percentage of library systems with various types of technology support personnel. Overall, 57% of Montana libraries have a full- or part-time staff person dedicated to network administration and technology support, but this aggregate statistic is not reflective of all Montana libraries. All city libraries have full-time personnel, while 71% of towns and 31% of libraries in rural and remote locations have full- or part-time personnel. Furthermore, 67% of personnel in town libraries and 59% of personnel in rural/remote locations are part-time.

Table 17 also shows that public libraries also hire dedicated technology trainers. Approximately 30% of Montana libraries have technology trainers; 6% hire full-time and 24% hire part-time technology trainers. All city public libraries have technology

[4] One prominent site for public-access computer software is www.techsoupforlibraries.org. To be eligible for software discounts, public libraries must be listed in the Institute of Museum and Library Services (IMLS) database. Additionally, not all software titles are available and software purchases per title are restricted to fifty software licenses per suite.

Table 15: Software Use and Costs in Montana Public Libraries

	Percentage of Libraries with Software				
	All Libraries	*City*	*Town*	*Rural / Remote*	*Cost per PC*
Microsoft Office	58%	100%	56%	52%	$24
Deep Freeze	45%	100%	67%	29%	$180 for 1 year, 5 pack
Microsoft Operating System	36%	33%	22%	43%	$12
Children's Games	21%	33%	22%	19%	Varies
Sonic Wall Filtering	12%	0%	22%	10%	$300-$700
Security	9%	0%	0%	14%	Varies
Norton Internet Security	9%	0%	22%	10%	$7
Anti-virus	9%	67%	0%	5%	Varies
PC Reservation	9%	67%	0%	5%	$200-$350*
Number of Libraries	33	3	9	21	

Notes: Table constructed by authors using information from MSL data, 2011. Libraries in rural and remote areas are consolidated given the limited number of libraries in these areas.
*: PC Reservation costs are per site. Cost per computer depend on the number of computers.

Table 16: Annual Software Costs in Montana Library Systems

	All Libraries	**City**	**Town**	**Rural / Remote**
Software Expenditures				
MSC Costs	$3,536	$21,214	$4,531	$1,483
MontanaLibrary2Go Cost	$2,002	$11,667	$2,245	$955
Other Software Costs	$1,617	$5,733	$1,393	$956
Total Expenditures	$7,155	$38,614	$8,169	$3,394

Note: Table constructed by authors using information from MSL data. All costs represent averages per library systems. Libraries serving rural and remote areas are consolidated because of the limited number of libraries reporting costs.

trainers, while only 29% of town libraries and 19% of rural/remote libraries have technology trainers, 78% of whom work part-time. Finally, 23% of rural/remote libraries have used intergovernmental technology support agreements to obtain technology support service.

Table 17 provides the annual costs (including salary and benefits) to provide technology support services. The average full-time cost for a network administrator in 2011 was $54,458. For those libraries that had part-time network administration staff, the cost was $11,873 per staff person. The table also displays technology trainer costs: $40,500 for full-time trainers and $12,232 for part-time trainers. Given the small sample size, these costs cannot be broken down by urbanicity.

5.4 Internet Access Costs

Broadband costs represent a large portion of the costs to obtain Internet access in libraries. The federal E-rate program offsets these costs for libraries. In Montana, current discount rates range from 50% to 80% off of total access costs. Of Montana libraries sampled in early 2012, 60.3% had enrolled in the E-rate program.

> Of sampled Montana public libraries, 60.3% had enrolled in the E-rate program. On average, broadband access costs are $427 per Mbps, but are reduced to $125 per Mbps when using E-rate discounts.

Annual broadband Internet access costs per Mbps are provided in Table 18. Costs are broken down by total access costs and discounted access costs based on E-rate rates for a library system. Given that libraries vary in Internet bandwidth need, the table presents the cost per Mbps.

The average annual cost of 1 Mbps in 2011 was $427, but varied widely depending on urbanicity: libraries in cities and towns paid $387 per Mbps, while libraries in rural or remote locations paid $463 per Mbps. E-rate discount costs were substantially lower, with the average discount across all libraries being 71%. This equates to an average cost to Montana libraries of $125 per Mbps, with libraries in cities/towns paying $130 per Mbps and libraries in rural/remote locations paying $120 per Mbps.

Table 17: Percentage of Montana Library Systems with Technology Support Personnel Costs

	Full-time Network Administration/IT Support	**Part-time Network Administration/IT Support**	**Full-time Technology Training**	**Part-time Technology Training**	**Inter-government IT Agreement**
	Percentage of Libraries with IT Personnel				
City	100%	0%	33%	100%	0%
Town	43%	29%	0%	29%	0%
Rural/Remote	12%	19%	4%	15%	23%
All Libraries	28%	29%	6%	24%	18%
Number of Libraries	43	43	43	43	43
	IT Personnel Costs				
Cost per employee	$54,458	$11,873	$40,500	$12,232	–
Number of Libraries	5	7	1	6	–

Note: Table constructed by authors using information from MSL Survey Data, 2012 and Summer Leadership Institute Pre-Conference Survey, 2012. Cost per employee includes salary and benefits.

Table 18: Annual Broadband Internet Access Costs per Mbps for Montana Public Libraries

		All	**City/Town**	**Rural / Remote**
Total Cost	Maximum	$1,786	$1,000	$1,786
	Mean	$427	$387	$463
	Minimum	$112	$120	$112
Discounted Cost (E-rate)	Maximum	$411	$311	$411
	Mean	$125	$130	$120
	Minimum	$39	$48	$39
E-rate Discount	Maximum	80%	80%	80%
	Mean	71%	66%	74%
	Minimum	50%	60%	50%
Number of Libraries		27	13	14

Note: Table constructed by authors using information from MSL Survey Data, 2012.

6. Funding Opportunities

A complement to identifying Internet and technology access costs is locating funding opportunities. However, demands for technology services in libraries and competition for financial resources have rapidly increased, making it more difficult to obtain funding from public and private institutions that have traditionally assisted public libraries.

In response to increasing competition and decreased availability of financial resources, Montana public libraries will need to aggressively continue seeking funding opportunities from traditional sources as well as considering alternative options. The sections below provide information about opportunities that are targeted to improving and sustaining Internet accessibility and recommendations for locating additional resources.

6.1 Internet Access Funding Opportunities

Many of the funding opportunities targeted to public libraries are provided by the U.S. government. There are two general types of funding opportunities. The first are grants that are available on an ongoing annual basis and are expected to provide assistance with maintaining technology and Internet accessibility in libraries. The second type are one-time awards (often for larger amounts) intended to improve technology infrastructure.

As competition for both types of grants has grown, public libraries must continue to apply for financial assistance. Five financial opportunities are described below: the Universal Service Program for Schools and Libraries (federal E-rate program), the Connect America Fund, the Grants to States program, the Native American and Native Hawaiian Library Services program, and the Community Connect Grant Program. A summary of these opportunities is provided in Table 21.

6.1.1 Federal E-rate Program

Section 4.1 provides an overview of the Universal Service Program for Schools and Libraries. The program provides the most ongoing financial support for broadband Internet access in libraries. In Montana, the program offers savings to public libraries by offsetting a substantial percentage of Internet access costs. For many Montana public libraries, Internet accessibility costs are high because of low supply of broadband Internet services in remote locations, which increases Internet access fees. Table 19 shows the amount and percentage of cost savings that a sample of Montana public libraries were able to secure in the 2012-13 fiscal year. Libraries serving cities, rural, and remote areas receive at least a 50% cost savings, a savings of about 60% of total broadband Internet access costs.

> Federal E-rate savings are an important part of public libraries' strategies for providing cost-effective Internet access to their patrons.

These savings are an important part of public libraries' strategy for providing cost-effective Internet access to their patrons, but there are several challenges associated with applying for the federal E-rate program. A major challenge is the increasing competition for E-rate discounts. As noted in section 4.1, over $5.24 billion was requested by schools and libraries seeking discounts for the 2012-13 fiscal year. Almost half of this request is for Priority 1 funding ($2.44

Table 19: Savings Associated with the E-rate Program for Montana Public Libraries

		City/Town	Rural	Remote
Savings	Maximum	$5,827	$1,381	$4,126
	Mean	$2,095	$1,007	$1,272
	Minimum	$288	$792	$288
Percentage of total costs	Maximum	80%	70%	80%
	Mean	68%	63%	71%
	Minimum	50%	60%	50%
Number of Libraries		19	3	36

Note: Table constructed by authors using information provided by the MSL, 2012.

billion), an increase of 12.5% from 2011-12. In May 2012, the FCC announced that the 2012-13 funding year E-rate program would be limited to $2.34 billion.

A second challenge noted by public library administrators is the level of complexity and amount of time required to apply for federal E-rate discounts. In a survey conducted for the 2012 Montana State Library Summer Institute, Montana public library directors were asked to rate the difficulty of the E-rate application process. Of eighteen responses, nine rated the process as either somewhat difficult or very difficult. Moreover, respondents that did not apply to the program indicated that the time burden associated with the application was not worth the potential savings.

Knowledge of increased competition, difficulty of the application process, and perceived program elimination may have kept some library administrators from applying for the federal E-rate discounts. However, many Montana libraries may be overlooking opportunities for cost reductions. First, funding for the E-rate program is expected to continue indefinitely. Furthermore, because discounts are assigned based on the size of the discount rate and postmark date, Montana public libraries have an opportunity to be competitive for obtaining Internet access discounts. Lastly, the FCC has recently made efforts to reduce the complexity of the application process for library administrators, substantially reducing the time commitments required for smaller Montana libraries to apply for Internet access discounts.

6.1.2 Connect America Fund

A brief overview of the Connect America Fund (CAF) is provided in section 4.5. The program is part of the Universal Service Fund, which intends to make modern broadband services universally available to community anchor institutions at reasonable rates and provide modern networks capable of supporting advanced broadband services. The USF has a firm $4.5 billion budget between 2011 and 2016, which should minimize uncertainty for both broadband providers and customers.

The purpose of the Connect America Fund is to make broadband Internet access available to community anchor institutions in areas that either do not or would not be able to (without the CAF) have access to broadband services, with the ultimate goal of replacing all existing high-

cost broadband support mechanisms with less expensive alternatives. The program is based on market-driven incentives, and service funds are distributed after a competitive bidding process.

Phase 1 of the CAF program will make funds available to connect areas where broadband Internet accessibility is most lacking. Moreover, carriers will be required to provide services with actual speeds of at least 4 Mbps downstream and 1 Mbps upstream. Public libraries in areas where Phase 1 funding is available are encouraged to determine whether carriers plan to apply for CAF funding and work with local carriers and other area groups to obtain CAF assistance and provide high-speed Internet access to underserved areas.

6.1.3 Grants to States

The Grants to States program is funded through the Library Services and Technology Act and has provided funding for the development of public library resources for over fifty years. The program uses a population-based formula to determine funding levels, which are awarded to state library administrative agencies and can be used either for statewide initiatives and services or be distributed through competitions or cooperative agreements to public, academic, research, school, and special libraries in the state. Important goals of the Grants to States program include:

- Expanding services for learning and access to information and educational resources in all types of libraries to support individual needs for education, lifelong learning, workforce development, and digital literacy skills.
- Establishing or enhancing electronic and other linkages and improving coordination among libraries and entities to improve the quality of and access to library and information services.
- Providing training and professional development, including continuing education, to enhance the skills of library employees and leadership and advance the delivery of library and information services.
- Developing public and private partnerships with other agencies and community-based organizations.
- Targeting library services to individuals of diverse geographic, cultural, and socioeconomic backgrounds and to individuals with limited functional literacy or information skills.
- Targeting library and information services to persons having difficulty using a library and to underserved urban and rural communities, including children from families below the poverty line.
- Developing library services that provide access to information through local, state, regional, national, and international collaborations and networks.

Between 2007 and 2011, Montana has received an average of approximately $1 million through the Grants to States program. In 2012, the Senate funded $156.3 million to be allocated toward Grants to States, which would likely provide Montana with a similar amount of funding. The year 2012 also marks the conclusion of Montana's current five-year plan, which is required to obtain Grants to States funds. Initiatives in the 2013-17 plan can specifically target projects and goals that would (a) substantially increase Internet and technology accessibility in all Montana libraries and (b) develop strategies to provide long-term sustainability of that accessibility.

Table 20: Equipment Purchased for Montana Public Libraries Using BTOP Grant Funding

	BTOP Funding	Number Acquired
Expenditures		
PC Towers	$197,875	248
Monitors	$43,122	285
Laptops/Touchscreen PCs	$212,955	183
Peripherals	$41,000	182
Other	$199,494	650
Total Expenditures	$694,446	1,548

Note: Table constructed by authors using information from MSL Survey data.

For example, funds can be used to upgrade, revitalize, and standardize Internet-accessible public and staff devices, similar to the efforts under the BTOP grant. Table 20 shows that forty-two Montana library outlets were able to substantially improve their technological infrastructures using funding supplied by the BTOP grant. By developing a strategic long-term plan, funds from programs such as Grants to States can be used to enhance the technology infrastructures in all Montana libraries.

The 2013-17 Grants to States plan can target projects and goals that seek to substantially increase Internet and technology accessibility in all Montana libraries provide long-term sustainability of that access.

6.1.4 Native American Library Services

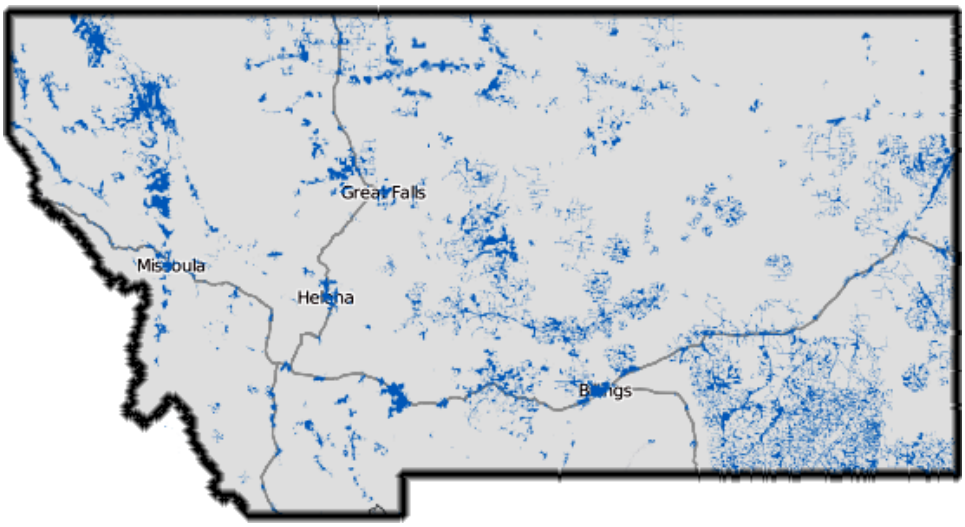
Montana is rich in American Indian heritage, and Montana public libraries serve these American Indian communities. In 2012, the U.S. Senate funded $3.8 million toward the Native American and Hawaiian Library Services program, which provides grants to support library services for American Indians. The program is administered by the Institute of Museum and Library Services.

There are two types of Native American Library Services grants. Basic grants are intended to fund existing library operations and to maintain core library services. Enhancement grants are to be used to improve existing services or implement new services, in accordance with similar goals for the Grants to States program (see section 6.1.3). Only Indian tribes, regional corporations, and village corporations are eligible to apply for this program's funding. However, in partnership with eligible applicants, entities such as libraries may be involved in the administration of the program and their staff may serve as project directors. These opportunities can be especially relevant to libraries serving American Indian communities.

6.1.5 Community Connect Program

The Community Connect Program (CCP) is a competitive granting program under the U.S. Department of Agriculture Rural Development division. The program provides funds to communities that are underserved by broadband connectivity and have populations of less than 20,000. The program has awarded 197 grants and

Figure 11: Broadband Internet Availability in Montana



Note: Broadband Internet service availability shown in blue. Figure is from http://www.broadbandmap.gov.

over $88 million, but despite the numerous rural communities in Montana that have limited or no broadband Internet services, as shown in Figure 11, Montana is one of the few states that has yet to take advantage of the Community Connect Program.

An important aspect of the program is that each project must include a community center with at least ten computers for free public use. This can provide opportunities for public libraries to leverage their role as community anchors and low-cost information service providers to form partnerships that improve Internet accessibility in their communities.

6.2 Nontraditional Opportunities

Increased competition for federal grants and continuing reduction 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 nontraditional 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 nontraditional opportunities can further strengthen libraries' roles as information service providers in their communities.

Four examples of nontraditional opportunities are described below. These are multiagency cooperatives, digital literacy initiatives, partnerships with higher education providers, and collaboration with community organizations. A summary of these opportunities is provided in Table 23.

6.2.1 Multiagency Cooperatives

Partnerships with other public service agencies offer public libraries numerous benefits. Because project outputs address multiple needs, they can provide access to a significantly larger number of funding opportunities, improve the strength of proposals and the likelihood of acquiring financial

Table 21: Summary of Internet Access Funding Opportunities

Program:	Universal Service Program for Schools and Libraries (E-Rate)
Purpose:	FCC provides discounted telecommunication and Internet to schools and libraries administered by the Universal Service Administrative Company (USAC).
Relevant information:	The program provides the largest ongoing financial support for broadband Internet access in libraries. In Montana, the program offers substantial savings to public libraries by offsetting a substantial percentage of Internet access costs.
Relevance to libraries:	Libraries may obtain discounts ranging from 20%-90% depending on eligibility.
Link to program website:	http://usac.org/sl
Program:	Connect America Fund
Purpose:	Make broadband Internet access available to community anchor institutions in areas that either do not or would not be able to (without the CAF) have access to broadband services.
Relevant information:	Carriers will be required to provide services with actual speeds of at least 4 Mbps downstream and 1 Mbps upstream.
Relevance to libraries:	Public libraries in areas where Phase 1 funding is available are encouraged to determine if carriers plan to apply for CAF funding and work with local carriers and other area groups to initiate action that could lead to obtaining CAF assistance and provide high-speed Internet access to the underserved areas.
Link to program website:	http://fcc.gov/encyclopedia/connecting-america
Program:	Grants to States
Purpose:	Expand services for learning and access to information and educational resources in a variety of formats, in all types of libraries, for individuals of all ages in order to support such individuals' needs for education, lifelong learning, workforce development, and digital literacy skills.
Relevant information:	Funds can be used either for statewide initiatives and services or to distribute the funds through competitions or cooperative agreements to public, academic, research, school, and special libraries in the state.
Relevance to libraries:	Initiatives in the 2013-17 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.
Link to program website:	http://imls.gov/programs

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Program:	Native American Library Services
Purpose:	Support of library services for American Indians.
Relevant information:	Libraries may be involved in the administration of this program and their staff may serve as project directors, in partnership with an eligible applicant.
Relevance to libraries:	Basic grants are intended to fund existing library operations and to maintain core library services. Enhancement grants, however, are intended to be used for improving existing services or implementing new services.
Link to program website:	http://imls.gov/applicants/detail.aspx?GrantId=16
Program:	Community Connect Program
Purpose:	Provide funds to communities that are underserved by broadband connectivity and that have less than 20,000 population.
Relevant information:	Montana is one of the few states that has yet to take advantage of the Community Connect Program.
Relevance to libraries:	Each project must include a community center that provides at least 10 computers for public use at no charge. This can provide opportunities for public libraries to leverage their role as a community anchor and low-cost information service provider to form partnerships that would result in the improvement of Internet accessibility in their communities.
Link to program website:	http://www.rurdev.usda.gov/utp_commconnect.html

Note: Table constructed by authors.

assistance, and increase the overall impact of the effort. Moreover, collaboration can reduce average costs of applying for funding and completing the project. Potential challenges include decisions about autonomy and leadership, communication of long-term goals, and considerations of cost and time distribution among participants.

Despite potential drawbacks, partnerships between public libraries and other agencies have been successful, leading to significant benefits to libraries and their communities. One example of a successful multiagency initiative is the Nevada State Health Information Technology Initiative. The Health Information Technology for Economic and Clinical Health (HITECH) Act provided up to $30 billion in investments to address barriers to health information technology adoption, leading to effective strategies and best practices to use information technology to support health and health care improvements. The Nevada State Library took on an important role advocating the use of public libraries as community information centers where patrons were able to freely access health care resources. As a result, Nevada public libraries were able to appropriate $3 million for improving broadband access in libraries serving rural communities.

The Distance Learning and Telemedicine Loan and Grant Program (DLT) is another example of a multiagency funding opportunity that can be especially viable for rural Montana public libraries. The program is designed to meet the educational and health care needs of rural U.S. communities by providing financial assistance to advance telecommunication technologies for the improvement of learning and health care. The DLT program offers funding based on a competitive basis, with awards ranging from $50,000 to $500,000. Funded grants are expected to be used for the acquisition of eligible capital assets, including instructional programming, interactive video equipment, audio and video equipment, terminal equipment, data terminal equipment, inside wiring, computer hardware and software, or computer network components. Funds may also be used to acquire technical assistance and instruction for using eligible equipment.

The program has awarded over $403 million in grants and loans; $15 million is available in fiscal year 2012. Similar to the Community Connect Program (see section 6.1.5), DLT grant applicants must serve communities with a population of 20,000 or less. The 2011 Montana public library survey indicates that over 90% of Montana public library systems meet this criterion.

Montana applicants have been relatively successful in securing DLT funding. Montana public libraries may also be able to significantly benefit from this program through partnerships with community institutions such as public schools, community colleges, and health providers. For example, libraries can apply for grants to acquire Internet access and technology equipment that can be used for teleconferencing with health-care professionals as well as for public use. Alternatively, strong state and national initiatives to increase online higher education opportunities for rural areas can also offer Montana public libraries to serve as anchors for providing distance learning resources for their communities. Funding requests for these purposes may include acquiring teleconferencing equipment and improve Internet access infrastructures.

6.2.2 Digital Literacy and Education Initiatives

Nine federal and state agencies across the United States are increasing efforts to improve digital literacy and educational achievement through technology. According to the Department of Commerce (DOC), 96% of working Americans use modern telecommunication tools in their daily lives, and 62% use the Internet as an integral technology for their jobs. Despite this, many Americans still do not possess the skills to use modern technologies, reducing their ability to evaluate information, connect and collaborate with others, and more efficiently and effectively achieve professional and personal goals. To continue improving technology knowledge and reducing low educational attainment, the nine-agency consortium, led by the DOC's National Telecommunications and Information Administration and the Department of Education, funds initiatives that offer innovative solutions for increasing digital literacy and educational achievement throughout the United States.

