



**Broadband Infrastructure Application
Submission to RUS (BIP) and NTIA (BTOP)**

Submitted Date: 8/17/2009 3:22:19 PM	Easygrants ID: 1029
Funding Opportunity: Broadband Initiatives Program and Broadband Technology Opportunities Program	Applicant Organization: Keystone Initiative for Network Based Education and Research
Task: Submit Application - Infrastructure Programs	Applicant Name: Mr. Arthur C Stephens

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A. General Application Information

1. Applicant Information	
1-A. Name, Address, and Federal ID for Applicant	
i. Legal Name:	Keystone Initiative for Network Based Education and Research
ii. Employer/Taxpayer Identification Number (EIN/TIN):	[REDACTED]
Street 1:	401 Old Main
Street 2:	
City:	University Park
County:	Centre
State:	PA
Country	United States
Zip/Postal Code:	16802-1505

1-B. Name and Contact Information of Person to be Contacted on Matters Involving this Application:

Prefix:	Mr.
First Name:	Arthur
Middle Name:	C
Last Name:	Stephens
Suffix:	
Telephone Number:	717-433-1678
Fax Number:	
Email:	Astephens@passhe.edu
Title:	KINBER Board Member



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1-C. Other Required Identification Numbers

i. Organizational DUNS:	
ii. CCR # (CAGE):	
iii. Funding Opportunity Number:	1
iv. Catalog of Federal Domestic Assistance Number:	BTOP CFDA Number: 11.557 BIP CFDA Number: 10.787 BTOP CFDA Title: Broadband Technology Opportunities Program BIP CFDA Title: Broadband Initiatives Program

1-D Eligible Entities

Please classify your organization. (Note: If there are multiple organizations involved in the project, designate the lead applicant that would enter into a Loan or Grant agreement with the Agency and assume operational and financial responsibility should an award be made). **Non-Profit Corporation**

1-E. RUS Borrower Status

No

1-F. Applicant Federal Debt Delinquency Explanation

Is the Applicant Delinquent On Any Federal Debt? **No**

Federal debt delinquency Explanation:

2. Project Description & Project Title

2-A. Project Title: Pennsylvania Research and Education Network (PennREN)

2-B. Project Description: Pennsylvania Research and Education Network (PennREN) is an historic collaborative effort for a statewide broadband network designed by research institutions that will optimize access for core constituents including hospitals and health care providers, pre-K through 12 and higher education institutions, library networks, state and local government agencies and economic development entities.



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3. Application ID for Multiple Submissions for Identified Service Areas:

4. Rural Area Determination

At least 75 percent of the proposed service area to be funded falls within rural areas that are unserved or underserved.

No

5. Applications for Rural Areas: Please choose the funding program(s) to which you are submitting this application.

a) BIP broadband infrastructure category to which you are applying:

b) Would you like this Application for Rural Areas to also be considered for BTOP funding?

c) BTOP Infrastructure category for which you are applying.

6. Applications for All Other Areas: Per the NOFA, all applications to fund broadband infrastructure projects in areas that are less than 75% rural must be submitted to NTIA for consideration under BTOP.

BTOP broadband infrastructure category to which you are applying: **Middle Mile**

B. Eligibility Factors

7. Application Submission

BIP and BTOP Factors Selected By Applicant:

Applicant has submitted a completed application and provided all supporting documentation required for the application.

The Project will be substantially complete within 2nd year from the award date, and the project will be fully



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complete by the end of the 3rd year from the award date.

For projects seeking more than \$1 million funding, the Applicant agrees to submit a certification, from a Professional Engineer, that attests that a) the system will deliver the stated performance; and b) the projected project will be substantially completed within two years, and fully completed within three years.

The Applicant provides two-way data transmission with advertised speeds of at least 768 kbps downstream and 200 kbps upstream.

Applicant understands and agrees to comply with the nondiscrimination and interconnection obligations outlined in the NOFA.

If applying for a last mile Broadband Infrastructure project, applicant understands and agrees to comply with the last mile coverage obligations as outlined in the NOFA.

Additional Factors for BIP Selected By Applicant

Additional BTOP Factors Selected By Applicant

- Conformity with Statutory Purposes
- Cost Sharing/Matching
- Reasonableness of Project Budget

The project advances at least one of the statutory purposes for BTOP

Applicant has provided documentation that the project would not have been implemented during the grant period without federal grant assistance.



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Applicant has provided a budget that is appropriate to the proposed technical solution and only includes eligible costs.

- **Demonstration the Project Could not be Implemented But For Federal Grant Assistance**
Applicant is providing matching funds of at least 20 percent towards the total eligible project costs?
Yes

7-k. Cost Sharing/Matching Fund Explanation

C. Executive Summary

Executive Summary of Project for BIP and BTOP:

8. Infrastructure Projects Executive Summary

8. Executive Summary of Project

The Pennsylvania Research and Education Network (PennREN) is a public/private venture for the design, construction and management of fiber optic networks statewide which will offer affordable, enhanced broadband services to Pre-K through 12 and higher education systems, health care networks, libraries, state and local governments and workforce/economic development entities.

a. Opportunity the proposed system seeks to address

The public benefits of affordable access to robust broadband services are well-documented. The availability of funding through the American Recovery and Reinvestment Act for the creation of a statewide network for research and development in the Commonwealth is a once-in-a-generation opportunity.

PennREN, through its operating entity, KINBER (the Keystone Initiative for Network Based Education and Research) will serve as the coordinator for the construction and management of a statewide fiber optic network accessible to a host of educational, research, health care and



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economic development partners seeking to aggregate services for their members and subscribers at affordable cost. The need for a cost-effective networking infrastructure far exceeds what any single entity could procure on its own. The partners identified in this proposal lack sufficient capital to construct their own networks and/or the ability to charge fees at a rate high enough to sustain a system once it is built. PennREN will use the Recovery Act funds, matched by contributions in excess of twenty percent of the total project cost, to construct the network. By aggregating the service needs of the partners, it will have the ability to negotiate rates lower than those now available. Without Recovery Act funding this project will not go forward.

b/c. A general description of the proposed funded service areas and number of households and business participating

The PennREN network will reach every region of the Commonwealth with more than 44,000 square miles of coverage. The network will provide in excess of 4,082 miles of direct access to an estimated 5,159,780 individuals in 2,047,442 households and 204,193 businesses within the 10 mile radius of the community anchor institutions.

d. Number of community anchor institutions, public safety entities, and critical community organizations passed and/or involved with project (e.g., health care, education, libraries, etc.)

The network is designed with thirteen core nodes at anchor institutions: The University of Scranton, Lehigh University, Philadelphia Collocation facility, Penn State Hershey, D & E Collocation facility, Level 3 Communication Collocation facility, Indiana University of Pennsylvania, Allegheny Center Mall, Slippery Rock University, Penn State/Behrend, Clarion University, Penn State Dubois, and Bucknell University. The institutions of higher education were chosen because of their strong presence in the potential service areas and their willingness to permit all-hours access by nonemployee staff. Each core node will host Ethernet switch and optical transport equipment. The core nodes are supplemented by over 50 local nodes which will not have PennREN-controlled equipment, but are intended as a mechanism to allow broader access to the network via dark fiber.

e. Proposed services and applications for the proposed funded service areas and users



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PennREN has established relationships with a number of commercial partners to offer a menu of services to subscribers.

Through an agreement with a fiber optic construction company, PennREN will have forty-eight (48) strands of fiber optic cable that encompasses nearly 1696 route miles within the Commonwealth. Two strands of fiber will yield more than 100 Gigabytes of capacity. Two other commercial partners manufacture optical and switching electronics and will enable PennREN to offer Private Wavelength Services and Shared Wavelength Services.

By choosing one of these options subscribers will have the option to: create their own statewide infrastructure that reaches areas where such a capability has not been possible or cost prohibitive; assign dark fiber pairs in point to point configurations; enjoy significant economies of scale through the deployment of "managed services" for entities that require full state, partial or adjoining region access to reach their objectives or combine with other groups to benefit from shared wavelength services.

Initially, PennREN will provide Internet access to its members through existing relationships with Cogent (through MAGPi in Philadelphia), and Sprint and Global Crossing (through 3ROX in Pittsburgh). Additional service providers can be readily added because of the PennREN nodes at carrier hotels in these two cities. PennREN subscribers will be able to connect to any service provider with a connection at any of the 13 primary backbone or local nodes on the network.

f. Approach to addressing the non-discrimination and interconnection obligations
As part of its mission as a network serving community anchor institutions in the Commonwealth without discrimination, KINBER will populate its Board of Directors with representatives from public and private universities, community colleges, health care providers and economic development entities, among others. KINBER will also develop a community-based Advisory Board to facilitate inclusive dialogue and collaboration throughout the Commonwealth. The business plan for the rollout of services to subscribers will reflect the consensus on the fairest distribution to all of these interests.

g. Type of broadband system that will be deployed (network type and technology standard)



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An optical network using dense wave division multiplexing

h. Qualifications of the applicant that demonstrate the ability to implement and operate a broadband infrastructure, and/or be a sustainable broadband service provider
During the design and early construction phases, while permanent staff is being identified, PennREN will be overseen by the staff from the originating partners who have years of experience in developing and managing robust broadband networks. For example, the MAGPi partners work for the University of Pennsylvania and manage a Philadelphia Gigapop serving portions of Pennsylvania and Delaware. The 3ROX partners work for Carnegie Mellon University and manage a Pittsburgh Gigapop providing connection to both Internet 2 and the National Lambda Rail. The Pennsylvania State System of Higher Education, with its 14 campuses and the Pennsylvania State University with its 24 campuses, a teaching hospital, and with privately owned fiber connecting the campus in State College to the Pittsburgh Gigapop will assign professionals to the project.

Specific information about the staff described above is included in the resumes provided in response to question 37.

i. Overall infrastructure cost of the broadband system

Recovery Act Funding	\$99,660,678
Matching Funds	\$29,217,353
Total	\$128,878,031

j. Overall expected subscriber projections for the project

As documented in Attachment H we have identified 71 cumulative subscribers.

k. Number of jobs estimated to be created or saved as a result of this project.

During the initial phases of the project, the fiber optic network design and construction partners will utilize the workforce necessary to meet the deadlines for completion in the application. It is anticipated that dozens of resources will be involved in the design and construction phases.

The PennREN originating partners will interview and hire staff for KINBER which will total five permanent positions to be supplemented by contracts for specific services.



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The project has been developed to be a catalyst for stabilization and future growth in several important segments of the economy of the Commonwealth including higher education, health care and workforce development.

Description of BTOP Project Purpose (BTOP Applicants Only Next Three Questions)

9. BTOP Statutory Purpose:

Provide improved access to broadband service to consumers residing in “underserved” areas of the United States.

Provide broadband education, awareness, training, access, equipment, and support to schools, libraries, medical and healthcare providers, community colleges and other institutions of higher education, and other community support organizations by or through these organizations.

Stimulate the demand for broadband, economic growth, and job creation.

10. Description of BTOP Project Purpose:

The PennREN project and its operating entity, KINBER, represent the coordination of a host of projects independently developed by educational, health care and research entities into a comprehensive, statewide broadband system. The underlying projects share the primary goal of addressing the demonstrated need for expanded and improved broadband access for identified end users. The broadband network will be openly accessible to all interested parties who meet the objectives of the organization’s mission. The shared goals of the KINBER consortium are to:

- Provide the most up-to-date learning tools to every educational institution—no matter its location in the Commonwealth or the financial health of its surrounding community—to ensure that all students have equal opportunity for success;
- Improve access to quality health care in a cost-effective manner in every region of the Commonwealth;
- Provide health care providers with the capability to share medical records and information on procedures through vehicles such as telemedicine;



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- Improve access to workforce training programs to increase Pennsylvania's competitiveness;
- Address unmet technology needs in rural and underserved areas;
- Enhance economic development initiatives designed to spur growth and new job opportunities, especially in those regions of the Commonwealth which have experienced decades of job losses and business migration.

The PennREN project is aligned with the statutory purposes outlined in the Recovery Act including:

- Providing improved broadband service access to consumers in underserved areas. The PennREN network will have four (4) of its thirteen (13) core nodes in underserved areas. The goal is to provide 1-10 GB connectivity to anchor institutions to support the increased needs of students, enhance research efforts of faculty and scientists, and improve connectivity across the health care, economic development, governmental and preK-12 spectrums.
- Providing broadband education, awareness, training, access, and equipment to a wide variety of stakeholders

The membership structure of KINBER represents the results of an extensive outreach effort by the organizers of the PennREN project to educate key stakeholders in the education, health care, research and workforce development communities in Pennsylvania to the benefits and capabilities of the proposed network. The letters of interest included with this application are demonstrable proof of the success of this effort. The active participation by the endorsers in the implementation of the project will ensure extensive communication with their colleagues to promote participation. In addition, the staff of KINBER will publicize the network capabilities and cost savings to all potential stakeholders as one of its primary responsibilities.

- Improving access to broadband service by public safety agencies
- The PennREN network will be available to state and local governments including public safety agencies such as the Pennsylvania Emergency Management Agency, the Pennsylvania State Police, and local law enforcement and emergency management officials. Additionally, the PennREN consortium will work with the Commonwealth of Pennsylvania to provide access to the PennREN network to support the state Public Safety Wireless Radio Network and other government functions where possible.