The 21st Century Community Learning Centers (CCLC) grant is an example of a program focusing on increasing educational achievement. The CCLC is funded through the U.S. Department of Education. The grant is formula-based. Funds are awarded to state educational agencies, which then manage statewide competitions for awards. Statewide competitions are open to both local educational agencies and community-based organizations, but preference is given to proposals submitted jointly from educational and community-based agencies. Funds are intended to finance before- and after-school activities (including during the summer) to improve student achievement. These activities include math, science, arts, and music education programs; tutoring services; telecommunications and technology education programs; expanded library service hours; and programs promoting parental involvement and family literacy.

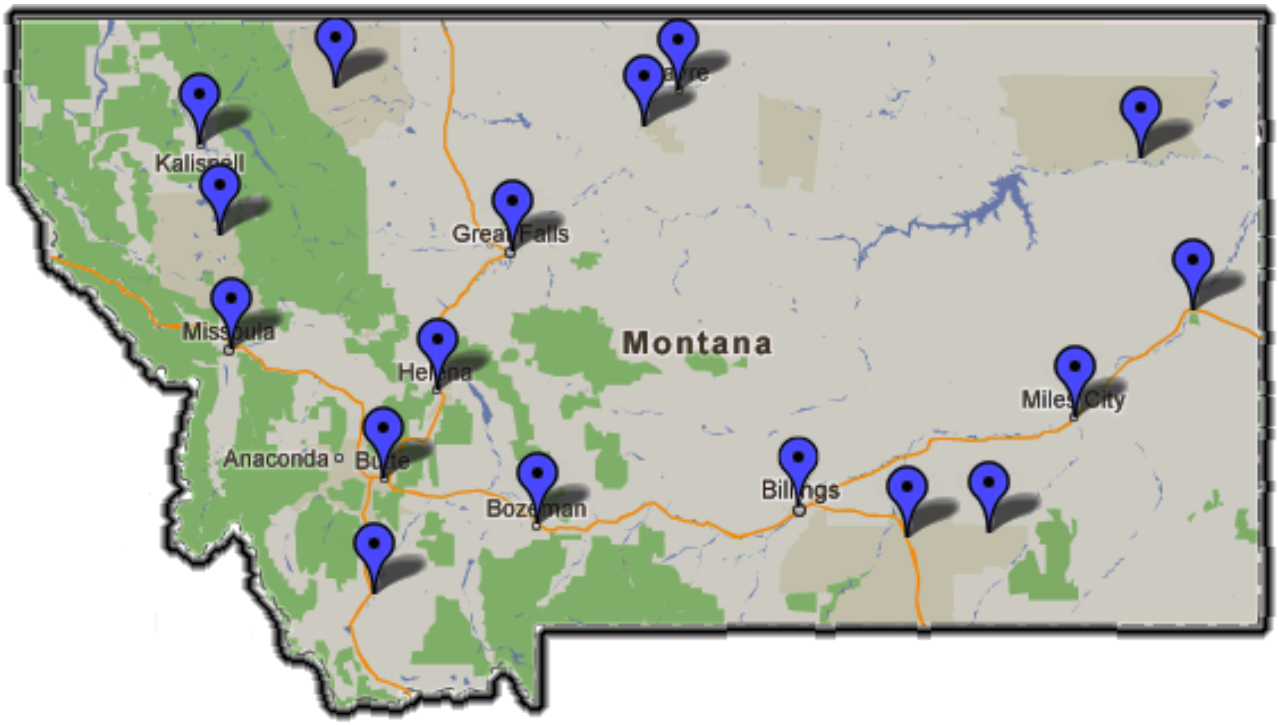
A second example is the Investing in Innovation Fund (IIF). The IIF was established under the American Recovery and Reinvestment Act and offers funding for local educational agencies and nonprofit organizations (in partnership with at least one educational agencies or a consortium of schools) to improve student achievement. The IIF offers three types of awards – scale-up, for continuing and expanding current projects; validation, for programs that show promise but need additional time for verification; and to develop new programs. Total funds available for awards in fiscal year 2012 are approximately $140.5 million, with potential for 11 to 27 awards.

The Innovative Approaches to Literacy (IAL) program is a new grant initiative under the authority of the Department of Educations' Fund for Improvement of Education. The IAL supports high-quality literacy programs that help develop tools for improving academic attainment in children from birth through high school graduation. Proposed projects should increase access to resources that provide learning opportunities for participants. For fiscal year 2012, $25 million were appropriated for this program, 50% of which must be distributed to school libraries. Funds for fiscal year 2013 are currently being debated in Congress.

6.2.3 Partnerships with Higher Education Providers

Institutions of higher education are often the first community organizations to receive access to improved technology services. Public li-

Figure 12: Main Campus Locations of Higher Education Institutes in Montana



Note: Figure constructed by authors.

Campus	Location
The University of Montana	Missoula, MT
Missoula College of Technology	Missoula, MT
The University of Montana – Helena College of Technology	Helena, MT
Montana Tech College of Technology	Butte, MT
The University of Montana Western	Dillon, MT
Montana State University – Bozeman	Bozeman, MT
Montana State University – Billings	Billings, MT
Billings College of Technology	Billings, MT
Montana State University – Northern	Havre, MT
Montana State University – Great Falls College of Technology	Great Falls, MT
Dawson Community College	Glendive, MT
Flathead Valley Community College	Kalispell, MT
Miles Community College	Miles City, MT
Aaniiih Nakoda College	Harlem, MT
Blackfeet Community College	Browning, MT
Chief Dull Knife College	Lame Deer, MT
Fort Peck Community College	Poplar, MT
Little Big Horn College	Crow Agency, MT
Salish Kootenai College	Pablo, MT
Stone Child College	Box Elder, MT
Carroll College	Helena, MT
University of Great Falls	Great Falls, MT
Rocky Mountain College	Billings, MT

braries serving these communities have unique opportunities to work with these institutions in an effort to procure access to similar services. While many libraries are not able to directly fund physical development of high-speed Internet infrastructure, they can develop partnerships with higher education institutions that would enable them to either use existing infrastructure or collaboratively work to establish new infrastructure using granting opportunities targeted to institutions of higher education.

One program that provides high-speed Internet access opportunities for higher education institutions is Gig.U: The University Community Next Generation Innovation Project. Gig.U is a consortium of thirty-seven leading research universities and technology corporations (including Google and Microsoft) across the United States, which seeks to accelerate the deployment of ultra high-speed networks to leading U.S. universities and their surrounding communities. The University of Montana is one of the only Gig.U members in the Northern Great Plains region.

On June 26, 2012, Gig.U announced a new initiative – Air.U (Advanced Internet Regions). The mission of Air.U is to use Super WiFi networks to significantly and cost-effectively improve broadband availability to underserved campuses and their surrounding communities. Using access to unused television channels ("white spaces"), Air.U will offer universities and neighboring communities enhanced high-speed wireless connectivity. Furthermore, because Super WiFi networks transmit signals using much lower frequencies than traditional wireless Internet, broadband signals can penetrate further into buildings and cover much larger areas.

As shown in Figure 12, two- and four-year higher education institutions are located throughout Montana and can therefore be used to potentially provide widespread coverage to Montana public libraries. Although only main campus locations are shown and listed, many institutions have affiliates in remote Montana communities.

6.2.4 Collaboration with Community Organizations

One of the three broad standards outlined by the Edge Initiative (see section 2.3) is that public libraries must be continually engaged with their communities, taking on leadership roles and developing strategic relationships with community partners to maximize the availability and use of technology resources. In addition to these benefits, community partnerships can lead to funding opportunities that may not have otherwise been available. Benefits and drawbacks to such partnerships are similar to those described above in section 6.2.1. An additional potential advantage is the opportunity to request funding from a wider range of public and private sources. Types of projects are highly dependent on the needs and strengths of a particular public library and community.

Table 22 is a sample of top Montana-based granting foundations that funded programs between 2008 and 2011 related to technology and Internet access improvements. An expanded listing of Montana-based foundations and those outside of Montana is presented in Appendix III. Public libraries can use these lists and search for other opportunities to develop ideas that enable them to successfully strengthen community relationships and procure necessary funds.

Table 22: Grant Funding Originating from Montana-based Foundations

Category	Foundation	Amount	Grants	Keywords
Building/renovation	Charles M. Bair Memorial Trust	$3,325,000	15	Scholarships.
Building/renovation	Gilhousen Family Foundation	$824,019	7	
Building/renovation	First Interstate BancSystem Foundation, Inc.	$190,833	7	Poverty, economic development.
Collections acquisition	Gilhousen Family Foundation	$34,500	2	
Computer technology	Gilhousen Family Foundation	$210,133	3	
Computer technology	O. P. and W. E. Edwards Foundation, Inc.	$5,000	1	At-risk youth.
Electronic media/online services	O. P. and W. E. Edwards Foundation, Inc.	$147,500	4	At-risk youth.
Electronic media/online services	Gilhousen Family Foundation	$10,000	1	
Equipment	Gilhousen Family Foundation	$319,350	6	
Equipment	First Interstate BancSystem Foundation, Inc.	$37,000	2	Poverty, economic development.
Equipment	O. P. and W. E. Edwards Foundation, Inc.	$15,000	1	At-risk youth.
Faculty/staff development	O. P. and W. E. Edwards Foundation, Inc.	$324,684	14	At-risk youth.
Faculty/staff development	Gilhousen Family Foundation	$152,137	7	
Faculty/staff development	First Interstate BancSystem Foundation, Inc.	$25,000	1	Poverty, economic development.
General/operating support	O. P. and W. E. Edwards Foundation, Inc.	$4,460,825	131	At-risk youth.
General/operating support	The Bair Ranch Foundation	$3,905,420	6	Personal development.
General/operating support	Charles M. Bair Memorial Trust	$3,325,000	15	Scholarships.
Income development	O. P. and W. E. Edwards Foundation, Inc.	$50,000	2	At-risk youth.
Income development	First Interstate BancSystem Foundation, Inc.	$10,000	1	Poverty, economic development.
Management development/capacity building	O. P. and W. E. Edwards Foundation, Inc.	$602,000	12	At-risk youth.
Management development/capacity building	Gilhousen Family Foundation	$107,000	4	
Matching/challenge support	O. P. and W. E. Edwards Foundation, Inc.	$225,179	12	At-risk youth.
Matching/challenge support	Gilhousen Family Foundation	$108,100	3	
Program development	Dennis & Phyllis Washington Foundation, Inc.	$19,289,915	155	Education, health & human services, arts & culture, and community service.
Program development	O. P. and W. E. Edwards Foundation, Inc.	$7,210,972	191	At-risk youth.
Program development	Gilhousen Family Foundation	$2,335,638	80	

Note: Table constructed by authors using 2008-11 information from http://www.foundationcenter.org.

Table 23: Summary of Nontraditional Funding Opportunities

Program:	Distance Learning and Telemedicine Loan and Grant Program
Purpose:	Meet the educational and health care needs of rural U.S. communities by providing financial assistance to advance telecommunication technologies for the improvement of learning and health care.
Relevant information:	The DLT program annually offers funding based on a competitive basis, with awards ranging between $50,000 and $500,000.
Relevance to libraries:	Montana public libraries may be able to significantly benefit from this program through partnerships with community institutions such as public schools, community colleges, and health providers.
Link to program website:	http://www.rurdev.usda.gov/utp_dlt.html
Program:	21st Century Community Learning Centers
Purpose:	Develop centers that develop and promote tools and programs to increase educational attainment.
Relevant information:	Funds are intended to be used to carry out before- and after-school activities (including the summer), which include math, science, arts, and music education programs; tutoring services; telecommunications and technology education programs; expanded library service hours; and programs promoting parental involvement and family literacy.
Relevance to libraries:	Statewide competitions are open to both local educational agencies and community-based organizations, but preference is given to proposals submitted jointly from educational and community-based agencies.
Link to program website:	http://www2.ed.gov/programs/21stcclc/index.html
Program:	Investing in Innovation Fund
Purpose:	Improve student achievement through investment in innovative practices that are demonstrated to have an impact on improving student achievement or student growth, closing achievement gaps, decreasing dropout rates, increasing high school graduation rates, or increasing college enrollment and completion rates.
Relevant information:	Three types of awards scale-up, for continuing and expanding current projects; validation, for programs that show promise but need additional time for verification; and development of new programs.
Relevance to libraries:	Funding for local educational agencies and nonprofit organizations (in partnership with at least one educational agencies or a consortium of schools) to improve student achievement.
Link to program website:	http://imls.gov/programs

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Program:	Innovative Approaches to Literacy
Purpose:	Support high-quality literacy programs, which help develop reading skills and tools for improving academic attainment in children from birth to 12th grade.
Relevant information:	Projects are intended to increase access to resources that provide learning opportunities for participants.
Relevance to libraries:	50% of total funds are required to be distributed to school libraries.

Program:	Gig.U: The University Community Next Generation Innovation Project
Purpose:	Accelerate the deployment of ultra high-speed networks to leading U.S. universities and their surrounding communities.
Relevant information:	A new initiative, Air.U, will seek to use Super WiFi networks to significantly and cost-effectively improve broadband availability to underserved campuses and their surrounding communities.
Relevance to libraries:	Numerous 2- and 4-year higher education institutions (and branches) are located throughout Montana and can be used to potentially provide widespread coverage to Montana public libraries.
Link to program website:	http://www.gig-u.org

Note: Table constructed by authors.

7. Cost-Effective Strategies

The information presented in sections 1-6 provides an important foundation for developing cost-effective Internet accessibility strategies and associated recommendations for action. The following recommendations are built 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 and Internet services to Montana communities.

The issues associated with providing access to high-quality technology and Internet services lead to a critical underlying conclusion: 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. There is a strong codependence between monetary access costs and opportunity (time) costs incurred in the process of providing Internet and technology services to library patrons. For example, public library administrators who improve patrons' access by focusing on locating funding opportunities or alternative Internet service providers may be significantly limited if they cannot readily access necessary information, are required to handle problems associated with ineffective technology equipment or service, or lack appropriate or sufficient training to resolve issues quickly. In the numerous smaller Montana public libraries, where the staff and their time resources are in even shorter supply, these limitations can result in potentially impenetrable barriers to cost-effectively improving Internet and technology services.

Knowledge and cost aggregation are key to library success in providing information services that have rapidly growing demand. The successes of these networked structures in public library settings have been documented throughout this report, and their widespread implementation in other public and private enterprises has also been described in depth. Consequently, two key components underlie the proposed strategies described below. The strategies are not mutually exclusive – each incorporates and adds to the components introduced in the preceding strategy. This progression provides a method for introducing, implementing, and assessing each structure.

The four strategies differ in the degree of centralization and integration of administration and Internet access methods among participating public libraries. The first strategy is most similar to the administrative and Internet access structure currently used in Montana public libraries, with cost savings coming from centralized knowledge resources. This centralization of resources is foundational. It is the most straightforward to introduce, offers the most immediate improvements with least implementation costs, and requires the least degree of commitment from public libraries. As a result, this strategy is anticipated to be the most readily accepted. The second strategy creates a consortial E-rate program to reduce the costs of acquiring E-rate discounts. The third recommendation introduces a regional, hub-and-spoke structure, in which libraries within a particular region aggregate and reduce average costs by sharing resources. The last model proposes integrating all Montana libraries, further aggregating costs and providing the greatest administrative efficiencies.

The four structures are intended to serve as benchmarks for developing an integrated,

cost-effective structure to provide high-quality technology and Internet access during a 3-10 year period. Centralizing information and service resources and consortial E-rate is recommended to be adopted in the first year. A transition to a hub-and-spoke structure is anticipated to take place in years 2-3. Lastly, a full centralization and integration would occur in years 5-10, depending on the availability of financial resources and technological opportunities.

7.1 Centralized Information and Service Resources

Rapid and widespread changes can require substantial start-up funds and significant planning. However, short-term efficiencies and cost savings can still be achieved by adopting more manageable strategies, which would primarily include developing a central information and service resource provider that focuses on improving technology and Internet access throughout Montana public libraries. Such centralization of knowledge and service resources can generate substantial savings, both monetary and time, through two key interrelated factors: technology standardization and an increase in centralized support.

The Montana State Library website and staff already provides library administrators with a significant amount of information and service resources. For example, the Montana Public Library E-rate blog (http://mtlibraryerate.blogspot.com) offers updates and information resources related to the federal E-rate program, and there are some training and assistance resources for libraries seeking help with program applications. Furthermore, the Montana BTOP Technology Training blog (http://jbirnel.wordpress.com) provides technology training information for Montana BTOP participants, including informational documents, archived training webinars, and a schedule of upcoming live webinars. The MSL also posts a calendar of upcoming workshops and training opportunities, with E-rate workshops aligned with USAC filing deadlines, and, as discussed in section 2, minimum computer specifications.

Although the MSL offers these information resources, there are several important ways in which the State Library can add even greater value and assist public libraries to help them provide cost-effective, sustainable technology services to their patrons. The Montana State Library would take on three critical leadership roles: facilitating a centralized source of information resources, facilitating the acquisition of standardized technology equipment, and offering resources that help libraries locate and successfully procure financial resources. These roles are within the scope of the MSL's mission and would help the Montana State Library increase their contribution to public libraries' efforts to provide information resources to their patrons.

> A critical role of the Montana State Library would be as a facilitator of information related to the technology and Internet services.

7.1.1 Information Centralization

A critical role of the Montana State Library would be as a central, one-stop facilitator of information related to technology and Internet services. Personal communication with library administrators indicated that there is a deficit of readily and easily accessible information resources that can be used by public libraries to make

important decisions about technology services. The MSL can significantly improve libraries' ability to acquire the desired information by developing a focused, interactive website that centralizes the information and services 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).

Furthermore, the website should allow interactivity among MSL and public library administrators. The evolution and use of the information resources depends significantly on users' ability to provide feedback and to rely on the MSL to offer insight when additional information is requested. For example, the website should provide an intuitive, user-friendly option for communicating with the MSL staff and other library administrators. An open-access user group or forum (rather than a listserv requiring a subscription) can allow library and MSL staff to ask, answer, and view discussions related to technology and Internet services. In many cases, issue may be common across numerous libraries and posted solutions (e.g., troubleshooting techniques) can provide fast, nearly costless solutions for a broader audience. The website would be the first and often most useful source of information for public library staff, reducing the time needed to locate solutions.

> An information resource website maintained by the Montana State Library would be the first and often most useful source of information sharing for public library staff, reducing the use of their time resources to locate solutions.

In addition to providing an interactive information exchange environment, the MSL can offer important informational services that enable public libraries to stay informed about threats and opportunities related to technology services. Many successful state and regional library networks provide quarterly or monthly e-mail newsletters and training to public library administrators. In Montana, an example of an effective application of this service would be through virtual training sessions, in which MSL or invited information technology specialists would provide recommendations for addressing the most common technology problems and answer questions. Videos and related material of these sessions would also be posted on the MSL website to ensure that the information is freely available.

One resource already available to the MSL that can be used to create a centralized information resource is WebJunction Montana. This platform provides peer-to-peer interactivity and already contains a number of the important information resources and functionalities discussed above. Furthermore, there may be lower costs to continuing development of the WebJunction platform as a single source of information and service resources because MSL staff have experience using the tool.

Two factors can significantly aid in the use of this resource by stakeholders. First, the website would need to be well-maintained and updated frequently. While some information and resources would require little ongoing change, many others would require regular upkeep as regulations and grant sources change. Second, it is important that the website be well-organized, easily accessible, and act as the single source for technology and Internet information and services. That is, the resources provided on this website should not be

duplicated elsewhere on the Montana State Library website, which could 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 would the WebJunction tool be underutilized, but those users accessing E-rate webinars from other sources would not have access to additional useful resources that may be available on WebJunction.

Users must have access to information from a single web source. Developing and promoting a single, one-stop information resource can minimize search costs, increase the use of the tool, and ultimately, provide a targeted, easily accessible information and service source.

7.1.2 Technology Standardization

The second leadership role of the Montana State Library would be to encourage and facilitate the acquisition of standardized equipment and software. As discussed in sections 1 and 2.1.2, technology equipment standardization can enable libraries to substantially decrease their technology costs and reduce costs associated with searching for new and replacement equipment. There are numerous advantages to standardizing public-access and staff technology across Montana public libraries. As discussed in section 5.1, the Western States Contracting Alliance (WSCA) provides significantly reduced prices for computers and peripheral devices. Table 24 shows the annual costs of replacing public-access (PAC) and staff computers using a five-year replacement cycle (assuming 262 PAC and 106 staff computers are replaced annually) with specifications used for acquiring computers for libraries participating in BTOP. The table shows a comparison of costs using three price and brand scenarios: Dell computers under the assumptions that prices remained the same as those used under BTOP in 2010; Dell computers using current WSCA prices; and prices for an alternative trusted brand, Lenovo (IBM).

In addition to reduced acquisition costs, equipment standardization can reduce public libraries' search costs. The website described above can be used to provide public libraries with information about computer specifications and an optional request that MSL facilitates an order for a particular number computers. In this manner, libraries can substantially reduce their costs of searching for the most cost-effective computer and peripheral equipment options. Moreover, it would allow the MSL to provide libraries reminders about equipment upgrades.

Table 24 also provides information about cost savings that can be obtained through software standardization. Although most of the software for public-access computers can be acquired at significantly reduced prices using www.techsoupforlibraries.org – a well-known source – this software cannot be installed on staff computers. Software standardization allows the MSL to facilitate purchasing site licenses at a discounted bulk rate. The first column in Table 24 shows the cost of installing Microsoft Office Professional 2010 for 106 staff computers that are replaced annually when the software is purchased using academic prices ($120 per computer). The middle columns reflect bulk rate costs of $69 per computer, resulting in annual savings of $5,416.

Lastly, standardization can substantially improve and lower costs associated with technical support burdens. First, MSL can provide

Table 24: Hardware and Software Costs for Standardized Equipment in Montana

	Costs			Lenovo Savings
Hardware Supplier	Dell, 2010	Dell, 2012	Lenovo, 2012	
Software Bundling Discount	No	Yes	Yes	
Hardware				
Staff	$100,359	$95,473	$88,996	$6,478
PACs	$247,401	$235,358	$219,388	$15,970
Total Hardware	$347,760	$330,832	$308,384	$22,448
Software				
Staff	$12,744	$7,328	$7,328	–
PACs	$6,283	$6,283	$6,283	–
Total Software	$19,027	$13,611	$13,611	$5,416
Total	$366,787	$349,859	$321,995	$27,864

Note: Table constructed by authors using information from the MLS BTOP Survey data. Costs are based on a 5-year replacement cycle, with 262 PAC and 106 staff computers replaced annually.

targeted technical support information and training because troubleshooting solutions for typical issues would be nearly identical. Second, standardized computers are readily interchangeable, allowing broken or malfunctioning machines to be replaced quickly. For example, suppose that a library has a technical issue that cannot be solved locally. Currently, the computer would either have to be sent out for repair or a technician would need to be brought in to troubleshoot the problem. Consequently, the library cannot supply the same level of technology and Internet services to its patrons until the computer is repaired, especially if it is in a rural or remote location and has a limited number of computers. If all computers are standardized, the library can contact another location (or MSL, if the Montana State Library chooses to provide this level of support) and request to borrow a computer for the duration of the repair period. The working machine can either be shipped quickly (e.g., overnight shipping) or delivered to the location and easily installed, because every computer is identical.