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- Stimulating demand for broadband economic growth and job creation
- Among the economic challenges faced by the Commonwealth is the ability to help resident employers remain competitive through modernization at a reasonable cost. Working with the economic development partners of the consortium, PennREN will provide employers large and small, access to the technology essential for their continued success and growth.

The majority of workforce development and training programs in the Commonwealth are offered through the community college and public university systems. Among the most important outcomes of the construction of the network will be the ability to expand distance learning programs, especially in the Northern Tier and North Central regions that do not have community colleges, and in which the State System universities are offering new programs as part of their core mission. In addition, enhanced access and capacity will afford our premiere research institutions the ability to work collaboratively (both regionally and globally) on projects resulting in technology transfer and company creation.

The network will also serve as the starting point for numerous last-mile projects across the state. Through an aggressive public education program, local and regional entities will become aware and will be able to plan for connecting their projects to the backbone. Several other BTOP grant applicants are hoping to leverage KINBER's mid-mile network.

In summary, this initiative addresses the majority of the five statutory purposes and reflects unprecedented collaboration in the higher education universe in Pennsylvania. The network will expand access to underserved communities, will provide enhanced capabilities for higher education anchor institutions for decades to come, and will improve the quality of health care by expanding access to world-class medical research and clinical case institutions. We believe PennREN is exactly the type of project envisioned by the Recovery Act.

11. BTOP Enhanced Services for Health Care Delivery, Education, and Children:

A June 2007 study, Beyond the Digital Divide: Broadband Internet Use and Rural Development in Pennsylvania, conducted by a research team at the Pennsylvania State University included the following findings:

- "...social and economic opportunity in our society is increasingly linked with Internet success..."



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- “Broadband connections are essential for teaching practices that go significantly beyond the text book.”
- “When the results of the websites survey for... 12 hospitals in rural Pennsylvania were compared with the best practices evident in literature...the population of hospitals, with one exception, lacked demonstrated utilization of cutting-edge practices.”

Through their extensive experience, the partners in the PennREN project have designed a broadband network capable of addressing these significant findings. The ultimate beneficiaries of their efforts will be those whose quality of life, up to now, has been hurt by their inability to access even the most basic educational and health care programs offered in the Commonwealth.

For them, PennREN means profound improvement:

- For school children, geographic location would no longer determine whether they have access to modern teaching tools and materials because their school district or intermediate unit (IU) or local library will be able to offer them. The Pennsylvania IU Network and regional library systems are key to this outcome.
- For college students this means greater access to educators and programs from multiple institutions through distance learning. All sectors of higher education are represented in the collaborative.
- For people requiring the services of a health care provider, it means getting the diagnosis and treatment they need through the sharing of best practices between their provider and hospital and health care institutions throughout the state, country and world. The Hospital and Healthcare Services Association of Pennsylvania, University of Pittsburgh Medical Center, Penn State Hershey Medical Center, PA e-health Initiative, and the Mountain Health Care Alliance all envision PennREN as the main artery of health care information across the Commonwealth.

In summary, PennREN has been established to specifically address the needs of health care, educational and other public sector and non-profit entities. Through expanded capabilities for these institutions, children and people of all ages who live in underserved areas will be the major beneficiaries of this project.



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D. Proposed Funded Service Area

12. Proposed Funded Service Area Maps:

12-A. Service Area Map (Reference Number): **C63A-6790-4C63-AC2D**

12-B. Is the applicant is seeking a waiver for providing less than 100% coverage of a census block. **No**

13. Proposed Funded Service Area (BIP - Last Mile Projects):

Please refer to section M at the end of document.

14. Proposed Funded Service Area (BTOP - Middle Mile Project):

Please refer to section M at the end of document.

15. Non-Funded Service Area(BIP Only):

16. Coverage Waiver:

Applicant is seeking a waiver for providing less than 100% coverage of a census block.

No

For Response of "Yes" please refer to upload section for additional supporting documentation.

17. Methodology for Area Status:

The Commonwealth of Pennsylvania's Department of Community and Economic Development contracted with the iMapData Corporation (See Footnote 1) to develop the Pennsylvania Technology Investment Map (PTIM). This Internet-based interactive map allows government and private sector partners to view detailed maps of the Commonwealth's telecom infrastructure in order to make strategic, informed decisions about regulation and potential investment that will support technology-based economic development. PTIM was used exclusively to determine the underserved areas.

The underlying GIS data layers of the iMapData application were derived from many government, industry, public and private sources. Of special use to this investigation was data supplied by

- Commonwealth of Pennsylvania
- US Decennial Census of 2000
- Cable Association of Pennsylvania



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- Pitney Bowes MapInfo Corporation
- Pennsylvania Telephone Association

The information in the iMapData application for each funded service area was used to determine the geographic area within a 10 mile radius of a PennREN core node as to whether it was served by Digital Subscriber Line (DSL) or Cable Broadband Service. Those areas with less than 50% of coverage were deemed to be underserved.

Additional data on population, households and business was corroborated with ESRI Corporation's ARCMAP 9.3 application.(See Footnote 2)

In addition to considering whether a Service Area was served or not by existing broadband providers, the census blocks within a 10 mile radius of PennREN's Core Node were investigated as to their rural or urban status. Although rural does not equate to underserved, it does serve as a validating measure.

1 www.iMapData.com
Copyright © 2009 iMapData All Rights Reserved
GSA contract #GS-35F-0625N
Phone: 866.650.4627 | Fax: 703.760.9625

2 www.esri.com
800-447-9778
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18. Middle Mile Benefits

Last mile service areas:
Hershey, PA
State College, PA
Indiana, PA
Slippery Rock, PA
Erie, PA
Clarion, PA



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DuBois, PA
Lewisburg, PA
Scranton, PA
Bethlehem, PA

Initially, PennREN will provide Internet access to its members through existing relationships with Cogent (through MAGPI in Philadelphia), and Sprint and Global Crossing (through 3ROX in Pittsburgh). Additional service providers can be readily added, because of the PennREN nodes at carrier hotels in these two cities. PennREN members can easily connect to any service provider with a connection at any backbone node on PennREN. These service areas encompass over 4,082 square miles of service areas and in actuality, the network reach should be the entire Commonwealth with over 44,000 square miles of coverage.

Additionally, a PennREN member who is eligible can connect to any of the research and education networks which already have connections at PennREN's Philadelphia and Pittsburgh nodes. These include National Lambda Rail, Internet 2, Transit Rail and the Internet2 Content Peering Service.