7.1.3 Financial Resources

In the proposed strategy, public libraries continue to obtain Internet access independently from local providers and maintain an existing budget. As a facilitator of information resources, Montana State Library would provide information and training to help administrators to locate and acquire funding.

For example, the MSL website can include a navigable list (with search capabilities) of granting agencies and opportunities such as those discussed in section 6. Furthermore, in addition to providing training for improving library staff's technical expertise, the Montana State Library would develop a series of training sessions to teach and assist library administrators with searching for and successfully developing funding proposals and establishing strategic community and business partnerships.

Implementing this strategy is not expected to incur additional administrative costs. There are currently a number of Montana State Library personnel tasked with collecting, maintaining, and promoting the information and services described

> The Montana State Library would develop a series of training sessions that would teach and assist library administrators with searching for and successfully developing funding proposals and establishing strategic community and business partnerships.

in the above sections. A minor reallocation and retargeting of personnel resources can be made to successfully administer and maintain the website. That is, the administrator would be able to add, update, and remove information, verify whether information and services are still relevant, and facilitate discussions, webinars, and other services.

7.1.4 Discussion

Perhaps the most important advantage of centralized information resources and services is a general preservation of independence for Montana public libraries. Libraries are still able to choose how and from whom to acquire Internet services and whether to apply for E-rate discounts, and they maintain much of their autonomy, especially with regard to decisions about technology support staffing. Furthermore, the structure would be a relatively low cost investment for public libraries. Libraries would be encouraged to use the new resources, but commitment would be minimal.

Although libraries can choose not to take advantage of the standardization and information resource benefits that would be provided to them by the Montana State Library, there is evidence that library administrators are very likely to participate within this structure, especially if there are cost-saving incentives. Table 25 provides a summary of responses collected from a survey of twenty-two Montana public library directors at the 2012 MSL Summer Institute. The table makes it clear that most library administrators would be willing to standardize the hardware and software used in their libraries. Moreover, this willingness is strongest in rural and remote libraries, likely because of the substantial benefits perceived by the directors of these libraries. As expected, library administrators were even more willing to purchase standardized hardware and software when they became aware that this would provide cost savings for their institution. Perhaps the most promising result was the fact that there were no directors who were unwilling to participate in the proposed structure.

However, the advantages of this structure perceived by some libraries may be considered drawbacks by other libraries. Public libraries that are currently struggling to gather necessary monetary and labor resources to maintain and improve technology and Internet services may be willing to trade off some of their autonomy in order to reduce their constraints. This largely includes small rural and remote libraries with limited staff and financial opportunities. Larger, less constrained libraries may be less willing to give up some measure of their autonomy.

A second potential drawback is that although there are cost savings associated with this structure, these can vary across libraries. Libraries that are more efficient in acquiring and maintaining their technology and Internet services may find that they already use the tools and strategies introduced by the Montana State Library. However, this

Table 25: Montana Public Library Directors' Reactions to Hardware and Software Standardization

	All	City/Town	Rural/Remote
What is the likelihood of your library following a set of hardware and software standards provided by the Montana State Library?			
Very likely	68%	50%	83%
Somewhat likely	32%	50%	17%
Not likely at all	0%	0%	0%
What is the likelihood of your library following a set of hardware and software standards provided by the Montana State Library and the recommendations lowered your costs?			
Very likely	82%	60%	100%
Somewhat likely	18%	40%	0%
Not likely at all	0%	0%	0%
Total responses	22	10	12

Note: Table constructed by authors using survey response data from the MSL Summer Institute, 2012.

structure would offer cost savings for the majority of public libraries in Montana and would likely create savings in time and resource allocation for all libraries through the sharing of information and service resources.

7.2 E-rate Consortium

Sixteen years after it was created, the federal E-rate program continues to be a stable source of funds for telecommunication services in public schools and libraries. Moreover, E-rate discounts are the most important (if not a necessary) component of many libraries' Internet service budgets. As shown in Tables 18 and 19, Montana public libraries receive average discounts of over 60% of total costs, yielding a total annual average savings of $1,000-$2,000.

Public libraries that not applied for federal E-rate discounts may be able to capture cost savings by doing so. Table 26 provides a comparison of E-rate savings realized by program participants and potential savings that were forgone by nonparticipants. Libraries that do not participate in the E-rate program have the potential to reduce realized Internet access costs by an average of 69%, with higher discounts (an average of 71%) in libraries serving rural and remote locations. For nonparticipating libraries, these discounts could save approximately $1,892 annually per library.

7.2.1 Consortial E-rate Discounts

Among the reasons that public library administrators decide not to apply for the federal E-rate program are concerns that the application process is too cumbersome, the payoff is not worth the effort, and increased competition for E-rate funds has lowered the likelihood that a library will receive assistance. The Montana State Library can be a leader in lowering libraries' barriers to applying for E-rate discounts and increase their

Table 26: E-rate Participation and Discount Rates in Montana Libraries

	All Libraries	City / Town	Rural / Remote
E-Rate Participation Rates	43%	57%	43%
Avg. Discount for E-rate participants	69%	66%	72%
Avg. Discount for nonparticipants	69%	66%	71%
Number of Libraries	75	29	46
Average Savings, Participants	$1,760	$2,129	$1,528
Average Possible Savings, Nonparticipants	$1,892	$2,870	$1,130
Number of Libraries	47	19	28

Note: Table constructed by authors using information from the MSL and data collected from the MSL 2012 Summer Institute. City and town, and rural and remote categories are combined due to low observation counts. Average savings were calculated only when for libraries for which annual Internet access costs were available.

opportunities for successfully obtaining Internet access cost savings.

One important way in which the Montana State Library can facilitate potentially higher E-rate participation and cost reduction is through a consortial E-rate application structure. This type of approach has been successful in reducing costs for libraries in many state and regional networks, including most of those described in section 1. In Montana, where discount rates for all libraries are high and can significantly reduce Internet access costs, similar benefits may be possible.

Each E-rate consortium has two components: the consortium leader and consortium members. The leader can be a state, an educational service agency, a regional library system, or any formal or informal organization established as a consortium. The critical factor is that the leader is authorized to act on behalf of its members. Generally, consortium leaders must:

- Collect Letters of Agency from the members,
- Post the Form 470,
- Conduct the competitive bidding,
- Select the vendor(s),
- Serve as the billed entity for the services covered,
- File Form 471 and respond to all PIA requests,
- Collect Form 479s from the members,
- File Form 486,
- File BEAR reimbursement form(s) as required,
- Comply with FCC document retention rules.

When filing the appropriate paperwork, a consortium should consider several factors. First, not all libraries need to apply for the same services, and each library members' needs can be met. Second, individual applications would still be required for each library member. This implies that Block 5: Discount Funding Request(s) must be filled out for each library member's funding requests. Third, the funding decision on a consortium application may be held up as the result of selective reviews on the individual applications of one or more of the members. Fourth, the consortium applies for one aggregate discount rate based on a weighted average of the members' discount rates.

The appropriation of the total consortial E-rate discount to libraries based on the proportion

Table 27: Example of Allocation of E-rate Discounts in a Consortium

	Discount Rate	Internet Access costs	E-rate Discount
	Scenario 1		
Separate E-rate Applications			
Library A	90%	$5,000	$4,500
Library B	50%	$5,000	$2,500
Total	–	$10,000	$7,000
Consortium E-rate Application	70%	$10,000	$7,000
Unmet Consortium Liability			$0
	Scenario 2		
Separate E-rate Applications			
Library A	90%	$4,000	$3,600
Library B	50%	$6,000	$3,000
Total	–	$10,000	$6,600
Consortium E-rate Application	70%	$10,000	$7,000
Unmet Consortium Liability			$400
	Scenario 3		
Separate E-rate Applications			
Library A	90%	$6,500	$5,850
Library B	50%	$3,500	$1,750
Total	–	$10,000	$7,600
Consortium E-rate Application	70%	$10,000	$7,000
Unmet Consortium Liability			($600)

Note: The example assumes a total consortium Internet access cost of $10,000 and an average consortium E-rate discount rate of 70%.

of a library's individual E-rate discount implies that there are few disincentives to participation by libraries with higher or lower than average individual discount rates. Libraries with a higher than consortial average discount rate are likely to receive the same discount amount as if they had applied independently. The converse is true for libraries with discount rates that are lower than the consortium average.

In the case of higher discount libraries, proportionate discount appropriations imply that participation in an E-rate consortium has two likely benefits. First, those libraries would receive the same discount amount. Second, and perhaps more importantly, they are likely to substantially (if not fully) reduce time and monetary costs associated with the application process. Because higher discount libraries typically serve rural and remote communities and may have fewer personnel resources (e.g., smaller staff, higher number of responsibilities per staff member), outsourcing the multistep application process to a third party can remove these burdens from library staff, allowing them to focus on providing higher quality service to their patrons.

Success of an E-rate consortium partially depends on the relationship between libraries' Internet costs and discount rates. Specifically, the correlation between total Internet costs and E-rate discounts must be close to zero or negative. For example, suppose that there are only two libraries in a consortium. Library A has a discount rate of 90% and Library B has a discount rate of 50%. The consortium average discount is, therefore, 70%. Furthermore, the total consortium Internet costs are $10,000. Discount scenarios, allocations, and total necessary discount funds are summarized in Table 27. In Scenario 1, Internet access costs are the same ($5,000) for each library; Library A receives ($5,000 × 90%) = $4,500 in discounts and Library B receives ($5,000 × 50%) = $2,500. The correlation between discounts and Internet access costs in this scenario is zero, implying that the total discount is $7,000, which equals the amount obtained for the consortium.

Because higher discount libraries typically serve rural and remote communities and may have fewer personnel resources, reducing E-rate related responsibilities can allow them to focus on providing higher quality service to their patrons.

In Scenario 2, Library A has lower Internet access costs than Library B, which implies a negative correlation between discount rates and Internet access costs. Total costs for Internet access are $400 less than the overall consortium discount amount, since Library A requires ($4,000 × 90%) = $3,600 and Library B requires ($6,000 × 50%) = $3,000.

When correlation between Internet costs and discounts is positive, as in Scenario 3, the total discount amount for participating libraries exceeds the discounts appropriated by the E-rate program. That is, Library A requires ($6,500 × 90%) = $5,850 and Library B requires ($3,500 × 50%) = $1,750, a total of $7,600. The amount by which aggregate library discounts exceed the consortium E-rate funds is exacerbated when Internet costs for higher discount libraries increase.

In a sample of fifty-four Montana public libraries receiving E-rate discounts in 2011, the correlation between Internet access costs and E-rate discount rates was -0.02 and was not statistically significantly different from zero. Moreover, if

these libraries were in a consortium, the discount amount calculated using the 69% consortial E-rate – $85,185 – was nearly identical to the sum of the individual library discounts in the sample – $85,058. This implies that a consortium E-rate structure is not likely to disproportionately allocate aggregate discount funds. However, it is critical that average Internet access costs and discounts for all potential participating libraries be investigated thoroughly before implementing an E-rate consortium.

7.2.2 Administration and Costs

Applying for consortial E-rate discounts is a lengthy and rigorous process, requiring a substantial allocation of labor hours and expertise. The Montana State Library can facilitate two options for administering the E-rate consortium. One 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. A second option is to outsource the work to a third-party consulting firm, such as the one procured using BTOP funds.

In both scenarios, costs would be distributed equitably among consortium libraries. A reasonable model for determining equitable costs for individual libraries would be commensurate with the amount of time each library allocates to completing an application. For example, if a library's application requires 4% of total hours, then that library's fees would be 4% of the total fees. However, records from the BTOP consortial E-rate program indicate that there is little *a priori* information to provide insight about the amount of time required for an individual library. Consequently, it is recommended that, at least initially, costs be distributed equally among participating libraries.

These two administration options are considered as Proposal 1 and Proposal 2 in Table 28. The alternative option, in which no libraries apply for E-rate discounts, is used as a benchmark. Table 28 shows a budget associated with each of the two proposed alternatives – a dedicated MSL employee and a third-party consulting service. The average time allocated per library, 6.5 hours, is based on consulting service records from the BTOP program. A 100% participation rate by Montana public libraries would require approximately 728 hours (about 18 full-time working weeks) to complete the application process. At an assumed $125 per hour rate (based on BTOP consulting service invoices), a consulting service would result in total costs of $91,000, or $812.50 per library. Alternatively, a qualified 1.0 FTE position is assumed to incur costs of approximately $61,000 ($47,000 salary plus $14,000 benefits). However, since only 18-26 working weeks would be allocated to the E-rate application process, libraries are assumed to incur only $30,500 of the FTE position costs, or $272 per library. The remaining employee costs are proposed to be shared by the MSL, as discussed in section 7.2.3.

Using MSL personnel instead of a consulting service to administer the E-rate application process can create substantial cost savings. The average fees associated with a consulting service constitute approximately 53% of the total E-rate discount a library receives. The average cost appropriated for an MSL employee would reduce E-rate discounts by about 18%. If all libraries participate in the E-rate consortium and an MSL employee administers the program, each library could save an estimated $1,244 in average Internet access fees.

Table 28: Montana E-rate Consortium Proposed Budgets

Full Participation in E-rate	Current*	Proposal 1	Proposal 2
Revenue			
E-rate Application Fee	-	$30,500	$91,000
E-rate Discount	-	$169,860	$169,860
Total Revenue	-	$30,500	$91,000
Expenditures			
Internet access	$247,201	$247,201	$247,201
Personnel	-	$61,000	$91,000
Consortium Leader	-	$30,500	$91,000
MSL Personnel Cost-share	-	$30,500	-
Total Expenditures	$247,201	$138,341	$168,341
Cost Savings Relative to Current			
Overall	-	$139,360	$78,860
Per Library	-	$1,244	$704

50% Participation in E-rate	Current*	Proposal 1	Proposal 2
Revenue			
E-rate Application Fee	-	$15,250	$45,500
E-rate Discount	-	$84,930	$84,930
Total Revenue	-	$15,250	$45,500
Expenditures			
Internet access	$123,601	$123,601	$123,601
Personnel	-	$61,000	$45,500
Consortium Leader	-	$15,250	$45,500
MSL Personnel Cost-share	-	$45,750	-
Total Expenditures	$123,601	$99,671	$84,171
Cost Savings Relative to Current			
Overall	-	$69,680	$39,430
Per Library	-	$622	$352

*: the 'Current' budget does not include E-rate discounts or the costs of resources expended to apply for these discounts.

7.2.3 Discussion

It is likely that the success of an E-rate consortium largely depends on the ability to use an MSL employee to administer the program since consulting service fees substantially (and for some libraries, prohibitively) reduce Internet access savings from the E-rate program. This may require a significantly high participation rate, so that library fees used to compensate an MSL employee are enough to create incentives for the Montana State Library to create the position. That is, if participating libraries contribute only 10% of the $61,000 MSL salary, this may not be enough to justify personnel cost-sharing by the MSL.

For many libraries, participation in an E-rate consortium would depend on whether their fees into the program are lower than the fees incurred by applying independently for the E-rate program or the associated Internet access cost savings. For libraries that currently do not apply for the E-rate program, the cost to participate (e.g., $272) must be less than the savings from E-rate discounts. Libraries that currently participate independently would consider their existing application costs. For example, suppose that a library administrator receives $45,500 ($35,000 salary plus $10,500 benefits) and works forty-nine weeks at forty hours per week. It is reasonable to assume that if the administrator can complete the application process in less than twelve hours (i.e., incur a cost that is less than $272), then the library administrator would not choose to participate in an E-rate consortium.

In a survey conducted for the 2012 Montana State Library Summer Institute, Montana public library directors were asked to rate the difficulty of the E-rate application process. Of eighteen responses, nine rated the process to be either somewhat difficult or very difficult. Moreover, respondents who did not participate in the E-rate program indicated that one of the reasons for not applying was that the time burden associated with the application was not worth the potential savings. This suggests that library administrators may spend more than twelve hours completing the E-rate application process.

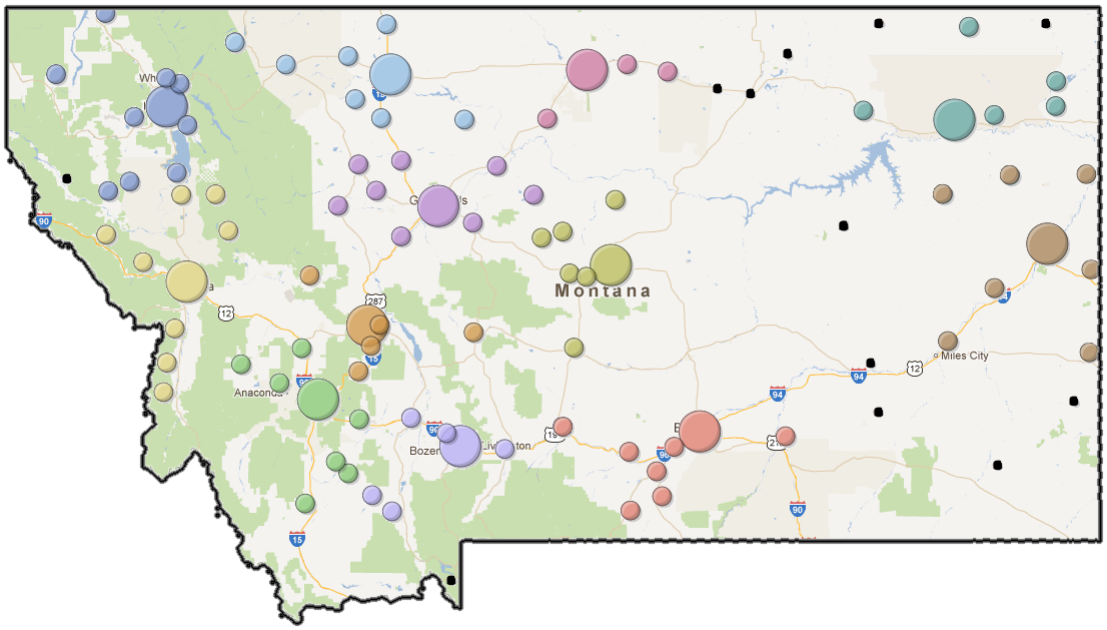
> Of eighteen surveyed library administrators, nine rated the E-rate application process to be either somewhat difficult or very difficult.

Ultimately, the success of using an MSL employee to administer the E-rate consortium would depend on the willingness of the Montana State Library to share the costs of the position. One recommendation is to assign the information and service centralization duties described in section 7.1 to this position. This can create valuable synergies, as the employee would be able to develop in-depth knowledge about technology and Internet access policies, news, and developments, passing the knowledge to public libraries. An alternative would be a restructuring of current positions, assigning consortial E-rate administration duties to an employee with substantial expertise in the area.

7.3 Regional IT Service Structure

The third cost-effective strategy to increase Internet access in Montana libraries maintains the cost-effectiveness strategies outlined in section 7.1 and increases cost savings by consolidating IT services into twelve regional library districts. Given standardized hardware equipment with five-year

Figure 13: Montana Library Technology Support Districts



Note: Figure constructed by authors using information from the Institute of Museum and Library Services (2011b).

on-site service warranties for a given regional library district, servicing individual libraries with on-site personnel may be inefficient; a consolidated system in which libraries cost-share IT personnel may provide additional cost savings.

Two possible IT service consolidation proposals depend on whether services in libraries in remote areas are included. Each proposal assumes that regional library IT districts have hub libraries and that IT personnel service the hub and surrounding libraries in their library IT district. To estimate the cost savings of consolidating IT personnel, Montana libraries are first designated into twelve library districts. The hubs for each library district are either located in a city or town (i.e., not a rural or remote location) and typically have 2 FTEs employed for IT services, excluding technology trainers. The hubs are assumed to be the centroid and a sixty-mile 'as the crow flies' radius is used to construct each library district.[5] This results in 91 of the 104 non-school-community libraries in Montana being in a regional district. Only thirteen libraries located in extremely remote areas are not included in a library district. The library IT districts and a list of excluded libraries are provided in Appendix IV.

Libraries were assigned to a particular district using two criteria. The first required that libraries to be within approximately sixty miles of a hub location in order to ensure that technology support personnel would be able to reach any location within 1-2 hours and be able to return to the hub location on the same day. The second criterion was that all libraries within a particular regional IT district also be in the same Montana Public Library

[5]The eight school-community libraries are excluded, as several have indicated that interagency IT agreements are in place that require local government IT personnel to perform IT services for them.

Federation. Leveraging existing administrative, professional, and personal connections among public libraries can reduce potential difficulties and hindrances that may arise in initially forming a regional technology support structure.

In Figure 13, each proposed district is designated by color, and black dots are libraries that are not assigned to a district. The hub libraries are designated by a larger dot and corresponding colored smaller dots represents libraries assigned to that particular district. Each district would encompass an average of 8 libraries (ranging from 4 to 10 libraries) and 133 computers. The administration of technology support personnel in each district could be the responsibility of existing library federation chairs.

Data collected from a survey of library directors attending the 2011 MSL Summer Leadership Institute indicate that the average library requires 6.5 computer repairs per year. In the proposed IT consolidation plan, IT specialists are assumed to have three approaches to conducting repairs: 1) remote desktop access from the hub, 2) send and receive broken computers to the hub using overnight postal shipping, and 3) visit each library quarterly. We assume no limit on the number of remote desktop access repairs and a limit of 6.5 computer repairs per library via postal service. Cost sharing of IT personnel is assumed to be proportional to the number of computers a libraries owns relative to the total number of computers in the library IT district. Using MSL data, it is estimated that, on average, a 1.0 FTE IT staff person services eighty computers.

7.3.1 Administrative Structure and Costs

The current structure for IT service personnel is decentralized, with administration at the library system level. Given the current IT environment with decentralized Internet networks and unstandardized computer hardware, local IT personnel are required. Assuming standardized computer hardware, IT service personnel cost savings can be realized. Further reductions can be realized if a central Internet network is also established.