PennREN's core membership consists of higher education institutions in Pennsylvania as community anchor institutions. The Pennsylvania State System of Higher Education, the Pennsylvania State University system, the University of Pittsburgh and the state's community colleges have over 50 locations outside metropolitan areas included in this proposal. Other major higher education institutions, include the University of Pennsylvania, the Pittsburgh Supercomputing Center, Lehigh, Bucknell, and Drexel Universities. Additional organizations who have participated in the formation of PennREN include statewide and regional health care organizations, preK-12 educational institutions, organized through the Pennsylvania Intermediate Units, and library networks. Workforce and economic development organizations have also provided endorsements.

Provide the projected end users that will be served by these proposed connections and the basis for these end-user projections.

PennREN will provide enhanced communication to the population within the 10 mile radius of the public community anchor institutions and will work with partners to provide access across all regions of the Commonwealth.

E. Proposed Service Offering



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19. Broadband Service Offerings for Last Mile Project:

Please refer to upload section at the end of the document.

20. Service Offerings for Middle Mile Project:

Please refer to upload section at the end of the document.

Competing Service Providers

21. Existing Broadband Service Providers and Services Offered:

Please refer to upload section at the end of the document.

Non-Discrimination, Interconnection

22. Description of Network Openness:

Description of Network Openness

The fiber optic network built under this project will have 48 strands under the control of KINBER, with the remainder retained by its fiber partners. This separation divides the question of network openness into two regimes. The fiber partners' primary business is providing wholesale transport for service providers. One of their major revenue streams is backhaul for wireless providers from remote sites to their central locations. They intend to continue and expand this offering, allowing wireless carriers ready access to new or underserved markets. In addition, they will be able to offer local and regional Internet service providers cost-effective, high-bandwidth transport to reach peers and national service providers. These national providers have presences primarily in the Pittsburgh and Philadelphia areas, a factor which has made access very expensive, particularly from the underserved regions of the Commonwealth. This network (PennREN) will not only facilitate basic broadband access in many new areas, but will enable a competitive Internet environment in many locations. The primary role of PennREN is to act as a network which serves community anchor institutions in Pennsylvania. In addition to providing high-bandwidth connectivity among its members, PennREN will offer qualified (based on the requirements of the other networks) and interested members access to national research and education networks, local and regional peering networks, neighboring state networks, national content



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peering networks and commodity Internet transit. Connections to most of these networks will be in Pittsburgh and Philadelphia. The national research and education networks include National LambdaRail, Internet2 and the US Department of Energy's ESnet. Settlement-free local and regional peerings—which we will actively pursue—are with networks such as DSL and cable providers—these are important in order to maximize traffic localization within the Commonwealth, and are enhanced by peering with the networks in neighboring states. The content peering networks (such as TransitRail and the Internet2 Content Peering Service) enable higher bandwidth, lower latency and less congested connections to many of the major content providers in the Internet, while reducing the need for more expensive commodity transit. Commodity Internet connectivity will make everything else reachable. Members needing to reach networks other than those offered by KINBER will be able to use KINBER's layer-1 and layer-2 offerings for transport to those providers or services.

Network management will be done on a distributed basis, with the leads being the NOCs at 3ROX, MAGPI, PASSHE and Penn State. Member institutions will provide hands-on support at the core nodes. There will be 24x7 monitoring of the network, with on-call personnel to respond to problems outside normal business hours. Because of the middle-mile nature of PennREN, NOC contacts will be with the network engineering and management staffs at the member institutions, not with end users.

Non-Discrimination and Interconnection (BTOP applicants only for next three questions)

23. Non-Discrimination Obligations (applicable to Last Mile and Middle Mile Applicants):

Adhere to the minimum non-discrimination requirements as set forth in the NOFA.

Display the nondiscrimination practices in a prominent location on the service provider's web page, and provide notice to customers of changes to these policies.

24. Interconnection Obligations (applicable to Last Mile Applicants):



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25. Interconnection Obligations Middle Mile Applicants:

Adhere to the minimum interconnection requirements as set forth in the NOFA.

Display the interconnection policies in a prominent location on the service provider's web page, and provide notice to customers of changes to these policies.

Commit to offering wholesale access to network components and services such as wavelength or fibers at reasonable rates and terms.

Commit to binding private arbitration of disputes concerning interconnection obligations.

Cost Effectiveness and Affordability

26. Cost per Household (BTOP only):

Estimated one-time cost per household is between \$26.98 and \$62.95

The higher number was derived by dividing the total project cost (\$128,878,031) by the number of households reported in question 14; 2,047,442. Data from Question 14 was used since the recommended #13 and #15 were not applicable sections to be completed by BTOP applicants.

We believe that the PennREN project will facilitate service throughout the entire Commonwealth and therefore the cost could decrease to \$26.98 per household by using the number of households reported in the 2000 Census; 4,777,003 households.

27. Affordability

Affordability/Price Comparison Chart- Included as Attachment 27.1

Basis for Comparison –



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PennREN has solicited and received quotations from fiber providers and telecommunications companies for services equal to those that PennREN will offer once the infrastructure is completed. For simplicity, the fees were calculated based on the total cost of ownership for a given service over a term commitment of five years.

Pricing for Pennsylvania statewide fiber assignments include the following:

1. Construction and non-recurring fees
2. Recurring costs for fiber maintenance
3. Recurring costs for co-location sites

Regional fiber assignments assume two strands of fiber optic cabling between any two of the thirteen core nodes as specified in the technical design. Maintenance and co-location facilities are also included.

Managed wavelengths of 10 Gigabit and 1 Gigabit capacities include the following additional components:

1. Apportioned cost of optical electronics
2. Switching hardware, cabinets, and related cross-connects
3. On-site maintenance, monitoring, and NOC support

A shared wavelength is a 1 Gigabit circuit that is accessible from all 13 core nodes by any member of PennREN for Layer 3 transport to any other institution on the network. This is a basic service for affiliate of full members and is included at no additional cost beyond the membership dues. This is not available from any commercial carrier as a private network offering.

F. Technology Strategy

28. Technology Type:

Wireline - Fiber-optic Cable
Other



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Other: Hybrid - aerial and underground

29. System Design

System Design

The PennREN network is designed to provide robust, extensible, high-speed connectivity for member community anchor institutions. Some of the major design criteria are:

- That there be no single point of failure in the backbone network;
- That the physical network topology facilitate easy connection by member institutions;
- That a variety of infrastructure-based services be available to members;
- That the available bandwidth on the network be sufficient for current needs and expandable to meet future needs;
- That access be available to a range of commodity and research and education networks;
- That network points of presence (PoPs) be collocated with member institutions as much as possible in order to facilitate all-hours access.

The starting point for the design of the network was to identify the locations of a number of community anchor institutions. The focus was on institutions of higher learning, as these generally have a strong presence in potential service areas and tend to be more amenable to all-hours access by non-employee network engineers and technicians than would medical facilities or schools. From these locations, one set was selected to host core nodes and another to host local nodes. A major factor in the selection of core nodes is the distance between them, which is relevant to optical transport.