Table 29 provides budget estimates on the current IT service personnel costs as well as on the proposed IT district strategy personnel costs using MSL data from 2011. Excluding the school-community libraries, there are currently an estimated 36.2 FTE IT service personnel. The associated salary and fringe benefit costs of these personnel are an estimated $1,687,846 annually.

The proposed consolidation plan assumes that city libraries maintain their current IT personnel FTE levels and cost-share with surrounding libraries, requiring 22 FTEs at an annual cost of $1,148,984. Additional expenses include shipping costs, $18,240, and travel expenses, $12,592. Shipping costs cover 6.5 round-trip shipments at $35.52 per shipment. Travel expenses are based on total round-trip mileage for four trips from the hub to each district library at a reimbursement cost of $0.555 per mile. The proposed consolidation plan would save approximately $508,030 per year, or $4,884 per library.

If libraries in remote locations do not participate in IT personnel consolidation, the number of non-school-community libraries decreases to thirty-six. However, these thirty-six libraries account for a majority of computers in Montana libraries – 1,157 of the 1,666 total computers. The thirty-six libraries would require 24.1 FTEs with an estimated salary and benefits cost of $1,186,771. The proposed IT personnel consolidation plan would reduce the number of IT personnel in the

Table 29: Montana IT Personnel Consolidation Budget

All Libraries	Current	Proposed
Resources		
Libraries	104	104
Computers	1,666	1,666
IT Personnel (FTE)	36	22
Revenues		
Collected library fee	–	$1,179,816
Total Revenue	–	$1,179,816
Expenditures		
Personnel	$1,687,846	$1,148,984
Travel	–	$12,592
Shipping	–	$18,240
Total Expenditures	$1,687,846	$1,179,816
Cost Savings Relative to Current		
Overall		$508,030
Per Library		$4,884

All Libraries Excluding Remote Libraries	Current	Proposed
Resources		
Libraries	36	36
Computers	1157	1157
IT Personnel (FTE)	24	16
Revenues		
Collected library fee	–	$879,450
Total Revenue	–	$879,450
Total Expenditures		
Personnel	$1,186,771	$870,592
Travel	–	$3,317
Shipping	–	$5,541
Total	$1,186,771	$879,450
Cost Savings Relative to Current		
Overall		$307,322
Per Library		$8,536

Note: Table constructed by authors using MSL data. All Montana public libraries are included, except eight school-community libraries. School-community libraries' IT services are assumed to be maintained by the local government through an intergovernment agreement.

hub and spoke model to 16.2. The estimated total expenditures of the plan are $879,450, with personnel costs are $870,592, shipping costs of $3,317, and travel costs of $5,541. Total cost savings relative to the current decentralized IT model are $307,322. Each library would realize, on average, $8,536 per year in cost savings.

> Substantial cost-savings can be generated by standardizing hardware and reducing technology support personnel.

7.3.2 Discussion

Cost-sharing IT personnel is cost-effective and provides substantial savings for a large proportion of libraries in Montana. It requires more co-ordination and communication between libraries. In particular, without hardware standardization, these substantial savings cannot be realized. An obvious drawback of this strategy is that each library would not have on-site IT personnel. However, if hardware and much of the software are standardized across libraries within the same district, these costs can be minimized.

The above cost saving estimates assume that only full-time IT personnel would be employed and that the compensation rate would correspond to the higher city IT personnel rate of $54,458. This is substantially higher than the rate in towns ($47,005) and rural/remote libraries ($41,556). However, compensation reflects productivity, which implies that almost all libraries would see an increase in IT service personnel quality at a reduced cost due to cost-sharing.

There could be substantial resistance from current library IT staff, as the number of IT personnel is proposed to be consolidated from 36.2 FTEs to as low as 12 FTEs. This resistance would be most likely from town libraries, given that 43% employ a full-time IT specialist and 29% employ a part-time IT specialist. Thus, these strategies should be introduced after hardware standardization, when library directors can better gauge excess IT personnel hours.

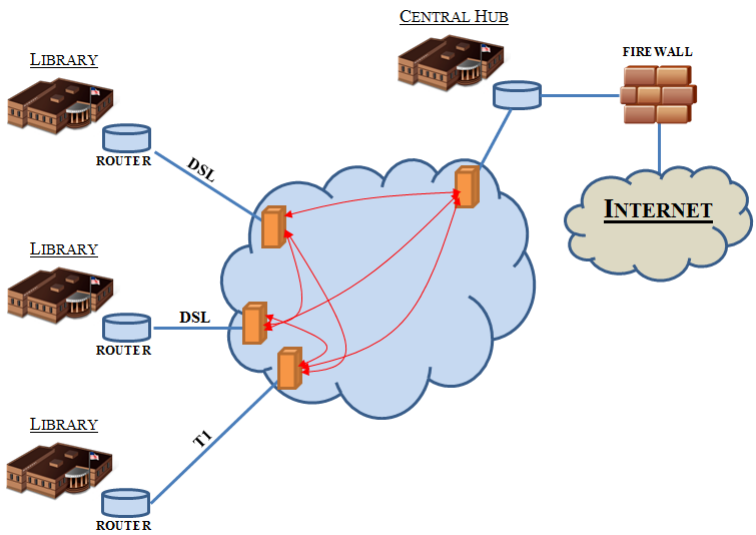
7.4 Complete Centralization

The strategy that can potentially lead to most long-term cost savings and quality improvements is a full centralization of technology services, support, and Internet access across all or most Montana public libraries. Centralization would create an integrated network that fully consolidates most technology and Internet access services and costs within a single administrative structure, reducing average costs and increasing efficiency and quality.

A Montana centralized network would be structured similar to other statewide networks described in section 1; an example of a centralized network structure is presented in Figure 14. The figure shows that computers in each library would be connected through routers onto a single network (represented by the large blue cloud). These connections would be facilitated using existing available technology (e.g., DSL, T1 circuits), or could be upgraded to higher-speed Ethernet circuits as the technology becomes available either through third-party sources or by expansion through grants or state funding.

The centralized network administration implies that there can be substantial improvements in the quality of traffic control to and from libraries. As recommended in section 2, all traffic would be subject to quality of service (QoS) standards. First, traffic would be assigned a priority level (based on a set protocol), allowing the most important

Figure 14: Proposed Montana Centralized Network Structure



Note: Figure constructed by authors.

information to be processed and transmitted first. Second, all traffic to and from a particular library would be directed via a secure network without being transmitted through the Internet. For example, as shown in Figure 15 by the red arrows in the central cloud, any traffic intended to go from one library to another (e.g., an e-mail) would be directly and securely transferred to that location. This is unlike the current structure in which traffic is first transmitted through the sender's firewall, then to the Internet, then again through the firewall of the receiving library – all of which significantly increases the transmission time. There are substantial gains in speed when traffic is transmitted directly within the network.

Prioritizing network traffic would result in faster Internet access, even when using libraries' existing Internet connections. This can improve connectivity and access among libraries and shared resources such as the Montana Shared Catalog and MontanaLibrary2Go because these resources are located within the network and would be accessed directly (rather than receiving requests and relaying information using the Internet). Moreover, as

> Traffic prioritization and localization would increase Internet access speeds using libraries' existing Internet connections.

discussed above, it would be possible to prioritize access requests for these services so that, for example, requests for these resources from libraries are assigned higher priority than requests from patron residences. As demand for these shared resources continues to increase (and as more shared resources are introduced in Montana), traffic localization and prioritization can be an effective approach to manage their use.

A third improvement can be realized through strategically choosing the location of the central server that transmits information to and from the Internet. Because traffic from libraries in

the network would be directed to the Internet from the central location, the server must have the capacity to handle this demand. One way to effectively meet this demand is locate the server such that it is connected to the 100 Gps Internet2 national network backbone, developed under the U.S. Unified Community Anchor Network (UCAN). In combination with increased internetwork connectivity, the ability to flexibly alter the bandwidth available to libraries on the network would substantially increase Internet access capabilities across the network.

In addition to improvements in Internet access and internetwork communication speeds, a centralized network can further standardize and consolidate other services and technology support. For example, e-mail addresses for all libraries would use a single domain name (e.g., first.last@mtlib.gov), rather than individualized domain names for each library system. Library webpage hosting would be centralized, reducing administrators' costs associated with learning how to manage a website. Furthermore, because all Internet-directed traffic is processed through a single location, firewall management would occur only at the central server location, not at an individual library. Moreover, content filtering would be centralized but extremely flexible. That is, a single filter would be installed, but the degree to which filtering occurs (or if any filtering occurs) would be determined on a library-by-library basis. This would provide all libraries with an opportunity to be a part of the network without losing their autonomy to filter Internet content and allow some libraries to apply for E-rate discounts.

The efficiency of technology support would also be improved through further service centralization. A dedicated help desk would be the first point of contact for all libraries. Help desk professionals would address queries in at least two ways. First, if possible, questions would be addressed over phone or e-mail. Second, help desk support would be able to log onto computers and attempt to address the issues remotely. These issues could include upgrading software, installing patches, and searching for and removing computer viruses. The help desk would also be responsible for communicating with libraries' local Internet service providers, whose circuits are used to connect a particular library to the network.

7.4.1 Administration and Costs

This report provides an overview of administration structure and costs based on quotes provided by Earthlink, Inc. The information offers a reasonable foundation for understanding costs associated with a centralized network, but it is recommended that other vendors be investigated in order to best match the needs and constraints of Montana public libraries with the services and opportunities provided by other potential vendors.

Due to the remoteness of many Montana public libraries and current Earthlink partnerships with Internet service providers, establishing an Earthlink-provided centralized network in the immediate short-run would be cost-effective for twenty-eight Montana libraries; these twenty-eight libraries account for 48% of all public-access computers across Montana and serve a major part of the Montana population. Therefore, an initial, smaller network can provide an important "pilot" program offering insight into the potential long-term success of a full centralization strategy. Appendix V lists the twenty-eight libraries. The network includes three libraries serving cities, eighteen serving towns, two serving rural locations,

Table 30: Montana Pilot Centralized Network Internet Access Budget for 28 Libraries

	Current		Proposed	
	No E-rate	E-rate	No E-rate	E-rate
Revenues				
E-rate Discount	–	$57,426	–	$45,748
Total Revenues	–	$57,426	–	$45,748
Expenditures				
Internet Access	$86,409	$86,409	$67,636	$67,636
Total Expenditures	$86,409	$28,983	$67,636	$21,888
Cost Savings Relative to Current				
Overall	–	–	$18,773	$7,095
Per Library	–	–	$670	$253

Note: Table constructed by authors using MSL data and quoted prices from Earthlink, Inc. Annual costs (E-rate) assume that all libraries within the centralized network participate in receiving the E-rate discount.

and five serving remote communities.

Table 30 provides a budget for existing and proposed costs for the twenty-eight libraries in the proposed network. Costs were determined after assuming that Internet access speeds remain the same or increase as an outcome of joining the network. That is, for libraries that currently access the Internet with speeds below 7 Mbps, joining the network would increase their speed to 7 Mbps. For libraries with current speeds above 7 Mbps, costs are calculated to match their existing access capacity. The budget provides an estimate of costs and potential savings in two scenarios: no libraries receive E-rate discounts and all libraries receive E-rate discounts.

Current total Internet access costs are approximately $86,409 annually. The proposed network would cost $67,636, saving $18,773 in costs per year. Savings are based on the average monthly payment of $123 per library. If all libraries received E-rate discounts, estimated current and proposed costs are $28,983 and $21,888 per year, a savings of $7,095. Since some libraries may wish to continue to participate in the E-rate program while others would opt out, actual savings would be between $7,095 and $18,773.

In addition to the Internet access savings, Internet access costs include various technology services and support. These costs would be reduced by standardizing technology services, including e-mail domain and website hosting and the creation of a centralized IT help desk, as discussed above. The help desk, in addition to being the first and only point of contact, would provide services such monitoring Internet circuits and the central server. An automated trouble-ticketing system would automatically detect Internet connection issues and alert technology support personnel. In many cases, the automated system would provide seamless problem resolution, allowing libraries to continue to use the network and the Internet without service interruptions.

Although a centralized technology help desk would provide solutions for many IT problems,

a partnership with local technology support professionals would still be necessary to address issues that cannot be repaired remotely. However, the creation of a help desk and standardization of hardware equipment would reduce demand for local IT personnel significantly. Similar to the regional IT strategy described in section 7.3, a centralized network would have hub locations where local technology support personnel are located. Figure 15 provides an illustration of the hub locations and the libraries that would be served by IT personnel at those hubs. Appendix V provides a corresponding listing.

Table 31 provides a budget comparison for costs associated with providing local technology support personnel for the twenty-eight libraries in the pilot program. Currently, these libraries have 18.4 FTE support personnel with an estimated annual cost of $918,171. Under the proposed centralized structure, only 7.1 FTEs would be necessary, resulting in a $540,216 annual savings, or $19,293 per library. The twenty-three libraries that are either a hub or can be served by a technology support professional located at a hub would have 5.0 FTEs. The five libraries that must maintain their own IT personnel due to their remote location would have a total of 2.1 FTEs.

In this structure, the Montana State Library would primarily be a facilitator promoting the network structure. Its long-term duties would involve collecting fees from participating libraries and providing payment to the network provider. It is expected that the minimal involvement of the MSL would allow for minor restructuring of current personnel in order to facilitate fee collection and bill payments.

7.4.2 Discussion

A centralized network can significantly reduce Internet access and technology support costs while increasing the quality and efficiency of access and IT support. For some libraries, potential drawbacks include a loss of autonomy and the loss of on-site technology support staff, as discussed in section 7.3. However, when the proposed centralized network was discussed with participants of the 2012 MSL Summer Leadership Institute, most library directors indicated interest in joining a centralized network, especially if there were associated cost savings. Table 32 shows that 50% of the Summer Leadership Institute participants were very likely and 45% were somewhat likely to join a network, with particular support coming from libraries serving rural and remote areas. Moreover, when asked if the libraries would be willing to join a network if participation resulted in lower technology and Internet access costs, 77% of participants were very likely and 23% were somewhat likely to join. No administrators indicated that their library's participation would be unlikely.

The network of twenty-eight libraries could be a potential test group for obtaining additional cost savings within a centralized Montana network. Furthermore, the success of the centralized network could be leveraged for obtaining large infrastructure grants to expand high-speed Ethernet circuits to more rural and remote locations. Quantitative evidence of a successful, committed effort to reduce technology and Internet access costs and improve service quality to anchor institutions through centralization may generate state and federal interest in building the Montana network.

Table 31: Montana Pilot Centralized Network IT Personnel Budget for 28 Libraries

	Current	Proposed
Resources		
Libraries	28	28
Computers	803	803
IT Personnel (FTE)	18.4	7.14
Revenues		
Library Fees	–	$377,955
Total Revenues	–	$377,955
Expenditures		
Personnel	$918,171	$370,452
Travel	–	$2,957
Shipping	–	$4,547
Total Expenditures	$918,171	$377,955
Cost Savings Relative to Current		
Overall	–	$540,216
Per Library	–	$19,293

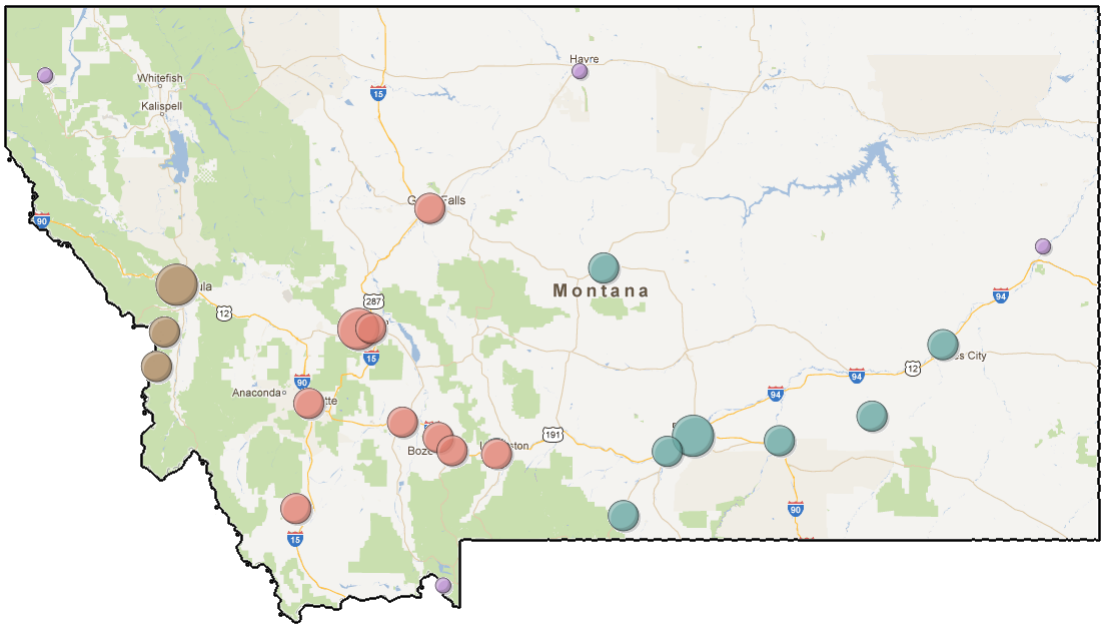
Note: Table constructed by authors using MSL data.

Table 32: Montana Public Library Directors' Reactions to Network Centralization

	All	**City/Town**	**Rural/Remote**
How likely is your library to join a centralized Montana network that included various services including Internet access?			
Very likely	50%	40%	58%
Somewhat likely	45%	50%	42%
Not likely at all	5%	10%	0%
Total responses	22	10	12
How likely is your library to join a centralized Montana network that included various services including Internet access but at lower than your current costs?			
Very likely	77%	60%	92%
Somewhat likely	27%	50%	8%
Not likely at all	0%	0%	0%
Total responses	23	11	12

Note: Table constructed by authors using survey response data from the MSL Summer Institute, 2012.

Figure 15: Montana Pilot Centralized Network IT Service Districts



Note: Figure constructed by authors using information from the Institute of Museum and Library Services (2011b).

Table 33 provides an estimated budget for full a implementation of a centralized Montana network. For libraries where Internet access and technology support expenditures information was not available, data were approximated by using the average expenditures in libraries serving communities of a similar size. For example, available data for libraries serving a town were assigned to missing information for other libraries serving towns. The table indicates that depending on the number of libraries that receive E-rate discounts, per library savings range between $7,889 and $9,067. It is important to also note that these savings do not capture quantitatively unmeasurable benefits associated with increases in the quality of Internet access and technology support. The benefits can substantially strengthen the role of public libraries as community anchors for providing information services.

Table 33: Montana Centralized Network Budget Comparison of Pilot and Full Implementation

	Pilot				Full Implementation			
	Current		*Proposed*		*Current*		*Proposed*	
	No E-rate	E-rate	No E-rate	E-rate	No E-rate	E-rate	No E-rate	E-rate
Resources								
Libraries	28	28	28	28	104	104	104	104
Computers	803	803	803	803	1,666	1,666	1,666	1,666
IT Personnel (FTE)	18.4	18.4	7.14	7.14	36	36	15	15
Revenues								
E-rate Discount	–	$57,426	–	$45,748	–	$169,860	–	$47,367
Total Revenues	–	$57,426	–	$45,748	–	$169,860	–	$47,367
Expenditures								
Internet Access	$86,409	$86,409	$67,636	$67,636	$247,201	$247,201	$193,495	$193,495
IT Personnel	$918,171	$918,171	$370,452	$370,452	$1,687,846	$1,687,847	$767,777	$767,777
IT Travel	–	–	$2,294	$2,294	–	–	$12,592	$12,592
IT Shipping	–	–	$4,547	$4,547	–	–	$18,240	$18,240
Total Net Expenditures	$1,004,580	$947,154	$444,929	$399,181	$1,935,047	$1,765,187	$992,104	$944,736
Total Savings Relative to Current	–	–	$559,651	$547,973	–	–	$942,944	$820,451
Total Savings Per Library	–	–	$19,964	$19,547	–	–	$9,067	$7,889

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Appendix I: List of Available Telcos by Library System

This appendix contains a list of telecommunication service providers (telcos) for each library system in Montana using FCC Form 477 data provided by telcos on their service area as of December 31, 2011. While service area validation procedures were conducted for each telco, the list may not be comprehensive, and public library staff should seek additional information about telcos in their local areas.[6] In particular, given the new Ronan Telephone Company high-speed middle-mile fiber network that is nearing completion, broadband expansion is imminent in St. Mary, Babb, Santa Rita, Heart Butte, Elmo, Big Arm, and Evaro. Information on each telco is available in Appendix II.

[6] One additional source of information about available broadband providers is http://www.broadbandmap.gov.

Library Name:	Alberton Branch Library
Current Type of Internet Connection	1MB DSL Modem
Potential Wired Telco(s)	Blackfoot Communications, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Belgrade Community Library
Current Type of Internet Connection	Other Type
Potential Wired Telco(s)	Bresnan Communications, LLC Little Apple Technologies CenturyLink Montana Opticom
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. WispWest.net AT&T, Inc.

Library Name:	Belt Public Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Konceptio Data Services, LLC 3 Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Bicentennial Library of Colstrip
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	USA Companies, LP CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Big Horn County Public Library
Current Type of Internet Connection	T1
Potential Wired Telco(s)	Tri County Telephone Association, Inc. USA Companies, LP CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Big Sandy Branch Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Big Sky Branch Library (Missoula Co.)
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Blackfoot Communications, Inc. Bresnan Communications, LLC Cutthroat Communications DigitalBridge Communications Corp. Rocky Mountain Internet
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Bigfork Branch Library
Current Type of Internet Connection	1MB DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Bitterroot Public Library
Current Type of Internet Connection	512K DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink Rocky Mountain Internet
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc.

Library Name:	Blaine County Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC Triangle Telephone Cooperative Assn., Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Bozeman Public Library
Current Type of Internet Connection	Cable Modem
Potential Wired Telco(s)	Bresnan Communications, LLC Cutthroat Communications Little Apple Technologies Montana Opticom CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. WispWest.net AT&T, Inc.

Library Name:	Bridger Public Library
Current Type of Internet Connection	Cable Modem
Potential Wired Telco(s)	CenturyLink USA Companies, LP
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Broadwater School and Community Library
Current Type of Internet Connection	T3
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink Montana Internet Corp.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Browning Branch Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Oki Communications, LLC 3 Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc.