Thirteen core nodes are planned, distributed through the commonwealth. These are primary network service locations, each hosting an Ethernet switch and optical transport equipment. In order to provide protection against a single fiber cut or the loss of a single node, a ring topology, rather than a linear or star topology, is needed. However, in most of the fiber routing scenarios considered, there was a (near) crossing in the State College area. In order to mitigate failures in that area, it was decided to implement three fiber rings—one in the west, one in the east and a small metropolitan ring in State College. In this way neither State College PoP is a single point of failure.

The PoPs housing the core nodes are interconnected with 48 strands of fiber, each PoP to its



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nearest neighbor on its ring (the State College PoPs have neighbors on two rings). One pair of fiber in each direction is connected to optical transport equipment (DWDM) at each node; the other 46 strands are reserved. Because of the evolving nature of DWDM gear, a final selection of equipment has not yet been made, but the minimum requirements are support for at least 32 channels (lambdas) at 10 Gb/s now, with announced plans for transport of 100 Gb/s wavelengths. These criteria will support any foreseeable growth.

At least two 10 Gb/s lambdas will be provisioned over the entire footprint at network turn-up. These lambdas will be connected to an Ethernet switch at each core node to form (at least) two redundant 10 Gb/s networks. One of these networks will be used to offer layer-3 services to all connected members. A second will be used to provision layer-2 services. Any other initially configured lambdas are reserved for future use. As with the DWDM equipment, the final selection of Ethernet switches depends on the price/performance point and announced 100 Gb/s plans at the time of deployment.

The core nodes in Pittsburgh and Philadelphia will have IP routers attached to the layer-3 services network. These routers will connect to the existing infrastructure at 3ROX and MAGPI and provide IPv4 and IPv6 unicast and multicast services to research and education networks, local and national peer networks and commodity Internet service providers. This layer-3 network will be implemented as a DMZ so that the PennREN routers and member border routers will have layer-2 reachability for the BGP routing protocol. The leading router candidate is the Juniper MX series because of its capabilities, price point and commitment to 100 Gb/s.

The layer-2 services network, which is shared capacity, will be used to configure point-to-point and point-to-multipoint Ethernets for members. These will be implemented as VLANs and can also be used to connect to layer-2 networks offered by national backbones (such as the static and dynamic Ethernet services of National LambdaRail and Internet2). Circuits configured on this network will have an absolute limit of 10 Gb/s (at least until the backbone is upgraded to 100 Gb/s), but it is expected that sites using 1 Gb/s or more for extended periods will procure a private Ethernet from PennREN (a service available between any set of core nodes).

Layer-1 services, generally thought of as private Ethernet circuits, will be obtainable in one of two ways. Either a member can connect to a PennREN Ethernet switch and have that port mapped into a DWDM wavelength or the member can connect directly to the PennREN DWDM equipment via an alien wave. The former implies connection to the member's switch;



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the latter to the member's own DWDM equipment. Layer-1 services will be available between any set of core nodes.

The local nodes will not have PennREN-controlled powered network equipment—they are intended as a mechanism to allow broader access to the network via dark fiber. They will be implemented as splice cases, “pads” (small structures with limited or no power and cooling intended to be more convenient splice points than splice cases on poles) or pass-through racks with patch panels in member machine rooms. The primary role of the local nodes is to provide backhaul to the nearest core node in order to gain access to network services. A small number of fiber strands on each segment connecting core nodes will be reserved for this purpose. Members will connect to PennREN by either their own or leased dark fiber (at core nodes or local nodes) or by third-party lit services (at core nodes only). If the lit service uses some technology other than Ethernet, the member will be responsible for obtaining a device to bridge that technology to Ethernet (as well as collocation space and power for the device). The motivations for this policy are 1) layer-2 services cannot easily be provisioned over SONET and 2) the high cost of SONET interfaces relative to Ethernet interfaces on modern routers. If a node is collocated at a member's site, “own fiber” could just be a jumper.

Dark fiber (layer-0) services can be provisioned between any pair of nodes on the network. The member is responsible for obtaining fiber to each endpoint.

30. Network Diagram:

Please refer to upload section at the end of document.

31. Certification by Professional Engineer:

Please refer to upload section at the end of document.

32. Buy American Waiver Request:

Is the applicant seeking an individual waiver of the Buy American provision? **No**

Buy American Waiver Request – Legal Justification



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33. Choice of Service Provider:

Does the project's Infrastructure and the Company's business plan allow more than one provider to serve end users in the proposed funded service area?

Yes

G. Project Milestones and Completion Factors

Timeline & Milestones

34. Infrastructure Build-out Timeline:

Please refer to upload section at the end of the document.

35. Licenses, Regulatory Approvals and Agreements:

Question 35- License, Regulatory Approvals and Agreements

PennREN will be contracting with Fibertech Networks and other providers to build and maintain the underlying fiber backbone of the network (see "Letter of Intent" of this application). Fibertech currently builds and operates metro networks in 11 states across the Northeast, and currently has over 450 fiber route miles in Pennsylvania. Fibertech is a certified CLEC, and has built more unique fiber infrastructure in the Northeast than any other metro network provider. As part of this project, and in practice with standard operating procedures, Fibertech will apply for all pole, conduit, and public Rights-of-Way associated with the project. In addition, Fibertech and PennREN will work cooperatively to secure any private easements (i.e. building entries) needed for delivering the network. Fibertech will track all applications and licenses associated with this network using an Operations Support System (called CARS – Customer Access Record System), which Fibertech has been using for all of its projects since 2006. This OSS system will ensure that Fibertech is capturing all relevant licenses and agreements, and will facilitate a smooth network turn-up.



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36. Construction and Vendor Contracts

PennREN will be contracting with technology-based organizations to provide services or products in the following categories:

- Fiber Optic Cable Infrastructure – PennREN will contract with regional utility construction companies to build the pathway, install the fiber optic cable and terminate the cable at the designated locations. FiberTech has provided a Letter of Intent to work with PennREN.
- Optical Network Transport Hardware - PennREN will work with optical network hardware vendors to assist with design of the optical transport hardware to allow PennREN to connect all 13 core nodes together at very high-speed(minimum of 40Gbps). Ciena Optical has provided a Letter of Intent to work with PennREN.
- Co-Location Facilities - PennREN will work with its member institutions to secure co-location space for the network hardware, the termination centers and building entry facilities for the wide area network components.
- Ethernet Switched Hardware - PennREN will work with commercial network equipment vendors to acquire the necessary components to provide connections to all PennREN Core nodes.
- Professional Network Consulting Services - PennREN will utilize the expertise of its members' technical staff to configure, monitor and maintain the operational aspects of the system.

PennREN will be using a combination of commercial hardware providers and services from the member institutions to build and maintain our state-wide network.

KINBER has received letters of support and letters of intent from the following contractors; 3ROX, Ciena, FiberTech and MAGPI. These documents are included in Supplemental Attachment 36.1.

Qualification of Management Team and Organizational Readiness



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37. Management Team Resumes:

Please refer to upload section at the end of the document.

38. Organizational Readiness:

Question 38:

In preparation for this application the organizing partners of PennREN identified potential K through post-graduate education, health care, workforce development and research entities with unmet demands for enhanced broadband services. In addition, discussions were held with private sector fiber and equipment providers to gauge the range of costs to meet the identified demand on a statewide basis. The information gathered through both outreach efforts became the basis for the financial plan included with this project. The PennREN partners subsequently formed a new entity, the Keystone Initiative for Network-Based Education and Research (KINBER) a 501 (c)(3) to implement, manage and operate the services network. KINBER membership is open to institutions of higher education, hospitals and other health care providers, public libraries, public television stations, preK-12 educational institutions, workforce and economic development agencies, public safety agencies, state and local government entities and other not-for-profit entities. A thirteen-person Board of Directors will provide direction and strategic guidance for the staff and project team. The organization plan also includes an Advisory Committee to assure that the services are being offered to the all interested parties without prejudice and in the most cost effective manner.

KINBER will employ permanent staff to provide daily management of the network. Permanent staffing will be supplemented with consulting support for project management and compliance related responsibilities. The initial staff will include an Executive Director, three network engineers and a clerical position. Expansion of the staff will be driven by network and membership growth. Following the construction of this network, operations are projected to be self-sustaining from membership and service fees. The network is designed to assure that there is sufficient fiber available for growth in both membership and services for the foreseeable future.

KINBER will also enter into maintenance and service agreements with private entities such as FiberTech, Juniper Systems and Ciena. Maintenance of the actual fiber will be contracted with



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external entities; KINBER will procure the fiber via a long term capital lease. If deemed necessary, considering the complexity of this grant, KINBER members are willing to assume the role of fiscal agent.

Until the permanent staff is hired, oversight will be provided by existing staff from member institutions. The founding members of PennREN include individuals with decades of experience in developing and managing robust broadband networks. Examples include: the University of Pennsylvania-based Philadelphia Gigapop, serving parts of Pennsylvania and Delaware; staff at Carnegie Mellon University and the University of Pittsburgh who manage the Pittsburgh Gigapop, which provides connections to both Internet 2 and the National Lambda Rail; staff in the PA State System of Higher Education who oversee information technology operations for the entire system; and staff at the Pennsylvania State University with its 24 campuses, a teaching hospital, and privately owned fiber connecting the campus in State College connected to the Pittsburgh Gigapop. Resumes of these professionals are included in the answer to question 37.

Other

39. Organizational Chart:

Please refer to upload section at the end of document.

40. Legal Opinion:

Please refer to upload section at the end of document

41. Government and other Key Partnerships:

PennREN is a collaborative effort between all sectors of public higher education, leading private and/or research universities and hospitals, statewide and regional healthcare organizations, workforce and economic development organizations, K through 12 educational groups and library associations in Pennsylvania.

Although Broadband needs will vary by region, the overriding goal of the project is to assure that service is universally accessible at affordable costs.

Interested partners will be offered a number of opportunities for participation ranging from a board seat on the newly formed 501(c)(3) KINBER, to associate membership or an advisory



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board role. It is the intent of this proposal to seek representation from as broad a range of public, non-profit and private sector participants as possible to assure that the proceedings of the collaborative are transparent and reflective of the true needs of our communities.

Anchor institutions that are part of the collaborative include the PASSHE universities, the community colleges, public libraries, and hospitals.

All partners; contact information and letters of support can be found in Attachment "41".

42. Recovery Act and Other Governmental Collaboration.

Question 42. Leverage of other Recovery Act funding

There are a number of applications which have been submitted by individual members of the PennREN consortium for Recovery Act funding. The following are three representative projects:

PA MaS-SE Teacher Residency Program

The Pennsylvania State System of Higher Education partnered with 17 school districts, 13 universities, 4 private institutions, the Pennsylvania Department of Education, the Philadelphia Education Fund and the Team PA Foundation to submit a proposal for a Federal Teacher Quality Partnership Program Grant in the amount of \$25 million over five years.

The proposal addresses teacher shortages in high need areas across the Commonwealth, which varies substantially in size and location, from the very small to the very large and the urban to remote.

The partnership proposes an innovative, statewide strategy to develop regional residency programs that will allow higher education institutions to collaborate to take full advantage of their individual strengths, to provide residents with the greatest flexibility in selecting programs and coursework and to eliminate the need for costly duplication of effort.

For this model to work successfully, distance education is an essential delivery mechanism. Because of varying levels of broadband availability in many regions of the Commonwealth the PennREN project assures that this effort will be universally accessible and affordable.

Enhancing Access to Discovery: Linking Rural Hospitals to Advanced Medicine through IT Connectivity.

Penn State Hershey Medical Center received an FCC Rural Health Care Pilot Program Award of approximately \$900K. While the thrust of this grant is to advance healthcare in rural Pennsylvania communities, the potential opportunities for education and research are significant. The availability of high quality local continuing education via remote participation in medical grant rounds or tumor review boards is especially important when a provider's absence from the rural community creates a deficit in the healthcare services



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available. The project director is working to identify special clinical programs that will be advanced by improved broadband infrastructure for future connection to PennREN. Commonwealth of Pennsylvania

The members of the PennREN collaborative are aware of the several applications being submitted by the Commonwealth for a number of Recovery Act programs. We foresee a number of opportunities to work collaboratively with the various agencies on joint efforts.

eiNetwork

The Electronic Information Network (eiNetwork) is submitting a proposal for NTIA funding for Public Computing Centers to expand capacity and access to broadband services at Centers located in the 73 public libraries in Allegheny County benefitting 1.2 million residents. The innovative technology proposed for the region's public library consortium will alleviate current capacity limitations and provide a platform for future expansions. PennREN will enable us to expand access not only to educational and healthcare systems in Pennsylvania, but also throughout the country and the world.

Community Involvement (BTOP Applicants Only)

43. Partnering with Disadvantaged Businesses

As of the application submission date, no partnerships or agreements to work with SDBs have been established.