Library Name:	Butte-Silver Bow Public Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC DigitalBridge Communications Corp. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Butte-Silver Bow Public Library South Branch
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC DigitalBridge Communications Corp. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Carnegie Public Library
Current Type of Internet Connection	Shared Modem
Potential Wired Telco(s)	Bresnan Communications, LLC Triangle Telephone Cooperative Assn., Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. WispWest.net AT&T, Inc.

Library Name:	Choteau/Teton Public Library
Current Type of Internet Connection	T1
Potential Wired Telco(s)	3 Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Chouteau County Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC Landmark Electronics Inc. Triangle Telephone Cooperative Assn., Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Columbia Falls Branch Library
Current Type of Internet Connection	1MB DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink Halstad Telephone Company
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Conrad Public Library
Current Type of Internet Connection	256K DSL Modem
Potential Wired Telco(s)	3 Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Culbertson Public Library
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	Nemont Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Daniels County Library
Current Type of Internet Connection	256K DSL Modem
Potential Wired Telco(s)	Nemont Telephone Cooperative, Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Darby Community Public Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	CenturyLink Rocky Mountain Internet
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Denton Public Library
Current Type of Internet Connection	1MB DSL Modem
Potential Wired Telco(s)	Triangle Telephone Cooperative Assn., Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Dillon Public Library
Current Type of Internet Connection	512K Frame Relay
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Dodson Branch Library
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	Triangle Telephone Cooperative Assn., Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Dorothy Asbjornson Community Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Triangle Telephone Cooperative Assn., Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Drummond School & Community Library
Current Type of Internet Connection	T1
Potential Wired Telco(s)	Blackfoot Communications, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Dutton/Teton Public Library
Current Type of Internet Connection	Wireless
Potential Wired Telco(s)	CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	East Glacier Park Branch Library
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	CenturyLink Oki Communications, LLC
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Ekalaka Public Library
Current Type of Internet Connection	1MB DSL Modem
Potential Wired Telco(s)	Mid-Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	AT&T, Inc.

Library Name:	Eureka Branch Library
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	Frontier Communications Corporation InterBel Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Fairfield/Teton Public Library
Current Type of Internet Connection	Wireless
Potential Wired Telco(s)	Bresnan Communications, LLC 3 Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc.

Library Name:	Fallon County Library
Current Type of Internet Connection	512K DSL Modem
Potential Wired Telco(s)	CenturyLink Mid-Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Flathead County Library System
Current Type of Internet Connection	T1
Potential Wired Telco(s)	Bresnan Communications, LLC Cutthroat Communications CenturyLink Montana Sky Networks
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Frenchtown School and Community Library (Missoula Co.)
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Froid Branch Library
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Garfield County Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Mid-Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	George McCone Memorial County Library
Current Type of Internet Connection	256K DSL Modem
Potential Wired Telco(s)	Mid-Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Geraldine Branch Library
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	Landmark Electronics Inc. CenturyLink Triangle Telephone Cooperative Assn., Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	AT&T, Inc.

Library Name:	Glacier County Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink Northern Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Glasgow City-County Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Nemont Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc.

Library Name:	Glendive Public Library
Current Type of Internet Connection	Cable Modem
Potential Wired Telco(s)	Mid-Rivers Telephone Cooperative, Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Great Falls Public Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC Cutthroat Communications DigitalBridge Communications Corp. Konceptio Data Services, LLC Landmark Electronics Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Harlem Public Library
Current Type of Internet Connection	256K DSL Modem
Potential Wired Telco(s)	Triangle Telephone Cooperative
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Harlowton Public Library
Current Type of Internet Connection	T3
Potential Wired Telco(s)	Triangle Telephone Cooperative Assn., Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Havre-Hill County Library
Current Type of Internet Connection	256K DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC Triangle Telephone Cooperative Assn., Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Hearst Free Library
Current Type of Internet Connection	MicroWave
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Henry A Malley Memorial Library
Current Type of Internet Connection	1MB DSL Modem
Potential Wired Telco(s)	Range Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Highwood School Community Library
Current Type of Internet Connection	1MB DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC 3 Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Hobson Community Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Triangle Telephone Cooperative Assn., Inc. Montana Internet Corp.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Jefferson County Library System
Current Type of Internet Connection	T1
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink Montana Internet Corp.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Joliet Public Library
Current Type of Internet Connection	Satellite
Potential Wired Telco(s)	Tri County Telephone Association, Inc. CenturyLink USA Companies, LP
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Judith Basin County Free Library
Current Type of Internet Connection	512K DSL Modem
Potential Wired Telco(s)	CenturyLink Triangle Telephone Cooperative Assn., Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Laurel Public Library
Current Type of Internet Connection	Cable Modem
Potential Wired Telco(s)	Bresnan Communications, LLC Tri County Telephone Association, Inc. Montana Opticom
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Lewis and Clark Library
Current Type of Internet Connection	Other Type
Potential Wired Telco(s)	Bresnan Communications, LLC Cutthroat Communications CenturyLink Montana Internet Corp.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Lewis and Clark Library Augusta Branch
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	3 Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Lewis and Clark Library East Helena Branch
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink Montana Internet Corp.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Lewis and Clark Library Lincoln Branch
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	Lincoln Telephone Company , Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Lewistown Public Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Mid-Rivers Telephone Cooperative, Inc. CenturyLink Montana Internet Corp.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Liberty County Library
Current Type of Internet Connection	1MB DSL Modem
Potential Wired Telco(s)	Triangle Telephone Cooperative Assn., Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Lincoln County Public Libraries
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Frontier Communications Corporation InterBel Telephone Cooperative, Inc. Windjammer Communications LLC CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Verizon Communications, Inc. AT&T, Inc.

Library Name:	Livingston-Park County Public Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC Montana Opticom CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. WispWest.net AT&T, Inc.

Library Name:	Madison Valley Public Library
Current Type of Internet Connection	Other Type
Potential Wired Telco(s)	CenturyLink 3 Rivers Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. WispWest.net AT&T, Inc.

Library Name:	Manhattan Community School Library
Current Type of Internet Connection	T3
Potential Wired Telco(s)	Bresnan Communications, LLC Little Apple Technologies CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Marion Branch Library
Current Type of Internet Connection	512K DSL Modem
Potential Wired Telco(s)	CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Meagher County/City Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Triangle Telephone Cooperative Assn., Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Miles City Public Library
Current Type of Internet Connection	Cable Modem
Potential Wired Telco(s)	Mid-Rivers Telephone Cooperative, Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Mineral County Public Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Blackfoot Communications, Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Missoula Public Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Blackfoot Communications, Inc. Bresnan Communications, LLC Cutthroat Communications DigitalBridge Communications Corp. CenturyLink Rocky Mountain Internet
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Moore Public Library
Current Type of Internet Connection	256K DSL Modem
Potential Wired Telco(s)	Triangle Telephone Cooperative Assn., Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc. Montana Internet Corp.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	North Jefferson County Library District
Current Type of Internet Connection	Cable Modem
Potential Wired Telco(s)	Bresnan Communications, LLC
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	North Lake County Public Library
Current Type of Internet Connection	Other Type
Potential Wired Telco(s)	Blackfoot Communications, Inc. Bresnan Communications, LLC Western Montana CommunityTel CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	North Toole County Library
Current Type of Internet Connection	256K Frame Relay
Potential Wired Telco(s)	Northern Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	North Valley Public Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	CenturyLink Rocky Mountain Internet
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Opheim Community Library
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	Nemont Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	AT&T, Inc.

Library Name:	Parmly Billings Library
Current Type of Internet Connection	T3
Potential Wired Telco(s)	Bresnan Communications, LLC, Cutthroat Communications Tri County Telephone Association, Inc. USA Companies, LP Montana Opticom CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Petroleum County School-Community Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	CenturyLink Mid-Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Verizon Communications, Inc. AT&T, Inc.

Library Name:	Philipsburg Public Library
Current Type of Internet Connection	256K DSL Modem
Potential Wired Telco(s)	Blackfoot Communications, Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Phillips County Library
Current Type of Internet Connection	1MB DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC Triangle Telephone Cooperative Assn., Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc.

Library Name:	Plains Public Library District
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Blackfoot Communications, Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Poplar City Library
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	Nemont Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Prairie County Library
Current Type of Internet Connection	1MB DSL Modem
Potential Wired Telco(s)	Mid-Rivers Telephone Cooperative, Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Preston Hot Springs Town-County Library
Current Type of Internet Connection	512K Frame Relay
Potential Wired Telco(s)	Blackfoot Communications, Inc. Hot Springs Telephone Company CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	AT&T, Inc.

Library Name:	Red Lodge Carnegie Library
Current Type of Internet Connection	Cable Modem
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Richey Public Library
Current Type of Internet Connection	Wireless
Potential Wired Telco(s)	Mid-Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	AT&T, Inc.

Library Name:	Ronan City Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Blackfoot Communications, Inc. Bresnan Communications, LLC Western Montana CommunityTel
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Roosevelt County Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Nemont Telephone Cooperative, Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Rosebud County Library
Current Type of Internet Connection	MicroWave
Potential Wired Telco(s)	Range Telephone Cooperative Inc USA Companies, LP CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Roundup School-Community Library
Current Type of Internet Connection	1MB DSL Modem
Potential Wired Telco(s)	Mid-Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Saco Branch Library
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	CenturyLink Nemont Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Seeley Lake Branch Library (Missoula Co.)
Current Type of Internet Connection	1MB DSL Modem
Potential Wired Telco(s)	CenturyLink Blackfoot Communications, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Sheridan County Library
Current Type of Internet Connection	1MB DSL Modem
Potential Wired Telco(s)	CenturyLink Nemont Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Sheridan Public Library
Current Type of Internet Connection	Other Type
Potential Wired Telco(s)	3 Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Sidney-Richland County Library
Current Type of Internet Connection	Cable Modem
Potential Wired Telco(s)	Mid-Rivers Telephone Cooperative, Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	St Ignatius School-Community Library
Current Type of Internet Connection	T1
Potential Wired Telco(s)	CenturyLink Blackfoot Communications, Inc. Western Montana Community Tel
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	St. Regis School and Community Library
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	CenturyLink Blackfoot Communications, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Stillwater County Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Swan Valley Community Library (Missoula Co.)
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	CenturyLink Blackfoot Communications, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	AT&T, Inc.

Library Name:	Thompson Falls Public Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Blackfoot Communications, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Thompson-Hickman County Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	CenturyLink 3 Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation AT&T, Inc.

Library Name:	Three Forks Community Library
Current Type of Internet Connection	Satellite
Potential Wired Telco(s)	Little Apple Technologies CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Toole County Library
Current Type of Internet Connection	256K Frame Relay
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink 3 Rivers Telephone Cooperative, Inc. Northern Telephone Cooperative
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Troy Branch Library
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	Frontier Communications Corporation InterBel Telephone Cooperative, Inc. Windjammer Communications LLC CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	AT&T, Inc.

Library Name:	Twin Bridges Public Library
Current Type of Internet Connection	256K DSL Modem
Potential Wired Telco(s)	3 Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Valier Public Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	CenturyLink 3 Rivers Telephone Cooperative, Inc.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Wedsworth Memorial Library
Current Type of Internet Connection	256K DSL Modem
Potential Wired Telco(s)	CenturyLink Montana Internet Corp.
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	West Yellowstone Public Library
Current Type of Internet Connection	256K DSL Modem
Potential Wired Telco(s)	CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Whitefish Branch Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	Whitehall Community Library
Current Type of Internet Connection	No Connection
Potential Wired Telco(s)	CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. WispWest.net AT&T, Inc.

Library Name:	Wibaux Public Library
Current Type of Internet Connection	256K DSL Modem
Potential Wired Telco(s)	Mid-Rivers Telephone Cooperative, Inc. CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Library Name:	William K. Kohrs Memorial Library
Current Type of Internet Connection	1MB+ DSL Modem
Potential Wired Telco(s)	Bresnan Communications, LLC CenturyLink
Potential Satellite Telco(s)	Hughes Communications, Inc. New Edge Network, Inc. StarBand Communications, Inc.
Potential Mobile Telco(s)	Sprint Nextel Corporation Verizon Communications, Inc. AT&T, Inc.

Appendix II: Directory of Telecommunication Service Providers in Montana

This appendix contains contact and pricing information on telecommunication service providers (telcos) in Montana. Telcos are required by mandate to provide the FCC with pricing information; this information is subject to change. Asterisks (*) indicate that no information could be found for a particular telco. The telcos directly below were nonresponsive to requests for information from the Montana Department of Commerce and may no longer be providing telecommunication services.

Cutthroat Communications, Inc.
Global Net, Inc.
Halstad Telephone Company
Integra Telecom Holdings, Inc.
Landmark Electronics
Lightnex Communications, Inc.
Montana Opticom
MTPCS Holdings, LLC
Northwest Communications
OrbitCom, Inc.
Traceworks, LLC
USA Companies LP

Holding Company Name:	3 Rivers Telephone Cooperative, Inc.
Filing Company Name:	3 Rivers Telephone Cooperative, Inc.
Contact Information:	Phone: (800) 796-4567 Email: 3rt@3rivers.net
Types of Service:	High speed DSL and Satellite; Satellite speeds up to 5 Mbps
Pricing:	DSL (speed not available) $49.95 per month; Satellite 10 Gbps for $50 month, requires $100 in equipment

Holding Company Name:	Blackfoot Telephone Cooperative, Inc.
Filing Company Name:	Blackfoot Communications, Inc.
Contact Information:	Phone: (866) 541-5000 Email: customerservice@blackfoot.com
Types of Service:	DSL
Pricing:	384 Kbps/256 Kbps for $50 per month 1.5 Mbps/1 Mbps for $62 per month 3 Mbps/1 Mbps for $71 per month 3 Mbps/2 Mbps for $95 per month 8 Mbps/1 Mbps for $81 per month 8 Mbps/2 Mbps for $105 per month 15 Mbps/1 Mbps for $150 per month 15 Mbps/2 Mbps for $174 per month Discounts available for multi-year contracts

Holding Company Name:	MTPCS Holdings, LLC
Filing Company Name:	Cellular One
Contact Information:	Web: www.cellonenation.com
Types of Service:	Internet plans using Aircard device.
Pricing:	250 Mb of data for $29.99 2 Gb of data $49.99

Holding Company Name:	CenturyTel, Inc.
Filing Company Name:	CenturyLink
Contact Information:	Phone: (877) 744-4416
Types of Service:	DSL generally from 1.5 Mbps to 7 Mbps, potential for up to 40 Mbps
Pricing:	1.5 Mbps for $60 per month, 7 Mbps for $80 per month; Discounts available for multi-year contracts

Holding Company Name:	Cutthroat Communications
Filing Company Name:	Cutthroat Communications
Contact Information:	Phone: (406) 556-1700
Types of Service:	Ethernet (2 Mbps to 45 Mbps in first mile), T1 (1+ Gbps), DS3 (1+ Gbps), OC-3 (1+ Gbps), ADSL (256 Kbps to 7 Mbps), ADSL2+ (1 Mbps to 20 Mbps), and SDSL
Pricing:	*

Holding Company Name:	DigitalBridge Communications Corp.
Filing Company Name:	DigitalBridge Communications Corp.
Contact Information:	Phone: (800) 979-3797
Types of Service:	Wireless Broadband, from to 2 Mbps
Pricing:	2 Mbps/500 Kbps for $24.99 per month; 2 Mbps/1 Mbps for $44.99 per month; 3 Mbps/2 Mbps for $54.99 per month

Holding Company Name:	New Edge Network, Inc.
Filing Company Name:	EarthLink
Contact Information:	Phone: (866) 636-4357 Email: customercare@corp.earthlink.com
Types of Service:	DSL and Satellite
Pricing:	T1 lines from $300 to $1000 (no installation fees with 3 year plan)

Holding Company Name:	Frontier Communications Corporation
Filing Company Name:	Frontier Communications Corporation
Contact Information:	Phone: (800) 921-8102
Types of Service:	Phone, DLS; up to 6 Mbps
Pricing:	$176.87 per month; discounts available

Holding Company Name:	Global Crossing Telecommunications, Inc.
Filing Company Name:	Global Crossing Telecommunications, Inc.
Contact Information:	Web: www.globalcrossing.com
Types of Service:	*
Pricing:	*

Holding Company Name:	Greenfly Networks, Inc.
Filing Company Name:	Clearfly
Contact Information:	Phone: (866) 652-7520
Types of Service:	Phone, Fax, Internet
Pricing:	*

Holding Company Name:	Grizzly Internet, Inc.
Filing Company Name:	Grizzly Internet, Inc.
Contact Information:	Phone: (406) 646-7006 Email: pond@grizzlyinternet.com
Types of Service:	Broadband 1.5 Mbps to 15 Mbps
Pricing:	computers; $100-$1000 per month for commercial; discounts

Holding Company Name:	Hot Springs Telephone Company
Filing Company Name:	Hot Springs Telephone Company
Contact Information:	Phone: (406) 741-2751
Types of Service:	DSL, Cable; speeds up to 2.5 Mbps
Pricing:	$47.50 per month

Holding Company Name:	Hughes Communications, Inc.
Filing Company Name:	HNS License Sub, LLC
Contact Information:	Phone: (800) 460-3929 (Louise Herrington)
Types of Service:	Satellite; 256 Mbps-850 Mbps per 24 hours; 1 Mbps to 5 Mbps upload speed
Pricing:	Government pricing plan $60-$350 per month; $640 install

Holding Company Name:	Integra Telecom Holdings, Inc.
Filing Company Name:	OneEighty Communications, Inc.
Contact Information:	Phone: (406) 294-4000
Types of Service:	T1 and Ethernet connections
Pricing:	*

Holding Company Name:	InterBel Telephone Cooperative, Inc.
Filing Company Name:	InterBel Telephone Cooperative, Inc.
Contact Information:	Phone: (406) 889-3311
Types of Service:	Broadband DSL, 6 Mbps to 15 Mbps
Pricing:	Prices from $19.95 to $49.95 per month; discounts available

Holding Company Name:	Konceptio Data Services, LLC
Filing Company Name:	Konceptio Data Services, LLC
Contact Information:	Phone: (406) 788-6054
Types of Service:	Wireless Microwave System; 2 Mbps
Pricing:	$48.95 to $54.95 per month, non-profits/public agencies receive 15-20% discount

Holding Company Name:	Landmark Electronics, Inc.
Filing Company Name:	Landmark Electronics, Inc.
Contact Information:	Phone: (406) 564-1884
Types of Service:	Broadband Wireless, up to 10 Mbps
Pricing:	Discounts available. Does not participate in E-Rate program

Holding Company Name:	LAT, Inc.
Filing Company Name:	Little Apple Technologies
Contact Information:	Phone: (406) 284-3174
Types of Service:	Wireless Internet, 2 Mbps
Pricing:	$55-$149 per month

Holding Company Name:	Level 3 Communications, LLC
Filing Company Name:	Broadwing Communications, LLC
Contact Information:	Phone: (877) 932-2780
Types of Service:	High-capacity Tier 1 IP service
Pricing:	*

Holding Company Name:	Lincoln Telephone Company
Filing Company Name:	Lincoln Telephone Company
Contact Information:	Phone: (406) 362-4216
Types of Service:	DSL and Dialup; 500 Kbps to 4Mbps
Pricing:	500 Kbps for $29.90 per month, 1 Mbps for $39.90 per month, 1.5 Mbps for $59.90 per month, 4 Mbps for $99

Holding Company Name:	Megapath, Inc.
Filing Company Name:	DSLnet Communications, LLC
Contact Information:	Phone: (866) 300-8947 Email: sales@megapath.com
Types of Service:	T1 service, speeds vary by proximity to central office
Pricing:	*

Holding Company Name:	Mid-Rivers Telephone Cooperative, Inc.
Filing Company Name:	Mid-Rivers Telephone Cooperative, Inc.
Contact Information:	Phone: (800) 452-2288 Email: customerservices@midrivers.coop
Types of Service:	Broadband from 3 Mbps to 10 Mbps
Pricing:	3 Mbps for $60 per month; 10 Mbps for $85 per month

Holding Company Name:	The Montana Internet Corporation
Filing Company Name:	The Montana Internet Corporation
Contact Information:	Phone: (406) 771-9700 Email: support@mt.net
Types of Service:	Wireless internet
Pricing:	Up to 10 Mbps with committed 384 Kbps for $30 per month Up to 10 Mbps with committed 768 Kbps for $45 per month Up to 10 Mbps with committed 2 Mbps for $55 per month

Holding Company Name:	Bridgeband Communications, Inc.
Filing Company Name:	Montana Opticom
Contact Information:	Phone: (877) 375-2263 Email: sales@bridgeband.net
Types of Service:	DSL from 20 Mbps up to 100 Mbps
Pricing:	*

Holding Company Name:	Montana Sky Networks
Filing Company Name:	Montana Sky Networks
Contact Information:	Phone: (406) 752-4335
Types of Service:	Wireless internet
Pricing:	*

Holding Company Name:	Nemont Telephone Cooperative, Inc.
Filing Company Name:	Nemont Telephone Cooperative, Inc.
Contact Information:	Phone: (800) 636-6680 Email: nemont@nemont.coop
Types of Service:	High-speed DSL on fiber-optic up to 10 Mbps; Satellite where DSL is not available 1.5 Mbps; VDSL in some locations up to 20 Mbps
Pricing:	1.5 Mbps for $43.95 per month, 6 Mbps for $50 per month, 30 Mbps for $110 per month, discounts available

Holding Company Name:	Northern Telephone Cooperative, Inc.
Filing Company Name:	Northern Telephone Cooperative, Inc.
Contact Information:	Phone: (877) 937-2114 Email: ntc@northerntel.net
Types of Service:	DSL with speed of 1 Mbps or 1.5 Mbps
Pricing:	1 Mbps for $50 per month, 1.5 Mbps for $75 per month; one time installation fee of $50, first month is free

Holding Company Name:	Oki Communications, LLC
Filing Company Name:	Oki Communications, LLC
Contact Information:	Phone: (406) 338-3222 Email: info@okicomm.com
Types of Service:	Wimax over the radio spectrum, up to 3 Mbps
Pricing:	2 Mbps for $58.95, 3 Mbps for $79.95 per month

Holding Company Name:	Bresnan Communications, LLC
Filing Company Name:	Optimum
Contact Information:	Phone: (866) 674-2943
Types of Service:	DSL from 15 Mbps to 30 Mbps
Pricing:	15 Mbps for $30 per month, 30 Mbps for $45 per month

Holding Company Name:	OrbitCom, Inc.
Filing Company Name:	OrbitCom, Inc.
Contact Information:	Phone: (866) 834-7837 Email: OrbitComcustomercare@OrbitCominc.net
Types of Service:	DSL
Pricing:	*