H. Project Budget

44. General Overall Budget



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Budget	Loan Request	Grant Request	Equity	Debt	Bond	Other
Network & Access Equipment (switching, routing, transport, access)		4,240,000	2,039,000			
Outside Plant (cables, conduits, ducts, poles, towers, repeaters, etc.)		94,767,078	25,316,770			
Buildings and Land – (new construction, improvements, renovations, lease)			48,000			
Customer Premise Equipment (modems, set-top boxes, inside wiring, etc.)						
Billing and Operational Support Systems (IT systems, software, etc.)			79,960			
Operating Equipment			6,000			



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(vehicles, office equipment, other)						
Engineering/ Professional Services (engineering design, project management, consulting, etc.)		220,000	1,094,223			
Testing (network elements, IT system elements, user devices, test generators, lab furnishings, servers/computers, etc.)		433,600	633,400			
Site Preparation						
Other						
TOTAL BROADBAND SYSTEM		99,660,678	29,217,353			



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Total Budget: \$ 128,878,031

45. Detailed Budget:

Please refer to upload section at the end of the document.

Sustainability

46. Reasonableness

Question 46 - Reasonableness

PennREN, and its governing body, KINBER, are proposing an advanced fiber optic network as a middle mile solution throughout the Commonwealth of Pennsylvania. By partnering with providers of fiber optic cabling, PennREN will be an asset consisting of 48 strands of fiber that encompass 1,696 route miles. The 13 nodes are strategically positioned throughout the state to enable access and use of the network for all participating institutions, with a potential to increase the number of access nodes to 56 and beyond. This establishes an infrastructure that is highly scalable, and due to the non-profit nature of KINBER, extremely cost effective.

PennREN has leveraged the nature of optical networking to provide transport services in four basic areas; 1. Statewide Dark Fiber Assignments, 2. Regional Dark Fiber Assignments, 3. Private Wavelength Services and 4. Shared Wavelength Services. The equipment partners were selected based on their proven track records within the industry, price competitiveness, and willingness to collaborate. The result is that each of the 13 core nodes will begin with four, 10 Gbps wavelengths across the entire network. The switching devices act as access points for the region and will permit the separation into 40, 1 Gbps wavelengths, each is capable of continuing to the next node or the entire network.

The unit cost referenced in attachment G of \$69,846 per route mile indicates a one-time fee that breaks down to \$3,492/mile over the 20 year life of the fiber. Ongoing maintenance is minimal as well, at \$48/mile/year. With the understanding that the capacity at startup is 40 Gbps, the cost/Megabit/year of transport between two average nodes, (70 miles) is \$6.20. The Penn REN fee structure for a similar segment, which includes the optical equipment, staff, support, and operations, comes to \$24.25 the first year and \$12 each year thereafter. Commercial transport providers are between \$38 and \$40/Mb for the same service.

The communities that this network will serve have come together to reduce operating expenses as much as possible by offering affordable co-location space in their institutions and their own



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staff resources for local support. For the items labeled as Network Access, as detailed in Attachment G, NTIA funding has been maximized to provide the most scalable and economical delivery of services that will benefit the greatest number of citizens in Pennsylvania. In addition, the KINBER organization is very interested in working with other BTOP grant awardees to continue to leverage other investments into making our solution more affordable.

47. Historical Financial Statements:

Please refer to upload section at the end of the document.

48. Broadband Subscriber Estimates:

Please refer to upload section at the end of the document.

49. Other Services:

Please refer to upload section at the end of the document.

50. Pro Forma 5-Year Financial Forecast and Assumptions:

Please refer to upload section at the end of the document.

51. Commitment of Capital Funding Support

Partner	Type	Amount	% of Budget	Use of Funds
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KINBER	Cash	\$5,025,583	4%	Working Capital,
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FiberTech	Cash	\$23,691,770	18%	Infrastructure
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Ciena	Cash	\$500,000	<1%	Network, Equipment
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Total		\$29,217,353	22.60%	
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Currently, KINBER is not seeking external financing for the PennREN Project.

BTOP Requirements



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52. Matching Funds:

- a. Cash: \$ 29,217,353.00
- b. In-Kind: \$.00
- c. Percent of Total Project Cost: 23

53. Demonstration of Financial Need:

Question 53. Demonstration of Financial Need

During the past eighteen months, the Commonwealth of Pennsylvania has experienced severe declines in state tax revenues leading to a current budget deficit in excess of \$1 billion. At this time, there is no adopted fiscal year 2009-10 State Budget, six weeks past the statutory deadline of July 1st.

When the budget is finally enacted, state executive agency allocations are projected to be substantially reduced. One of the major impacts of these reductions will be the delay or total elimination of a number of technology initiatives.

Public education and public health are two of the most severely impacted sectors of the economy, both in terms of state budgetary support and funding for technology projects. A number of studies — "Beyond the Digital Divide: Broadband Internet use and Rural Development in Pennsylvania" and "Connect the Docs: Bringing High Speed e-Medicine to the Patient-Doctor Relationship" to cite two--have identified enhanced broadband capabilities as one of the major factors in helping these sectors operate more efficiently and effectively. Therefore, despite substantial financial challenges, the need for enhanced technology has never been greater.

As detailed in prior sections of this application, a number of groups have developed or implemented private broadband networks, all of which could require upgrades within the next five years including the capability to connect to the statewide broadband network created by this project. None of the organizations have the resources necessary to expand on their own. It is unlikely that state financial assistance will be available in the amounts required by the projects. The PennREN creates the greatest opportunity for modernization and growth that would not otherwise be available. By aggregating identified demand, PennREN will offer greatly enhanced access for all at substantially reduced cost, including to those in currently



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unserved and underserved regions of the Commonwealth.

54. Unjust Enrichment

The PennREN project has not applied for or received any Federal support for non-recurring or other project related costs.

55. Disclosure of Federal and/or State Funding Sources

PennREN has neither received nor applied for any state or federal funding related to projects or activities associated with this project.

I. Self Scoring – BIP Only Self Scoring

56. Self Scoring Sheet



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Criteria	Method	Points	Self Scores
<u>PROJECT PURPOSE</u>			
Proportion of Rural Residents Served in Unserved Areas	1 point for every 10,000 unserved households	Up to 5	
Rural Area Targeting	1 point for every 5% increase in the rural service area up the minimum 75% rural area requirement	Up to 5	
Remote Area targeting	1 point for every 50 miles a service area is located from a non-rural area	Up to 5	
Title II Borrower	If you are or were a Title II borrower	5	
Recovery Act and other governmental collaboration	1 point will be awarded for each governmental or Recovery program the applicant is partnering with	Up to 5	
<u>PROJECT BENEFITS</u>			
Performance of the offered services	If a last mile wireline project delivers 20M to household – if a last mile wireless projects delivers 2M to end-user – if a middle mile projects delivers 100M to end points	10	
Affordable of services offered	Points awarded based on the proposed rate structure and the logistics of the proposed service area	Up to 5	



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Funding Opportunity: Broadband Initiatives Program and Broadband Technology Opportunities Program	Applicant Organization: Keystone Initiative for Network Based Education and Research
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Choice of service provider	If the proposed infrastructure is available to be used by multiple service providers	5	
Critical Community Facilities	If discounted rate packages at least 25% lower than advertised rates are available to critical facilities	5	

PROJECT VIABILITY

Applicant's organizational capability	Points will be awarded on the strengths and accomplishments of key management	Up to 12	
Community Support	If a letter of support has been received from a designated representative of the community for every community in the proposed service territory	2	
Ability to promptly start project	If the applicant can demonstrate that all licenses and regulatory approvals have been received, contractors and vendors are ready to enter into contracts, and equity has been deposited into applicant accounts	10	
Socially and economically disadvantaged small businesses (SDB), as defined by section 8(a) of the Small Business Act, 15 U.S.C. §637.	If the applicant is a Section 8(a) entity	1	

PROJECT BUDGET AND SUSTAINABILITY

Reasonableness of the budget	Points will be awarded based on the reasonableness of the budget	Up to 5	
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	adequacy of the proposed budget		
Leverage of outside resources (outside funding/financing requested)	(i) 10 points if this ratio is greater than 100% (ii) 7 points if this ratio is between 100% and 75% (iii) 5 points if this ratio is between 75% and 50% (iv) 3 points if this ratio is between 50% and 25% (v) 1 points if this ratio is lower than 25%	10	
Extent of grant funding (Grant funds/loan funds)	(i) 0 points if this ratio equals 100% (ii) 1 points if this ratio is between 100% and 75% (iii) 3 points if this ratio is between 75% and 50% (iv) 5 points if this ratio is lower than 50% (v) 10 points if no grant funds are requested	10	
Total Points		100	



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J. BTOP Certification Requirements

Certification (Requested for BTOP)

Please refer to upload section at the end of the document regarding following uploads.

1. U.S. Department of Commerce, Broadband Technology Opportunities Program
2. SF-424D Assurances—Construction Programs (Schedule N)
3. CD-511, Certification Regarding Lobbying (Attachment O)
4. SF-LLL, Disclosure of Lobbying Activities (Attachment P)
5. CD-512, Certification Regarding Lobbying—Lower-Tier Covered Transactions (Attachment Q) This certification will not be required until the time of the grant award, because it applies to subcontractors, etc.

K. BIP Certification Requirements

Certification (Requested for BIP)

Please refer to upload section at the end of the document regarding following uploads.

1. Equal Opportunity and Nondiscrimination Certification
2. Certification Regarding Architectural Barriers
3. Uniform Relocation Assistance and Real Property Acquisition - Policies Act of 1970 Certification
4. Certification Regarding Debarment, Suspension, and Other Responsibility Matters – Primary Covered Transactions
5. Certification Regarding Lobbying for Contracts, Grants, Loans, and Cooperative Agreements



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6. Network Design and Implementation Plan Certification (to be complete for projects requesting more than \$1 million in federal assistance)

L. Schedules

Schedule: A-1 Congressional Districts

1. State the Congressional District of the Applicant's headquarters

Pennsylvania - 5

2. State the Congressional District for each area covered by the Project.

Pennsylvania - 1

Pennsylvania - 2

Pennsylvania - 3

Pennsylvania - 4

Pennsylvania - 5

Pennsylvania - 6

Pennsylvania - 7

Pennsylvania - 8

Pennsylvania - 9

Pennsylvania - 10

Pennsylvania - 11

Pennsylvania - 12

Pennsylvania - 13



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Pennsylvania - 14

Pennsylvania - 15

Pennsylvania - 16

Pennsylvania - 17

Pennsylvania - 18

Pennsylvania - 19

M. Proposed Funded Service Area Details (BIP & BTOP)

13. Proposed Funded Service Area (BIP - Last Mile Projects):

Proposed Funded Service Area Name:

Census Blocks in Proposed Funded Service Area:

Community Name:

Rural Classification of the Community:

BIP - Service Status:

BIP - If Service Status is "Underserved" please select at least one applicable option from this list.

BTOP – Service Status:

BTOP - If Service Status is "Underserved" please select at least one applicable option from this list.

Total Square Miles of Community:

Total Population :

Total Number of Households:

Total Number of Businesses:

Total Number of Critical Community Facilities, Anchor Institutions and Public Safety Entities:



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14. Proposed Service Area (BTOP - Middle Mile Project):

Middle Mile Span Name: PennREN

Census Blocks in Middle Mile Span: Attachment "Z" details the entire list of all contiguous census blocks in the funded service area of PennREN.

Last Mile Service Area Name: See Table 14.1

Community Name: See Table 14.1

Rural Classification of the Community: Non-Rural

BIP – Service Status:

BIP - If Service Status is "Underserved" please select at least one applicable option from this list.

BTOP - Service Status: Underserved

BTOP - If Service Status is "Underserved" please select at least one applicable option from this list.

No more than 50% of the households in the proposed funded service area have access to facilities-based, terrestrial broadband service at greater than the minimum broadband transmission speed,

Total Square Miles of Service Area: 4,082

Total Population : 5,159,780

Total Number of Households: 2,047,442

Total Number of Businesses: 204,193

Total Number of Critical Community Facilities, Anchor Institutions and Public Safety Entities: 13



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Uploads

The following pages contain the following uploads provided by the applicant:

Upload Name
13) Q-40. Attachment F - Legal Opinion*
27) Pg-23. BTOP ONLY Att. N - Assur-Construction*
28) Pg-24. BTOP ONLY Attachment O - Lobbying*
29) Pg-25. BTOP ONLY Attachment P - Disclosure*
04) Q-20. Attachment B - Middle Mile Offerings
12) Q-39. Organization Chart
17) Q-47. Historical Financial Statements
07) Q-27. Affordability
44) Supplemental Information 2
30) Pg-26. BTOP ONLY Attachment Q - Lobbying*
22) Q-50. Attachment L - Balance Sheet



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23) Q-50. Attachment M - Statement of Cash Flows
24) Q-50. Financial Assumptions
05) Q-21. Attachment C - Competitor Tables
09) Q-31. Attachment D - Engineer Certification*
43) Supplemental Information 1
26) Pg-22. BTOP ONLY Certification Requirements*
16) Q-45. Attachment G - Detailed Project Cost
18) Q-48. Attachment H - Subscriber Estimates
21) Q-50. Attachment K - Income Statement
10) Q-34. Attachment E - Build-Out Timeline
15) Q-44. JOINT APPS ONLY: Additional Budget
11) Q-37. Management Team Resumes



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08) Q-30. Network Diagram

14) Q-41. Government and Other Key Partnerships

45) Supplemental Information 3

To preserve the integrity of the uploaded document, headers, footers and page numbers have not been added by the system