Holding Company Name:	Range Telephone Cooperative, Inc.
Filing Company Name:	Range Telephone Cooperative, Inc.
Contact Information:	Phone: (406) 347-2226
Types of Service:	DSL from 1 Mbps to 10 Mbps
Pricing:	*

Holding Company Name:	Reservation Telephone Cooperative
Filing Company Name:	Reservation Telephone Cooperative
Contact Information:	Phone: (888) 862-3115
Types of Service:	Fiber-optic, 1 Mbps
Pricing:	$70 per month

Holding Company Name:	Rocky Mountain Internet
Filing Company Name:	Rocky Mountain Internet
Contact Information:	Email: livewyr@rmtnnet.com
Types of Service:	Wireless Standard Service Wireless High-Speed Internet
Pricing:	*

Holding Company Name:	Southern Montana Telephone Company
Filing Company Name:	Southern Montana Telephone Company
Contact Information:	Phone: (888) 263-2270
Types of Service:	Fiber-optic up to 100 Mbps, DSL up to 5 Mbps
Pricing:	$39.90 per month for minimum system, 3 Mbps is $79.90 per month. Discounts available

Holding Company Name:	Sprint Nextel Corporation
Filing Company Name:	Sprint Nextel Corporation
Contact Information:	Phone: (800) 927-2199
Types of Service:	Wireless internet on 3G/4G network, peak downloads more than 10 Mbps
Pricing:	6 Gb of data for $50 per month 12 Gb of data for $80 per month

Holding Company Name:	StarBand Communications, Inc.
Filing Company Name:	StarBand Communications, Inc.
Contact Information:	Phone: (800) 478-2722 (Nathan Wills)
Types of Service:	Satellite and Wireless Internet; speeds from 512 Kbps to 1.5 Mbps
Pricing:	512 Kbps for $50 per month, 1 Mbps for $70 per month, 1.5 Mbps for $100 per month; equipment is $200, rebates available

Holding Company Name:	Tri County Telephone Association, Inc.
Filing Company Name:	Tri County Telephone Association, Inc.
Contact Information:	Phone: (800) 354-2911 Web: www.tctwest.net/high-speed-internet
Types of Service:	Cable Internet and Wireless Broadband
Pricing:	$42.45 per month

Holding Company Name:	Triangle Telephone Cooperative Assn., Inc.
Filing Company Name:	Triangle Telephone Cooperative Assn., Inc.
Contact Information:	Phone: (406) 394-7807
Types of Service:	Broadband, 768 Kbps to 3 Mbps
Pricing:	$66 to $76 for basic speeds

Holding Company Name:	tw telecom, Inc.
Filing Company Name:	tw telecom, Inc.
Contact Information:	Phone: (800) 829-0420 Web: www.twtelecom.com
Types of Service:	Ethernet
Pricing:	*

Holding Company Name:	USA Companies, L.P.
Filing Company Name:	USA Companies, L.P.
Contact Information:	Phone: (877) 234-0102 Web: www.rockymtncable.com
Types of Service:	DSL from 1.5 Mbps to 5 Mbps
Pricing:	*

Holding Company Name:	Verizon Communications, Inc.
Filing Company Name:	Verizon Communications, Inc.
Contact Information:	Web: www.vzw.com
Types of Service:	Wireless Broadband through 4G LTE, 3G, or extended 3G network. 5 - 12 Mbps download and 2 - 5 Mbps upload. Wi-Fi connectivity for up to 20 devices. Wired (Ethernet) connectivity for up to 4 devices
Pricing:	10 GB for $60, 20 GB for $90, and 30 GB for $120.

Holding Company Name:	West River Cooperative Telephone Company
Filing Company Name:	West River Cooperative Telephone Company
Contact Information:	Phone: (605) 244-5213 Web: www.sdplains.com/internet/high_speed.html
Types of Service:	DSL; 2-4 Mbps
Pricing:	$40 for 2 Mbps per month, $90 per month for 4 Mbps

Holding Company Name:	Western Montana Community Telephone
Filing Company Name:	Western Montana Community Telephone (also called Ronan Telephone Co. and Polson Community Telephone)
Contact Information:	Phone: (406) 676-0788
Types of Service:	Satellite, DSL, Wireless, Cable; from 512 Kbps up to 8 Mbps
Pricing:	512Kbps for $19.95 per month (residential only) 1.5 Mbps $29.95 residential or $34.95 business 4 Mbps $49.95 residential or $59.95 business 8 Mbps $59.95 residential or $69.95 business installation $50; non-profits can get the residential rate

Holding Company Name:	WildBlue Communications, Inc.
Filing Company Name:	WildBlue Communications, Inc.
Contact Information:	Phone: (877) 529-7680 Web: www.wildblue.com
Types of Service:	DSL; 5 Mbps
Pricing:	plans based on data consumed: 7.5 Gb for $50 per month, 15 Gb for $80 per month, 25 Gb for $130 per month; installation $149

Holding Company Name:	Windjammer Communications LLC
Filing Company Name:	Montana Sky TV
Contact Information:	Phone: (406) 293-8014
Types of Service:	Cable Broadband Internet, 1 Mbps to 10 Mbps
Pricing:	1 Mbps for $20 per month, 3 Mbps for $30 per month, 6 Mbps for $40 per month, 10 Mbps for $50 per month;

Holding Company Name:	WispWest.net
Filing Company Name:	WispWest.net
Contact Information:	Phone: (406) 222-5454 ext. 3 Email: support@wispwest.net
Types of Service:	High Speed Wireless Internet over radio waves, delivered via antenna
Pricing:	768 Kbps/768 Kbps for $29.95 per month 1.5 Mbps/1Mbps $39.95 per month 3 Mbps/1Mbps $49.00 per month 5 Mbps/2Mbps $59.00 per month 7 Mbps/3Mbps $69.00 per month

Holding Company Name:	Yellowstone Media Design
Filing Company Name:	Yellowstone Media Design
Contact Information:	Phone: (406) 848-7535
Types of Service:	*
Pricing:	*

Appendix III: Foundations Providing Financial Support to Montana Organizations

This appendix contains an expanded listing of granting institutions whose funds have been provided to Montana-based organizations. Two lists are shown below. The first provides information on Montana-based granting institutions. The second is of granting institutions located outside of Montana, but whose funds have been awarded to Montana-based organizations. Information is provided about the type of grant provided, granting institution, total grant amount, number of grants awarded between 2008 and 2011, a brief description of the granting institution's mission (if available), and an associated website (as of June 30, 2012). All granting institutions that have funded projects in categories that potentially apply to public libraries' efforts to increase Internet accessibility are listed. However, some organizations' missions may not be readily applicable. If this is the case, the mission statement of the associated granting institution reads "likely poor match."

Grant Funding Originating from Montana-based Foundations, 2008-2011

Category	Foundation	Amount	Grants	Mission	Website
Building/renovation	Charles M. Bair Memorial Trust	$ 3,325,000	15	Likely poor match.	http://www.charlesmbairtrusts.org/scholarship.html
Building/renovation	Gilhousen Family Foundation	$ 824,019	7		
Building/renovation	First Interstate BancSystem Foundation, Inc.	$ 190,833	7	Affordable housing projects, services targeted to low- and middle-income individuals, activities that revitalize or stabilize low- and middle-income geographies and activities that promote economic development.	https://www.firstinterstatebank.com/foundation/grant_guidelines.php
Building/renovation	O. P. and W. E. Edwards Foundation, Inc.	$ 144,050	5	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
Building/renovation	Dennis & Phyllis Washington Foundation, Inc.	$ 70,000	1	Education; health and human services; arts and culture; and community service.	http://www.dpwfoundation.org/organizations.php
Building/renovation	Town Pump Charitable Foundation	$ 50,000	1	Support Montana charitable or governmental organizations with a priority of supporting/meeting basic needs and education for Montana citizens.	http://www.townpump.com/index.aspx/corporate/community_giving
Collections acquisition	Gilhousen Family Foundation	$ 34,500	2		
Computer technology	Gilhousen Family Foundation	$ 210,133	3		
Computer technology	O. P. and W. E. Edwards Foundation, Inc.	$ 5,000	1	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html

Electronic media/online services	O. P. and W. E. Edwards Foundation, Inc.	$	147,500	4	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
Electronic media/online services	Gilhousen Family Foundation	$	10,000	1		
Equipment	Gilhousen Family Foundation	$	319,350	6		
Equipment	First Interstate BancSystem Foundation, Inc.	$	37,000	2	Affordable housing projects, services targeted to low- and middle-income individuals, activities that revitalize or stabilize low- and middle-income geographies and activities that promote economic development.	https://www.firstinterstatebank.com/foundation/grant_guidelines.php
Equipment	O. P. and W. E. Edwards Foundation, Inc.	$	15,000	1	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
Faculty/staff development	O. P. and W. E. Edwards Foundation, Inc.	$	324,684	14	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
Faculty/staff development	Gilhousen Family Foundation	$	152,137	7		
Faculty/staff development	First Interstate BancSystem Foundation, Inc.	$	25,000	1	Affordable housing projects, services targeted to low- and middle-income individuals, activities that revitalize or stabilize low- and middle-income geographies and activities that promote economic development.	https://www.firstinterstatebank.com/foundation/grant_guidelines.php
General/operating support	O. P. and W. E. Edwards Foundation, Inc.	$	4,460,825	131	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html

General/operating support	The Bair Ranch Foundation	$	3,905,420	6	Private nonprofit organizations whose primary purpose is to provide opportunities for people to acquire the knowledge, skills, desirable qualities of behavior and character, wisdom and general competence that will enable them to fully participate in and enjoy the social, political, economic and intellectual life of the community.	
General/operating support	Charles M. Bair Memorial Trust	$	3,325,000	15	Likely poor match.	http://www.charlesmbairtrusts.org/scholarship.html
General/operating support	Gilhousen Family Foundation	$	1,891,241	68		
General/operating support	Browning-Kimball Foundation	$	1,372,610	33	Improve, facilitate, and enhance cherished goals for youth and adults, in the community and in agriculture. Notable focus to Montana.	http://www.browningkimballfoundation.com/index.html
General/operating support	Oro y Plata Foundation	$	15,000	1	Arts; Children/youth, services; Education; Health organizations; Human services. Primarily Montana.	
General/operating support	First Interstate BancSystem Foundation, Inc.	$	12,000	1	Affordable housing projects, services targeted to low- and middle-income individuals, activities that revitalize or stabilize low- and middle-income geographies and activities that promote economic development.	https://www.firstinterstatebank.com/foundation/grant_guidelines.php
Income development	O. P. and W. E. Edwards Foundation, Inc.	$	50,000	2	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
Income development	First Interstate BancSystem Foundation, Inc.	$	10,000	1	Affordable housing projects, services targeted to low- and middle-income individuals, activities that revitalize or stabilize low- and middle-income geographies and activities that promote economic development.	https://www.firstinterstatebank.com/foundation/grant_guidelines.php
Management development/capacity building	O. P. and W. E. Edwards Foundation, Inc.	$	602,000	12	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
Management development/capacity building	Gilhousen Family Foundation	$	107,000	4		

Matching/challenge support	O. P. and W. E. Edwards Foundation, Inc.	$	225,179	12	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
Matching/challenge support	Gilhousen Family Foundation	$	108,100	3		
Program development	Dennis & Phyllis Washington Foundation, Inc.	$	19,289,915	155	Education; health and human services; arts and culture; and community service.	http://www.dpwfoundation.org/organizations.php
Program development	O. P. and W. E. Edwards Foundation, Inc.	$	7,210,972	191	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
Program development	Gilhousen Family Foundation	$	2,335,638	80		
Program development	Town Pump Charitable Foundation	$	395,000	25	Support Montana charitable or governmental organizations with a priority of supporting/meeting basic needs and education for Montana citizens.	http://www.townpump.com/index.aspx/corporate/community_giving
Program development	First Interstate BancSystem Foundation, Inc.	$	317,084	16	Affordable housing projects, services targeted to low- and middle-income individuals, activities that revitalize or stabilize low- and middle-income geographies and activities that promote economic development.	https://www.firstinterstatebank.com/foundation/grant_guidelines.php
Program development	Oro y Plata Foundation	$	145,000	6	Arts; Children/youth, services; Education; Health organizations; Human services. Primarily Montana.	
Program development	Charles M. Bair Family Trust	$	15,000	1	Support efforts in MT, specifically in Yellowstone, Meagher, and Wheatland counties.	http://www.charlesmbairtrusts.org/forms/grant/APPLICATION%20GUIDELINES.pdf

Grant Funding to Montana Organizations from Foundations Within and Outside of Montana, 2008-2011

Category	Foundation	Amount	Grants	Mission	Website
Building/renovation	M. J. Murdock Charitable Trust	$ 3,732,500	20	Funds programs specifically in the Pacific Northwest. Organizations involved in advancing culture and the arts are welcomed each year, as are projects targeted to elevating human services, health, and health care in the region.	http://www.murdock-trust.org/grants/index.php
Building/renovation	Charles M. Bair Memorial Trust	$ 3,165,000	13	Likely poor match.	http://www.charlesmbairtrusts.org/scholarship.html
Building/renovation	Richard King Mellon Foundation	$ 1,000,000	1	Southwest PA. Poor match.	http://foundationcenter.org/grantmaker/rkmellon/
Building/renovation	The Kresge Foundation	$ 850,000	2	Arts & culture; community development; education; environment; health; and human services.	http://www.kresge.org/funding
Building/renovation	Gilhousen Family Foundation	$ 824,019	7		
Building/renovation	Oak Hill Fund	$ 475,000	1		
Building/renovation	The Kendeda Fund	$ 409,500	2	The Kendeda Fund is a charitable giving program dedicated to exploring how human beings can relate to one another and to this planet more mindfully and use resources equitably.	
Building/renovation	The Arthur M. Blank Family Foundation	$ 202,450	7	Poor match. Primarily Atlanta and invite only.	http://www.blankfoundation.org/grant-seekers
Building/renovation	First Interstate BancSystem Foundation, Inc.	$ 178,333	6	Affordable housing projects, services targeted to low- and middle-income individuals, activities that revitalize or stabilize low- and middle-income geographies and activities that promote economic development.	https://www.firstinterstatebank.com/foundation/grant_guidelines.php
Building/renovation	The Paul G. Allen Family Foundation	$ 143,000	1	Primarily NW communities. Arts and culture; asset building; basic needs; education; libraries; and science and technology.	http://www.pgafoundations.com/TemplateMain.aspx?contentId=19
Building/renovation	The Martin Family Foundation	$ 104,000	3	Poor match. Supports faith-based initiatives.	http://martinfamilyfoundation.com/
Building/renovation	Dennis & Phyllis Washington Foundation, Inc.	$ 70,000	1	Education; health and human services; arts and culture; and community service.	http://www.dpwfoundation.org/organizations.php

Building/renovation	Stephen and Mary Birch Foundation, Inc.	$	50,000	1		
Building/renovation	BNSF Railway Foundation	$	50,000	1	Funds communities along a BNSF route. Supports civic services, cultural organizations, educational institutions, human and health services, and youth organizations.	http://www.bnsffoundation.org/
Building/renovation	Town Pump Charitable Foundation	$	50,000	1	Support Montana charitable or governmental organizations with a priority of supporting/meeting basic needs and education for Montana citizens.	http://www.townpump.com/index.aspx/corporate/community_giving
Building/renovation	The Cleveland Foundation	$	50,000	1	Primarily Cleveland. Poor match.	http://www.clevelandfoundation.org/Grantmaking/
Building/renovation	The Bullitt Foundation	$	50,000	1		
Building/renovation	Silicon Valley Community Foundation	$	46,000	2		
Building/renovation	U.S. Bancorp Foundation, Inc.	$	25,300	7		
Building/renovation	Community Foundation of New Jersey	$	25,000	1		
Building/renovation	Koch Foundation, Inc.	$	25,000	1		
Building/renovation	Apex Oil Company Charitable Foundation	$	20,000	1		
Building/renovation	The McMurry Foundation	$	14,142	1		

Building/renovation	Dr. Scholl Foundation	$	10,000	1		
Building/renovation	The Minneapolis Foundation	$	10,000	1		
Building/renovation	Community Foundation of Greater Memphis	$	10,000	1		
Building/renovation	The Max and Victoria Dreyfus Foundation, Inc.	$	10,000	1		
Building/renovation	Gannett Foundation, Inc.	$	2,079	2		
Building/renovation	The Denver Foundation	$	2,000	2		
Building/renovation	Arkansas Community Foundation, Inc.	$	1,000	1		
Collections acquisition	Gilhousen Family Foundation	$	34,500	2		
Collections acquisition	Lakeside Foundation	$	25,000	1		
Collections management/preservation	M. J. Murdock Charitable Trust	$	67,300	1	Funds programs specifically in the Pacific Northwest. Organizations involved in advancing culture and the arts are welcomed each year, as are projects targeted to elevating human services, health, and health care in the region.	http://www.murdock-trust.org/grants/index.php
Collections management/preservation	Lakeside Foundation	$	25,000	1		

Computer technology	Ford Foundation	$	1,000,000	1	Supports many different types of initiatives.	http://www.fordfoundation.org/pdfs/grants/grant-application-guide.pdf
Computer technology	Gilhousen Family Foundation	$	210,133	3		
Computer technology	Public Welfare Foundation, Inc.	$	150,000	1	Criminal justice, juvenile justice, and workers' rights.	http://www.publicwelfare.org/OurGrants.aspx
Computer technology	M. J. Murdock Charitable Trust	$	60,000	1	Funds programs specifically in the Pacific Northwest. Organizations involved in advancing culture and the arts are welcomed each year, as are projects targeted to elevating human services, health, and health care in the region.	http://www.murdock-trust.org/grants/index.php
Computer technology	The Paul G. Allen Family Foundation	$	20,000	1	Primarily NW communities. Arts and culture; asset building; basic needs; education; libraries; and science and technology.	http://www.pgafoundations.com/TemplateMain.aspx?contentId=19
Curriculum development	W. K. Kellogg Foundation	$	1,392,960	1	Educate kids, healthy kids, secure families, racial equity, and civic engagement.	http://www.wkkf.org/grants/for-grantseekers.aspx
Curriculum development	Carnegie Corporation of New York	$	169,900	1	Likely poor match.	http://carnegie.org/grants/grantseekers/
Curriculum development	American Honda Foundation	$	48,667	1	Youth education, specifically in the areas of science, technology, engineering, mathematics, the environment, job training and literacy.	http://corporate.honda.com/america/philanthropy.aspx?id=ahf
Curriculum development	O. P. and W. E. Edwards Foundation, Inc.	$	14,764	1	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
Curriculum development	The Sunshine Lady Foundation, Inc.	$	10,000	1	Advancement of education, well being and new life choices for disadvantaged people with special empathy for the working poor and families in crisis.	http://www.sunshinelady.org/
Curriculum development	The Allstate Foundation	$	7,500	1		
Electronic media/online services	Bill & Melinda Gates Foundation	$	590,000	1	Agricultural development; financial services for the poor; family homelessness; education (college-ready; early learning; libraries; postsecondary education); and empowering communities.	http://www.gatesfoundation.org/grantseeker/Pages/information-for-grant-seekers.aspx

Electronic media/online services	The Joyce Foundation	$	200,000	2	Research into Great Lakes protection and restoration, energy efficiency, teacher quality and early reading, workforce development, gun violence prevention, diverse art for diverse audiences, and a strong, thriving democracy.	http://www.joycefdn.org/
Electronic media/online services	Open Society Institute	$	160,000	1	Education and youth; health; media and information; and rights and justice.	http://www.soros.org/grants
Electronic media/online services	Public Welfare Foundation, Inc.	$	150,000	1	Criminal justice, juvenile justice, and workers' rights.	http://www.publicwelfare.org/OurGrants.aspx
Electronic media/online services	Ford Foundation	$	150,000	1	Supports many different types of initiatives.	http://www.fordfoundation.org/pdfs/grants/grant-application-guide.pdf
Electronic media/online services	M. J. Murdock Charitable Trust	$	60,000	1	Funds programs specifically in the Pacific Northwest. Organizations involved in advancing culture and the arts are welcomed each year, as are projects targeted to elevating human services, health, and health care in the region.	http://www.murdock-trust.org/grants/index.php
Electronic media/online services	Ethics & Excellence in Journalism Foundation	$	60,000	1		
Electronic media/online services	Gannett Foundation, Inc.	$	45,000	3		
Electronic media/online services	The Fondren Foundation	$	25,000	1		
Electronic media/online services	The William and Flora Hewlett Foundation	$	20,000	1	Education, environment, global development and population, performing arts, and philanthropy.	http://www.hewlett.org/grants/grantseekers
Electronic media/online services	Rochester Area Community Foundation	$	15,000	1		
Electronic media/online services	Gilhousen Family Foundation	$	10,000	1		
Equipment	M. J. Murdock Charitable Trust	$	5,973,800	26	Funds programs specifically in the Pacific Northwest. Organizations involved in advancing culture and the arts are welcomed each year, as are projects targeted to elevating human services, health, and health care in the region.	http://www.murdock-trust.org/grants/index.php
Equipment	Gilhousen Family Foundation	$	319,350	6		
Equipment	The Paul G. Allen Family Foundation	$	143,000	1	Primarily NW communities. Arts and culture; asset building; basic needs; education; libraries; and science and technology.	http://www.pgafoundations.com/TemplateMain.aspx?contentId=19
Equipment	The Arthur M. Blank Family Foundation	$	60,180	1	Poor match. Primarily Atlanta and invite only.	http://www.blankfoundation.org/grant-seekers
Equipment	The Hearst Foundation, Inc.	$	50,000	1	The Hearst Foundations support well-established nonprofit organizations that address important issues within our major areas of interests – education, health, culture, and social service – and that primarily serve large demographic and/or geographic constituencies.	http://hearstfdn.org/howtoapply.html

Equipment	First Interstate BancSystem Foundation, Inc.	$	12,000	1	Affordable housing projects, services targeted to low- and middle-income individuals, activities that revitalize or stabilize low- and middle-income geographies and activities that promote economic development.	https://www.firstinterstatebank.com/foundation/grant_guidelines.php
Equipment	Caterpillar Foundation	$	10,000	1		
Faculty/staff development	M. J. Murdock Charitable Trust	$	1,441,300	17	Funds programs specifically in the Pacific Northwest. Organizations involved in advancing culture and the arts are welcomed each year, as are projects targeted to elevating human services, health, and health care in the region.	http://www.murdock-trust.org/grants/index.php
Faculty/staff development	Ford Foundation	$	750,000	1	Supports many different types of initiatives.	http://www.fordfoundation.org/pdfs/grants/grant-application-guide.pdf
Faculty/staff development	The Andrew W. Mellon Foundation	$	296,000	1	Higher education and scholarship; scholarly communications and information technology; art history, conservation, and museums; performing arts; and conservation and the environment.	http://www.mellon.org/grant_programs/programs
Faculty/staff development	Gilhousen Family Foundation	$	142,137	6		
Faculty/staff development	O. P. and W. E. Edwards Foundation, Inc.	$	129,684	7	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
Faculty/staff development	The Paul G. Allen Family Foundation	$	100,000	1	Primarily NW communities. Arts and culture; asset building; basic needs; education; libraries; and science and technology.	http://www.pgafoundations.com/TemplateMain.aspx?contentId=19
Faculty/staff development	The Joyce Foundation	$	100,000	1	Research into Great Lakes protection and restoration, energy efficiency, teacher quality and early reading, workforce development, gun violence prevention, diverse art for diverse audiences, and a strong, thriving democracy.	http://www.joycefdn.org/
Faculty/staff development	Lilly Endowment Inc.	$	50,000	1		
Faculty/staff development	American Honda Foundation	$	48,667	1	Youth education, specifically in the areas of science, technology, engineering, mathematics, the environment, job training and literacy.	http://corporate.honda.com/america/philanthropy.aspx?id=ahf
Faculty/staff development	Qwest Foundation	$	45,500	1		
Faculty/staff development	Gordon and Betty Moore Foundation	$	21,000	1	The Gordon and Betty Moore Foundation seeks to advance environmental conservation and scientific research around the world and improve the quality of life in the San Francisco Bay Area.	http://www.moore.org/grants-awarded.aspx
Faculty/staff development	Raskob Foundation for Catholic Activities, Inc.	$	10,000	1		

General/operating support	The Bair Ranch Foundation	$	3,905,420	6	Private nonprofit organizations whose primary purpose is to provide opportunities for people to acquire the knowledge, skills, desirable qualities of behavior and character, wisdom and general competence that will enable them to fully participate in and enjoy the social, political, economic and intellectual life of the community.	
General/operating support	Charles M. Bair Memorial Trust	$	3,165,000	13	Likely poor match.	http://www.charlesmbairtrusts.org/scholarship.html
General/operating support	The William and Flora Hewlett Foundation	$	2,905,000	7	Education, environment, global development and population, performing arts, and philanthropy.	http://www.hewlett.org/grants/grantseekers
General/operating support	Ford Foundation	$	2,670,000	8	Supports many different types of initiatives.	http://www.fordfoundation.org/pdfs/grants/grant-application-guide.pdf
General/operating support	The Kendeda Fund	$	1,800,000	7	The Kendeda Fund is a charitable giving program dedicated to exploring how human beings can relate to one another and to this planet more mindfully and use resources equitably.	
General/operating support	Gilhousen Family Foundation	$	1,696,441	51		
General/operating support	O. P. and W. E. Edwards Foundation, Inc.	$	1,192,987	40	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
General/operating support	Lannan Foundation	$	1,075,000	6	Dedicated to cultural freedom, diversity and creativity through projects which support exceptional contemporary artists and writers, as well as inspired Native activists in rural indigenous communities.	http://www.lannan.org/
General/operating support	Foundation to Promote Open Society	$	1,060,000	5	Education and youth; health; media and information; and rights and justice.	http://www.soros.org/grants
General/operating support	Browning-Kimball Foundation	$	1,018,110	23	Improve, facilitate, and enhance cherished goals for youth and adults, in the community and in agriculture. Notable focus to Montana.	http://www.browningkimballfoundation.com/index.html
General/operating support	Silicon Valley Community Foundation	$	799,000	30		
General/operating support	The Pew Charitable Trusts	$	600,000	1		
General/operating support	The Nathan Cummings Foundation	$	370,000	2		
General/operating support	Howard Charitable Foundation	$	350,000	4		
General/operating support	Pema Foundation	$	321,615	3		
General/operating support	The Smart Family Foundation, Inc.	$	300,000	3		
General/operating support	Rockefeller Brothers Fund, Inc.	$	250,000	2		
General/operating support	Lilly Endowment Inc.	$	250,000	5		
General/operating support	The Cotswold Foundation	$	250,000	1		
General/operating support	The Minneapolis Foundation	$	226,386	39		
General/operating support	The F. Maytag Family Foundation	$	200,000	2		
General/operating support	The Cleveland Foundation	$	197,126	5	Primarily Cleveland. Poor match.	http://www.clevelandfoundation.org/Grantmaking/
General/operating support	Bohemian Foundation	$	168,081	1		
General/operating support	The Kresge Foundation	$	160,000	1	Arts & culture; community development; education; environment; health; and human services.	http://www.kresge.org/funding

General/operating support	Robertson Foundation	$	152,000	2		
General/operating support	The Seattle Foundation	$	145,500	13		
General/operating support	MDU Resources Foundation	$	145,500	8		
General/operating support	Claude R. Lambe Charitable Foundation	$	130,000	2		
General/operating support	U.S. Bancorp Foundation, Inc.	$	125,200	34		
General/operating support	The Paul G. Allen Family Foundation	$	120,000	1	Primarily NW communities. Arts and culture; asset building; basic needs; education; libraries; and science and technology.	http://www.pgafoundations.com/TemplateMain.aspx?contentId=19
General/operating support	Sarah Scaife Foundation, Inc.	$	110,000	3		
General/operating support	Boston Foundation, Inc.	$	108,656	17		
General/operating support	The Arthur M. Blank Family Foundation	$	102,200	11	Poor match. Primarily Atlanta and invite only.	http://www.blankfoundation.org/grant-seekers
General/operating support	Turner Foundation, Inc.	$	100,000	1	Committed to preventing damage to the natural systems - water, air, and land - on which all life depends.	http://www.turnerfoundation.org/grants/index.asp
General/operating support	The F. B. Heron Foundation	$	100,000	1		
General/operating support	The Wilburforce Foundation	$	90,000	5	Environmental conservation.	http://www.wilburforce.org/for-grantseekers/
General/operating support	Gladys and Roland Harriman Foundation	$	85,000	2		
General/operating support	The Lynde and Harry Bradley Foundation, Inc.	$	85,000	5		
General/operating support	Jessie Smith Noyes Foundation, Inc.	$	80,000	4		
General/operating support	Bunting Family Foundation, Inc.	$	70,000	2		
General/operating support	Northwest Area Foundation	$	70,000	2	Focus on: increased assets and wealth among people with low incomes; increased capacity and leadership to reduce poverty; and improved public policy solutions to reduce poverty.	http://www.nwaf.org/Content/Grants
General/operating support	Kalliopeia Foundation	$	60,000	1		
General/operating support	The San Francisco Foundation	$	56,500	16	Primarily the Bay Area. Poor match.	
General/operating support	The Shubert Foundation, Inc.	$	55,000	3		
General/operating support	The Tapeats Fund	$	51,668	2		
General/operating support	The Libra Foundation	$	50,000	1		
General/operating support	Earhart Foundation	$	50,000	2		
General/operating support	Hess Foundation, Inc.	$	50,000	2		
General/operating support	The New York Community Trust	$	49,000	22		
General/operating support	The Oregon Community Foundation	$	48,000	9		
General/operating support	The Denver Foundation	$	44,440	15		
General/operating support	George B. Storer Foundation, Inc.	$	40,000	2		
General/operating support	The Roe Foundation	$	40,000	3		
General/operating support	General Motors Foundation, Inc.	$	38,000	2		
General/operating support	The San Diego Foundation	$	35,000	3		
General/operating support	The East Bay Community Foundation	$	33,000	4		
General/operating support	General Mills Foundation	$	30,500	4		
General/operating support	The Ambrose Monell Foundation	$	30,000	3		
General/operating support	HRH Foundation	$	30,000	2		
General/operating support	Wood-Claeyssens Foundation	$	30,000	1		
General/operating support	Flora Family Foundation	$	30,000	1		
General/operating support	Yum! Brands Foundation, Inc.	$	29,950	2		
General/operating support	Linden Root Dickinson Foundation	$	25,000	1		
General/operating support	Eula Mae and John Baugh Foundation	$	25,000	1		
General/operating support	Edward John Noble Foundation, Inc.	$	25,000	1		
General/operating support	Homer A. & Mildred S. Scott Foundation	$	25,000	2		
General/operating support	Gannett Foundation, Inc.	$	24,321	5		
General/operating support	Community Foundation of North Texas	$	23,000	6		
General/operating support	The Thomas and Stacey Siebel Foundation	$	22,000	3	Meth and stem cell research.	

General/operating support	Arkansas Community Foundation, Inc.	$	20,638	3		
General/operating support	Ethics & Excellence in Journalism Foundation	$	20,379	1		
General/operating support	Dalio Family Foundation, Inc.	$	20,000	2		
General/operating support	Vital Projects Fund, Inc.	$	20,000	1		
General/operating support	The Martin Family Foundation	$	20,000	1	Poor match. Supports faith-based initiatives.	http://martinfamilyfoundation.com/
General/operating support	The Bobolink Foundation	$	20,000	2		
General/operating support	Safeco Insurance Foundation	$	15,000	1		
General/operating support	Oro y Plata Foundation	$	15,000	1	Arts; Children/youth, services; Education; Health organizations; Human services. Primarily Montana.	
General/operating support	The Lowndes Foundation, Inc.	$	15,000	1		
General/operating support	Eugene V. & Clare E. Thaw Charitable Trust	$	15,000	1		
General/operating support	Ben & Jerry's Foundation, Inc.	$	15,000	1		
General/operating support	First Interstate BancSystem Foundation, Inc.	$	12,000	1	Affordable housing projects, services targeted to low- and middle-income individuals, activities that revitalize or stabilize low- and middle-income geographies and activities that promote economic development.	https://www.firstinterstatebank.com/foundation/grant_guidelines.php
General/operating support	Inland Northwest Community Foundation	$	12,000	2		
General/operating support	Firedoll Foundation	$	11,000	1		
General/operating support	The Annie E. Casey Foundation	$	10,000	2	The Annie E. Casey Foundation is limited to initiatives in the United States that have significant potential to demonstrate innovative policy, service delivery, and community supports for disadvantaged children and families.	http://www.aecf.org/AboutUs/GrantInformation.aspx
General/operating support	Dominion Foundation	$	10,000	1		
General/operating support	Tosa Foundation	$	10,000	1		
General/operating support	The Ernest Gallo Foundation	$	10,000	1		
General/operating support	Gordon and Betty Moore Foundation	$	9,000	2	The Gordon and Betty Moore Foundation seeks to advance environmental conservation and scientific research around the world and improve the quality of life in the San Francisco Bay Area.	http://www.moore.org/grants-awarded.aspx
General/operating support	The Edna Wardlaw Charitable Trust	$	7,500	1		
General/operating support	Dyson Foundation	$	7,500	1		
General/operating support	The Community Foundation Serving Richmond & Central Virginia	$	7,000	3		
General/operating support	The Summerlee Foundation	$	6,000	1		
General/operating support	Koret Foundation	$	6,000	2		
General/operating support	Public Welfare Foundation, Inc.	$	5,000	1	Criminal justice, juvenile justice, and workers' rights.	http://www.publicwelfare.org/OurGrants.aspx
General/operating support	Tulsa Community Foundation	$	5,000	1		
General/operating support	The Sidley Austin Foundation	$	5,000	1		
General/operating support	Hill-Snowdon Foundation	$	5,000	1		
General/operating support	Community Foundation of Greater Memphis	$	4,000	4		
General/operating support	Marguerite Casey Foundation	$	4,000	2		
General/operating support	Macy's Foundation	$	3,000	1		
General/operating support	The Greystone Foundation	$	3,000	1		
General/operating support	Triad Foundation, Inc.	$	2,500	1		
General/operating support	The Ford Family Foundation	$	2,000	1		
General/operating support	Rochester Area Community Foundation	$	1,000	1		
General/operating support	Kinder Foundation	$	1,000	1		

General/operating support	Adirondack Community Trust	$	1,000	1		
General/operating support	Enterprise Holdings Foundation	$	1,000	1		
General/operating support	The Baltimore Community Foundation	$	1,000	1		
Income development	Ford Foundation	$	1,750,000	2	Supports many different types of initiatives.	http://www.fordfoundation.org/pdfs/grants/grant-application-guide.pdf
Income development	M. J. Murdock Charitable Trust	$	709,000	6	Funds programs specifically in the Pacific Northwest. Organizations involved in advancing culture and the arts are welcomed each year, as are projects targeted to elevating human services, health, and health care in the region.	http://www.murdock-trust.org/grants/index.php
Income development	Bush Foundation	$	261,750	1	Poor match. Primarily MN, ND, and SD.	http://www.bushfoundation.org/
Income development	Homer A. & Mildred S. Scott Foundation	$	103,333	4		
Income development	BNSF Railway Foundation	$	50,000	1	Funds communities along a BNSF route. Supports civic services, cultural organizations, educational institutions, human and health services, and youth organizations.	http://www.bnsffoundation.org/
Income development	Carnegie Corporation of New York	$	50,000	1	Likely poor match.	http://carnegie.org/grants/grantseekers/
Income development	The Paul G. Allen Family Foundation	$	50,000	1	Primarily NW communities. Arts and culture; asset building; basic needs; education; libraries; and science and technology.	http://www.pgafoundations.com/TemplateMain.aspx?contentId=19
Income development	First Interstate BancSystem Foundation, Inc.	$	10,000	1	Affordable housing projects, services targeted to low- and middle-income individuals, activities that revitalize or stabilize low- and middle-income geographies and activities that promote economic development.	https://www.firstinterstatebank.com/foundation/grant_guidelines.php
Income development	The McMurry Foundation	$	1,500	1		
Income development	Lannan Foundation	$	1,000	1	Dedicated to cultural freedom, diversity and creativity through projects which support exceptional contemporary artists and writers, as well as inspired Native activists in rural indigenous communities.	http://www.lannan.org/
Management development/capacity building	Ford Foundation	$	1,975,000	3	Supports many different types of initiatives.	http://www.fordfoundation.org/pdfs/grants/grant-application-guide.pdf
Management development/capacity building	M. J. Murdock Charitable Trust	$	725,000	5	Funds programs specifically in the Pacific Northwest. Organizations involved in advancing culture and the arts are welcomed each year, as are projects targeted to elevating human services, health, and health care in the region.	http://www.murdock-trust.org/grants/index.php
Management development/capacity building	The Paul G. Allen Family Foundation	$	605,000	4	Primarily NW communities. Arts and culture; asset building; basic needs; education; libraries; and science and technology.	http://www.pgafoundations.com/TemplateMain.aspx?contentId=19
Management development/capacity building	The Wilburforce Foundation	$	595,000	2	Environmental conservation.	http://www.wilburforce.org/for-grantseekers/

Management development/capacity building	Charles Stewart Mott Foundation	$	300,000	2	Civic participation; community foundations; community organizing; income security; nonprofit sector; sustainable development; vulernable youth; and workforce development.	http://www.mott.org/grantsandguidelines/ForGrantseekers.aspx
Management development/capacity building	Bush Foundation	$	261,750	1	Poor match. Primarily MN, ND, and SD.	http://www.bushfoundation.org/
Management development/capacity building	Gordon and Betty Moore Foundation	$	198,915	1	The Gordon and Betty Moore Foundation seeks to advance environmental conservation and scientific research around the world and improve the quality of life in the San Francisco Bay Area.	http://www.moore.org/grants-awarded.aspx
Management development/capacity building	O. P. and W. E. Edwards Foundation, Inc.	$	160,000	6	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
Management development/capacity building	V. Kann Rasmussen Foundation	$	100,000	2		
Management development/capacity building	The Kendeda Fund	$	100,000	1	The Kendeda Fund is a charitable giving program dedicated to exploring how human beings can relate to one another and to this planet more mindfully and use resources equitably.	
Management development/capacity building	Gilhousen Family Foundation	$	95,000	3		
Management development/capacity building	Northwest Area Foundation	$	85,000	2	Focus on: increased assets and wealth among people with low incomes; increased capacity and leadership to reduce poverty; and improved public policy solutions to reduce poverty.	http://www.nwaf.org/Content/Grants
Management development/capacity building	GE Foundation	$	75,000	1		
Management development/capacity building	The Annie E. Casey Foundation	$	50,000	1	The Annie E. Casey Foundation is limited to initiatives in the United States that have significant potential to demonstrate innovative policy, service delivery, and community supports for disadvantaged children and families.	http://www.aecf.org/AboutUs/GrantInformation.aspx
Management development/capacity building	Carnegie Corporation of New York	$	50,000	1	Likely poor match.	http://carnegie.org/grants/grantseekers/
Management development/capacity building	Homer A. & Mildred S. Scott Foundation	$	33,333	1		
Management development/capacity building	The William and Flora Hewlett Foundation	$	25,000	1	Education, environment, global development and population, performing arts, and philanthropy.	http://www.hewlett.org/grants/grantseekers
Management development/capacity building	Gaylord and Dorothy Donnelley Foundation	$	25,000	1		
Management development/capacity building	Rockefeller Brothers Fund, Inc.	$	5,000	1		
Management development/capacity building	The Arthur M. Blank Family Foundation	$	4,500	3	Poor match. Primarily Atlanta and invite only.	http://www.blankfoundation.org/grant-seekers
Matching/challenge support	The Kresge Foundation	$	850,000	2	Arts & culture; community development; education; environment; health; and human services.	http://www.kresge.org/funding
Matching/challenge support	Gilhousen Family Foundation	$	108,100	3		

Matching/challenge support	O. P. and W. E. Edwards Foundation, Inc.	$	60,179	3	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
Matching/challenge support	The Martin Family Foundation	$	45,000	1	Poor match. Supports faith-based initiatives.	http://martinfamilyfoundation.com/
Matching/challenge support	The William and Flora Hewlett Foundation	$	24,000	1	Education, environment, global development and population, performing arts, and philanthropy.	http://www.hewlett.org/grants/grantseekers
Matching/challenge support	Ethics & Excellence in Journalism Foundation	$	20,379	1		
Matching/challenge support	The Charlotte W. Newcombe Foundation	$	20,000	1		
Matching/challenge support	Homer A. & Mildred S. Scott Foundation	$	10,000	1		
Program development	Dennis & Phyllis Washington Foundation, Inc.	$	16,025,090	134	Education; health and human services; arts and culture; and community service.	http://www.dpwfoundation.org/organizations.php
Program development	The David and Lucile Packard Foundation	$	15,485,000	5	Conservation and science; population and reproductive health; and children, families, and communities.	http://www.packard.org/what-we-fund/
Program development	The Thomas and Stacey Siebel Foundation	$	4,034,000	14	Meth and stem cell research.	
Program development	Northwest Area Foundation	$	3,839,500	16	Focus on: increased assets and wealth among people with low incomes; increased capacity and leadership to reduce poverty; and improved public policy solutions to reduce poverty.	http://www.nwaf.org/Content/Grants
Program development	Ford Foundation	$	3,610,500	9	Supports many different types of initiatives.	http://www.fordfoundation.org/pdfs/grants/grant-application-guide.pdf
Program development	Gordon and Betty Moore Foundation	$	3,174,816	4	The Gordon and Betty Moore Foundation seeks to advance environmental conservation and scientific research around the world and improve the quality of life in the San Francisco Bay Area.	http://www.moore.org/grants-awarded.aspx
Program development	W. K. Kellogg Foundation	$	2,996,000	7	Educate kids, healthy kids, secure families, racial equity, and civic engagement.	http://www.wkkf.org/grants/for-grantseekers.aspx
Program development	M. J. Murdock Charitable Trust	$	2,278,800	13	Funds programs specifically in the Pacific Northwest. Organizations involved in advancing culture and the arts are welcomed each year, as are projects targeted to elevating human services, health, and health care in the region.	http://www.murdock-trust.org/grants/index.php
Program development	Gilhousen Family Foundation	$	2,161,538	67		
Program development	O. P. and W. E. Edwards Foundation, Inc.	$	1,938,987	66	The O.P. and W.E. Edwards Foundation General Fund supports organizations that help provide a bridge to a life of greater opportunity to low-income, at-risk, underserved youth and children.	http://opweedwards.org/Philosophy_of_Giving.html
Program development	The Wilburforce Foundation	$	1,687,000	33	Environmental conservation.	http://www.wilburforce.org/for-grantseekers/
Program development	Bernard Osher Foundation	$	1,150,000	2	Lifelong learning; integrative medicine; local arts and education.	http://www.osherfoundation.org/index.php?programs

Program development	The Robert Wood Johnson Foundation	$	1,136,146	4	Improve health and health care of all Americans.	http://www.rwjf.org/grants/
Program development	The Paul G. Allen Family Foundation	$	1,130,000	9	Primarily NW communities. Arts and culture; asset building; basic needs; education; libraries; and science and technology.	http://www.pgafoundations.com/TemplateMain.aspx?contentId=19
Program development	The Kresge Foundation	$	907,314	4	Arts & culture; community development; education; environment; health; and human services.	http://www.kresge.org/funding
Program development	The Bullitt Foundation	$	763,000	25		
Program development	Charles Stewart Mott Foundation	$	707,000	5	Civic participation; community foundations; community organizing; income security; nonprofit sector; sustainable development; vulernable youth; and workforce development.	http://www.mott.org/grantsandguidelines/ForGrantseekers.aspx
Program development	The William and Flora Hewlett Foundation	$	689,000	4	Education, environment, global development and population, performing arts, and philanthropy.	http://www.hewlett.org/grants/grantseekers
Program development	The Susan Thompson Buffett Foundation	$	650,850	1		
Program development	The Kendeda Fund	$	600,000	4	The Kendeda Fund is a charitable giving program dedicated to exploring how human beings can relate to one another and to this planet more mindfully and use resources equitably.	
Program development	The John D. and Catherine T. MacArthur Foundation	$	600,000	2	Broad mission statement.	http://www.macfound.org/
Program development	Toyota USA Foundation	$	550,676	2		
Program development	Alaska Conservation Foundation	$	415,301	3		
Program development	Lannan Foundation	$	400,000	5	Dedicated to cultural freedom, diversity and creativity through projects which support exceptional contemporary artists and writers, as well as inspired Native activists in rural indigenous communities.	http://www.lannan.org/
Program development	Town Pump Charitable Foundation	$	395,000	25	Support Montana charitable or governmental organizations with a priority of supporting/meeting basic needs and education for Montana citizens.	http://www.townpump.com/index.aspx/corporate/community_giving
Program development	The Annie E. Casey Foundation	$	390,000	10	The Annie E. Casey Foundation is limited to initiatives in the United States that have significant potential to demonstrate innovative policy, service delivery, and community supports for disadvantaged children and families.	http://www.aecf.org/AboutUs/GrantInformation.aspx
Program development	The Nathan Cummings Foundation	$	370,000	2		
Program development	The New York Community Trust	$	250,000	3		
Program development	Lumina Foundation for Education, Inc.	$	238,800	2		
Program development	Foundation to Promote Open Society	$	225,000	1	Education and youth; health; media and information; and rights and justice.	http://www.soros.org/grants

Program development	The Joyce Foundation	$	220,000	3	Research into Great Lakes protection and restoration, energy efficiency, teacher quality and early reading, workforce development, gun violence prevention, diverse art for diverse audiences, and a strong, thriving democracy.	http://www.joycefdn.org/
Program development	Silicon Valley Community Foundation	$	206,000	10		
Program development	Helene Fuld Health Trust	$	200,000	1		
Program development	Carnegie Corporation of New York	$	150,000	1	Likely poor match.	http://carnegie.org/grants/grantseekers/
Program development	Public Welfare Foundation, Inc.	$	150,000	1	Criminal justice, juvenile justice, and workers' rights.	http://www.publicwelfare.org/OurGrants.aspx
Program development	Mitsubishi Corporation Foundation for the Americas	$	150,000	1		
Program development	Oro y Plata Foundation	$	145,000	6	Arts; Children/youth, services; Education; Health organizations; Human services. Primarily Montana.	
Program development	The Marisla Foundation	$	140,000	6		
Program development	The Arthur M. Blank Family Foundation	$	139,700	9	Poor match. Primarily Atlanta and invite only.	http://www.blankfoundation.org/grant-seekers
Program development	Homer A. & Mildred S. Scott Foundation	$	136,500	6		
Program development	First Interstate BancSystem Foundation, Inc.	$	130,000	7	Affordable housing projects, services targeted to low- and middle-income individuals, activities that revitalize or stabilize low- and middle-income geographies and activities that promote economic development.	https://www.firstinterstatebank.com/foundation/grant_guidelines.php
Program development	The Martin Family Foundation	$	129,000	5	Poor match. Supports faith-based initiatives.	http://martinfamilyfoundation.com/
Program development	Alfred P. Sloan Foundation	$	128,789	2		
Program development	The Minneapolis Foundation	$	125,000	3		
Program development	U.S. Bancorp Foundation, Inc.	$	113,500	48		
Program development	Qwest Foundation	$	112,000	4		
Program development	The John Merck Fund	$	110,000	2		
Program development	Caterpillar Foundation	$	100,000	1		
Program development	Dominion Foundation	$	100,000	2		
Program development	Peter Kiewit Foundation	$	100,000	2		
Program development	The Libra Foundation	$	100,000	2		
Program development	The Hearst Foundation, Inc.	$	100,000	1	The Hearst Foundations support well-established nonprofit organizations that address important issues within our major areas of interests – education, health, culture, and social service – and that primarily serve large demographic and/or geographic constituencies.	http://hearstfdn.org/howtoapply.html
Program development	The California Endowment	$	100,000	1		
Program development	The Seattle Foundation	$	91,000	3		
Program development	Ethics & Excellence in Journalism Foundation	$	90,000	2		
Program development	The Wal-Mart Foundation, Inc.	$	86,000	4		
Program development	Otto Bremer Foundation	$	80,000	2		
Program development	General Mills Foundation	$	80,000	9		
Program development	The Thoresen Foundation	$	75,000	1		
Program development	Harold E. & Phyllis S. Thomas Foundation	$	73,000	2		
Program development	The J. M. Kaplan Fund, Inc.	$	65,000	2		
Program development	Charles G. Koch Charitable Foundation	$	62,644	2		
Program development	The East Bay Community Foundation	$	55,421	1		

Program development	V. Kann Rasmussen Foundation	$	50,000	1		
Program development	The Regina Bauer Frankenberg Foundation	$	50,000	1		
Program development	The Lynde and Harry Bradley Foundation, Inc.	$	50,000	1		
Program development	Lilly Endowment Inc.	$	50,000	1		
Program development	Laura Moore Cunningham Foundation, Inc.	$	50,000	1		
Program development	Edward John Noble Foundation, Inc.	$	50,000	1		
Program development	MetLife Foundation	$	45,000	1		
Program development	Jessie Smith Noyes Foundation, Inc.	$	45,000	2		
Program development	Oak Hill Fund	$	41,000	2		
Program development	S.D. Bechtel, Jr. Foundation	$	40,000	1		
Program development	The Pittsburgh Foundation	$	37,884	3		
Program development	Annenberg Foundation	$	35,000	2		
Program development	Park Foundation, Inc.	$	35,000	2		
Program development	Marguerite Casey Foundation	$	32,000	3		
Program development	Surdna Foundation, Inc.	$	30,000	2		
Program development	Windgate Charitable Foundation, Inc.	$	30,000	1		
Program development	Turner Foundation, Inc.	$	30,000	1	Committed to preventing damage to the natural systems - water, air, and land - on which all life depends.	http://www.turnerfoundation.org/grants/index.asp
Program development	Gannett Foundation, Inc.	$	30,000	2		
Program development	The Stewardship Foundation	$	30,000	2		
Program development	The Russell Family Foundation	$	30,000	1		
Program development	The McKnight Foundation	$	30,000	1		
Program development	The Butler Family Fund	$	30,000	2		
Program development	The Cotswold Foundation	$	26,000	1		
Program development	RGK Foundation	$	25,000	1		
Program development	Flora Family Foundation	$	25,000	1		
Program development	Alcoa Foundation	$	22,000	1		
Program development	Stephen and Mary Birch Foundation, Inc.	$	20,000	2		
Program development	Deer Creek Foundation	$	20,000	1		
Program development	The Baltimore Community Foundation	$	20,000	2		
Program development	Lisa and Douglas Goldman Fund	$	15,000	1		
Program development	Charles M. Bair Family Trust	$	15,000	1	Support efforts in MT, specifically in Yellowstone, Meagher, and Wheatland counties.	http://www.charlesmbairtrusts.org/forms/grant/APPLICATION%20GUIDELINES.pdf
Program development	E. Rhodes & Leona B. Carpenter Foundation	$	15,000	1		
Program development	Community Foundation of Jackson Hole	$	14,000	1		
Program development	The Medtronic Foundation	$	13,470	1		
Program development	Community Foundation of New Jersey	$	12,500	1		
Program development	ExxonMobil Foundation	$	12,500	2		
Program development	The Coleman Foundation, Inc.	$	12,500	1		
Program development	The San Francisco Foundation	$	12,200	1	Primarily the Bay Area. Poor match.	
Program development	Earhart Foundation	$	11,000	1		
Program development	The Chatlos Foundation, Inc.	$	11,000	2		
Program development	Coastal Community Foundation of South Carolina	$	10,000	1	Likely poor match.	http://www.coastalcommunityfoundation.org/nonprofits/grants.html
Program development	Citi Foundation	$	10,000	1		
Program development	Koch Foundation, Inc.	$	10,000	1		
Program development	Kiewit Companies Foundation	$	10,000	1		
Program development	The Case Foundation	$	10,000	1		
Program development	OneFamily Foundation	$	8,000	1		
Program development	CVS Caremark Charitable Trust, Inc.	$	7,500	2		
Program development	Rochester Area Community Foundation	$	5,900	2		
Program development	The Kenneth T. and Eileen L. Norris Foundation	$	5,000	1		
Program development	The Oregon Community Foundation	$	4,000	1		

Program development	The Denver Foundation	$	3,000	1		
Program development	BNSF Railway Foundation	$	2,500	1	Funds communities along a BNSF route. Supports civic services, cultural organizations, educational institutions, human and health services, and youth organizations.	http://www.bnsffoundation.org/
Program development	The Chrysler Foundation	$	2,200	1		
Program development	The San Diego Foundation	$	1,000	1		
Technical assistance	Ford Foundation	$	500,000	1	Supports many different types of initiatives.	http://www.fordfoundation.org/pdfs/grants/grant-application-guide.pdf
Technical assistance	Lannan Foundation	$	300,000	1	Dedicated to cultural freedom, diversity and creativity through projects which support exceptional contemporary artists and writers, as well as inspired Native activists in rural indigenous communities.	http://www.lannan.org/
Technical assistance	The Paul G. Allen Family Foundation	$	225,000	1	Primarily NW communities. Arts and culture; asset building; basic needs; education; libraries; and science and technology.	http://www.pgafoundations.com/TemplateMain.aspx?contentId=19

Appendix IV: Proposed Library IT Districts

This appendix contains a listing of proposed library IT Districts corresponding with Figure 13. Libraries marked with an asterisk (*) are designated as 'hub' libraries, the central IT servicers for the districts.

Library Name	Urbanicity	Computers
District 1		
Big Horn County Public Library	Town	34
Bridger Public Library	Remote	7
Carnegie Public Library	Remote	15
Joliet Public Library	Rural	5
Laurel Public Library	Town	22
Parmly Billings Library*	City	99
Red Lodge Carnegie Library	Remote	10
Stillwater County Library	Remote	9
Total Number of Computers in District 1		**201**
District 2		
Culbertson Public Library	Remote	0
Daniels County Library	Remote	4
Froid Branch Library	Remote	0
Glasgow City-County Library	Town	14
Poplar City Library	Town	0
Roosevelt County Library*	Town	30
Total Number of Computers in District 2		**48**
District 3		
Belt Public Library	Rural	13
Choteau/Teton Public Library	Remote	14
Chouteau County Library	Remote	19
Dutton/Teton Public Library	Remote	7
Fairfield/Teton Public Library	Remote	12
Geraldine Branch Library	Remote	0
Great Falls Public Library*	City	66
Lewis and Clark Library Augusta Branch	Remote	0
Wedsworth Memorial Library	Rural	6
Total Number of Computers in District 3		**137**

* IT hub library

Library Name	Urbanicity	Computers
District 4		
Denton Public Library	Remote	4
Dorothy Asbjornson Community Library	Remote	3
Harlowton Public Library	Remote	17
Hobson Community Library	Remote	5
Judith Basin County Free Library	Remote	7
Lewistown Public Library*	Town	15
Moore Public Library	Remote	3
Total Number of Computers in District 4		**54**
District 5		
Browning Branch Library	Town	5
Conrad Public Library	Town	16
East Glacier Park Branch Library	Remote	0
Glacier County Library	Town	21
Liberty County Library	Remote	12
North Toole County Library	Remote	4
Toole County Library*	Town	10
Valier Public Library	Remote	10
Total Number of Computers in District 5		**78**
District 6		
Big Sandy Branch Library	Remote	3
Blaine County Library	Remote	9
Harlem Public Library	Remote	4
Havre-Hill County Library*	Town	16
Total Number of Computers in District 6		**130**
District 7		
Jefferson County Library System	Remote	25
Lewis and Clark Library East Helena Branch	Town	0
Lewis and Clark Library Lincoln Branch	Remote	0
Lewis and Clark Library*	Town	87
Meagher County/City Library	Remote	12
North Jefferson County Library District	Rural	6
Total Number of Computers in District 7		**130**

* IT hub library

Library Name	Urbanicity	Computers
District 8		
Butte-Silver Bow Public Library South Branch	Town	15
Butte-Silver Bow Public Library*	Town	66
Dillon Public Library	Town	13
Hearst Free Library	Town	17
Philipsburg Public Library	Remote	4
Sheridan County Library	Remote	17
Twin Bridges Public Library	Remote	10
Whitehall Community Library	Remote	0
William K. Kohrs Memorial Library	Town	10
Total Number of Computers in District 8		**152**
District 9		
Belgrade Community Library	Town	23
Bozeman Public Library*	Town	72
Livingston-Park County Public Library	Town	38
Madison Valley Public Library	Remote	12
Thompson-Hickman County Library	Remote	11
Three Forks Community Library	Remote	8
Total Number of Computers in District 9		**164**
District 10		
Alberton Branch Library	Rural	2
Big Sky Branch Library	Remote	3
Bitterroot Public Library	Town	25
Darby Community Public Library	Remote	14
Mineral County Public Library	Remote	37
Missoula Public Library*	City	121
North Valley Public Library	Rural	26
Ronan City Library	Remote	13
Seeley Lake Branch Library	Remote	4
Swan Valley Community Library	Remote	5
Total Number of Computers in District 10		**250**

* IT hub library

Library Name	Urbanicity	Computers
District 11		
Bigfork Branch Library	Remote	5
Columbia Falls Branch Library	Town	11
Eureka Branch Library	Remote	0
Flathead County Library System*	Town	124
Lincoln County Public Libraries	Town	34
Marion Branch Library	Remote	14
North Lake County Public Library	Town	23
Plains Public Library District	Remote	9
Preston Hot Springs Town-County Library	Remote	15
Whitefish Branch Library	Town	0
Total Number of Computers in District 11		**235**
District 12		
Glendive Public Library*	Town	19
Miles City Public Library	Town	33
George McCone Memorial County Library	Remote	4
Richey Public Library	Remote	1
Sidney-Richland County Library	Town	20
Wibaux Public Library	Remote	9
Fallon County Library	Remote	13
Prairie County Library	Remote	10
Total Number of Computers in District 12		**109**

Independent Libraries

Library	Urbanicity	Computers
Bicentennial Library of Colstrip	Remote	0
Dodson Branch Library	Remote	0
Ekalaka Public Library	Remote	4
Garfield County Library	Remote	4
Henry A Malley Memorial Library	Remote	6
Opheim Community Library	Remote	0
Phillips County Library	Remote	8
Rosebud County Library	Remote	26
Saco Branch Library	Remote	0
Sheridan Public Library	Remote	7
Thompson Falls Public Library	Remote	11
Troy Branch Library	Remote	0
West Yellowstone Public Library	Remote	10
Total Number of Computers in Independent Libraries		**76.0**

* IT hub library

Library Name	Urbanicity	Computers

School-Community Libraries

Library	Urbanicity	Computers
Broadwater School and Community Library	Remote	37
Drummond School & Community Library	Remote	14
Frenchtown School and Community Library	Rural	7
Manhattan Community School Library	Rural	15
Petroleum County School-Community Library	Remote	7
Roundup School-Community Library	Remote	37
St Ignatius School-Community Library	Rural	57
St. Regis School and Community Library	Remote	0
Total Number of Computers in School-Community Libraries		**174**

Appendix V: Proposed Library IT Districts In Initial Centralized Network

This appendix contains a listing of proposed library IT districts in the initial centralized network and corresponds with Figure 15. Libraries marked with an asterisk (*) are designated as 'hub' libraries, the central IT service providers for the districts.

Library Name	Urbanicity	Computers
District 1		
Big Sky Branch Library	Remote	3
Bitterroot Public Library	Town	25
Missoula Public Library*	City	121
North Valley Public Library	Rural	26
Total Number of Computers in District 1		**175**
District 2		
Belgrade Community Library	Town	23
Bozeman Public Library	Town	72
Butte-Silver Bow Public Library	Town	66
Butte-Silver Bow Public Library South Branch	Town	15
Dillon Public Library	Town	13
Great Falls Public Library	City	66
Hearst Free Library	Town	17
Lewis and Clark Library*	Town	87
Lewis and Clark Library East Helena Branch	Town	0
Livingston-Park County Public Library	Town	38
Three Forks Community Library	Remote	8
William K. Kohrs Memorial Library	Town	10
Total Number of Computers in District 2		**415**
District 3		
Bicentennial Library of Colstrip	Remote	0
Big Horn County Public Library	Town	34
Laurel Public Library	Town	22
Lewistown Public Library	Town	15
Miles City Public Library	Town	33
Parmly Billings Library*	City	99
Red Lodge Carnegie Library	Remote	10
Total Number of Computers in District 3		**213**
Independent Libraries		
Glendive Public Library	Town	19
Havre-Hill County Library	Town	16
Lincoln County Public Libraries	Town	34
West Yellowstone Public Library	Remote	10
Frenchtown School and Community Library	Rural	7
Total Number of Computers in Independent Libraries		**86**

* IT hub library

Appendix VI: Library Urbanicity Categories

This appendix contains a listing of libraries and their urbanicity codes. The IMLS assigns locale codes to libraries using the same methodology used by the National Center for Education Statistics to assign locale codes to public schools for the Common Core of Data datasets (see Institute of Museum and Library Services (2011a) for more information). Each library system, both the central location and branches, is assigned one of the twelve locale codes according to the following criteria:

11 - City, Large: Territory inside an urbanized area and inside a principal city with population of 250,000 or more.
12 - City, Midsize: Territory inside an urbanized area and inside a principal city with population less than 250,000 and greater than or equal to 100,000.
13 - City, Small: Territory inside an urbanized area and inside a principal city with population less than 100,000.

21 - Suburb, Large: Territory outside a principal city and inside an urbanized area with population of 250,000 or more.
22 - Suburb, Midsize: Territory outside a principal city and inside an urbanized area with population less than 250,000 and greater than or equal to 100,000.
23 - Suburb, Small: Territory outside a principal city and inside an urbanized area with population less than 100,000.

31 - Town, Fringe: Territory inside an urban cluster that is less than or equal to 10 miles from an urbanized area.
32 - Town, Distant: Territory inside an urban cluster that is more than 10 miles and less than or equal to 35 miles from an urbanized area.
33 - Town, Remote: Territory inside an urban cluster that is more than 35 miles from an urbanized area.

41 - Rural, Fringe: Census-defined rural territory that is less than or equal to 5 miles from an urbanized area, as well as rural territory that is less than or equal to 2.5 miles from an urban cluster.
42 - Rural, Distant: Census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an urbanized area, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from an urban cluster.
43 - Rural, Remote: Census-defined rural territory that is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster.

For the purposes of this report, libraries were grouped as follows:

City - locale codes 11, 12, and 13.

Suburb - locale codes 21, 22, and 23.
Town - locale codes 31, 32, and 33.
Rural - locale code 41 and 42.
Remote - locale code 43.

Library Name	Locale	Urbanicity
Alberton Branch Library	42	Rural
Belgrade Community Library	33	Town
Belt Public Library	42	Rural
Bicentennial Library of Colstrip	43	Remote
Big Horn County Public Library	33	Town
Big Sandy Branch Library	43	Remote
Big Sky Branch Library	43	Remote
Bigfork Branch Library	43	Remote
Bitterroot Public Library	33	Town
Blaine County Library	43	Remote
Bozeman Public Library	33	Town
Bridger Public Library	43	Remote
Broadwater School and Community Library	43	Remote
Browning Branch Library	33	Town
Butte-Silver Bow Public Library	33	Town
Butte-Silver Bow Public Library South Branch	33	Town
Carnegie Public Library	43	Remote
Choteau/Teton Public Library	43	Remote
Chouteau County Library	43	Remote
Columbia Falls Branch Library	33	Town
Conrad Public Library	33	Town
Culbertson Public Library	43	Remote
Daniels County Library	43	Remote
Darby Community Public Library	43	Remote
Denton Public Library	43	Remote
Dillon Public Library	33	Town
Dodson Branch Library	43	Remote
Dorothy Asbjornson Community Library	43	Remote
Drummond School & Community Library	43	Remote
Dutton/Teton Public Library	43	Remote
East Glacier Park Branch Library	43	Remote
Ekalaka Public Library	43	Remote
Eureka Branch Library	43	Remote
Fairfield/Teton Public Library	43	Remote
Fallon County Library	43	Remote
Flathead County Library System	33	Town
Frenchtown School and Community Library	42	Rural
Froid Branch Library	43	Remote
Garfield County Library	43	Remote
George McCone Memorial County Library	43	Remote
Geraldine Branch Library	43	Remote

Library Name	Locale	Urbanicity
Glacier County Library	33	Town
Glasgow City-County Library	33	Town
Glendive Public Library	33	Town
Great Falls Public Library	13	city
Great Falls Public Library Bookmobile		
Harlem Public Library	43	Remote
Harlowton Public Library	43	Remote
Havre-Hill County Library	33	Town
Hearst Free Library	33	Town
Henry A Malley Memorial Library	43	Remote
Highwood School Community Library	43	Remote
Hobson Community Library	43	Remote
Jefferson County Library System	43	Remote
Joliet Public Library	42	Rural
Judith Basin County Free Library	43	Remote
Laurel Public Library	31	Town
Lewis and Clark Library	33	Town
Lewis and Clark Library Augusta Branch	43	Remote
Lewis and Clark Library East Helena Branch	33	Town
Lewis and Clark Library Lincoln Branch	43	Remote
Lewistown Public Library	33	Town
Liberty County Library	43	Remote
Lincoln County Public Libraries	43	Remote
Livingston-Park County Public Library	33	Town
Madison Valley Public Library	43	Remote
Manhattan Community School Library	42	Rural
Marion Branch Library	43	Remote
Meagher County/City Library	43	Remote
Miles City Public Library	33	Town
Mineral County Public Library	43	Remote
Missoula Public Library	13	city
Moore Public Library	43	Remote
North Jefferson County Library District	42	Rural
North Lake County Public Library	33	Town
North Toole County Library	43	Remote
North Valley Public Library	42	Rural
Opheim Community Library	43	Remote
Parmly Billings Library	12	city
Parmly Billings Library Bookmobile		
Petroleum County School-Community Library	43	Remote
Philipsburg Public Library	43	Remote

Library Name	Locale	Urbanicity
Phillips County Library	43	Remote
Plains Public Library District	43	Remote
Poplar City Library	33	Town
Prairie County Library	43	Remote
Preston Hot Springs Town-County Library	43	Remote
Red Lodge Carnegie Library	43	Remote
Richey Public Library	43	Remote
Ronan City Library	43	Remote
Roosevelt County Library	33	Town
Rosebud County Library	43	Remote
Roundup School-Community Library	43	Remote
Saco Branch Library	43	Remote
Seeley Lake Branch Library	43	Remote
Sheridan County Library	43	Remote
Sheridan Public Library	43	Remote
Sidney-Richland County Library	33	Town
St Ignatius School-Community Library	42	Rural
St. Regis School and Community Library	43	Remote
Stillwater County Library	43	Remote
Swan Valley Community Library	43	Remote
Thompson Falls Public Library	43	Remote
Thompson-Hickman County Library	43	Remote
Three Forks Community Library	43	Remote
Toole County Library	33	Town
Troy Branch Library	43	Remote
Twin Bridges Public Library	43	Remote
Valier Public Library	43	Remote
Wedsworth Memorial Library	42	Rural
West Yellowstone Public Library	43	Remote
Whitefish Branch Library	33	Town
Whitehall Community Library	43	Remote
Wibaux Public Library	43	Remote
William K. Kohrs Memorial Library	33	Town