

Broadband USA Applications Database

Applicant Name: Executive Office of the Commonwealth of Pennsylvania (Office of Administration)

Project Title: Commonwealth of Pennsylvania Broadband Middle Mile Project: Enhancing Connectivity in Northern PA

Project Type: Middle Mile

Executive Summary

The Opportunity The Commonwealth of Pennsylvania (Commonwealth) is submitting the enclosed application for funding of a BIP/BTOP middle mile regional wireless system to provide broadband services to a large area of the Commonwealth which is currently unserved or underserved by commercial broadband providers. Pennsylvania Act 183 of 2004 tracks the implementation of broadband services within the Commonwealth from broadband system providers. An analysis performed in the preparation of the Pennsylvania Statewide Broadband Plan reveals that while there are 36 broadband providers in the Proposed Funded Service Area, much of this region remains unserved or underserved by these providers. The population density in this region makes it difficult for providers to build a sound business model to serve these areas profitably. The Commonwealth sees this as an opportunity to build upon existing Commonwealth-owned infrastructure in this region to provide middle mile service to potential last mile providers, as well as bringing broadband service to anchor institutions.

Background The Commonwealth has constructed a statewide Land Mobile Radio communications system (PA STARNet) for use by state law enforcement, public safety and public service agencies. This system operates in the 800 MHz spectrum and will soon be expanded to utilize 700 MHz spectrum which is adjacent to spectrum recently auctioned to major last mile service providers by the FCC. The STARNet system utilizes 74 High (~300 ft) towers and 147 lower (~75 ft) cell sites to provide 95% coverage of the land mass in this region, on a point to mobile and point to multipoint basis. A microwave and landline backbone system, diagram attached, is installed on these towers, which currently provides 50 Mbps bandwidth in the major loops and 1.544Mbps or greater bandwidth between the cell sites and primary loops. This system currently backhauls the land mobile radio traffic and mobile data terminal traffic to the primary system control points and dispatch centers. The Commonwealth is currently in the process of installing Multi-Protocol Label Switching (MPLS) onto this microwave and land line network to increase system speed, create a method of prioritizing traffic, improve data throughput, and create alternate routing in the event of a path failure. This improvement is funded by the Public Safety Interoperable Communications (PSIC) grant funds released in 2008.

Proposed System The Commonwealth proposes to add an additional 150 Mbps capable microwave system to the existing 50 Mbps system to provide a middle mile solution, available to last mile providers and anchor institutions in the proposed funded service area (PFSA) on an "open system" basis. Last mile providers which use the recently auctioned 700 MHz spectrum to deliver their broadband service may expect to be able to cover 95% of the land mass in this region using the full tower and cell site network.

Proposed Funded Service Area (PFSA) The PFSA is an east-west corridor between I-80 and the Pennsylvania-New York State

border. The PFSA encompasses 32 counties, approximately one-half of the total area of the state, with a population of 2,450,060 living in 988,135 households. There are also 2657 Community Anchor Institutions, and 202,808 businesses. The PFSA also includes 1,222 Public Safety agencies (Law Enforcement, Fire/Rescue, Emergency Medical, and Emergency Management), 255 medical and health care facilities, 1,180 schools, institutions of higher learning, and libraries. The PFSA includes 9,315 unserved census blocks and 1,243 underserved census blocks. Proposed Services The Commonwealth's middle mile project proposes to provide a very robust microwave and landline-based broadband middle mile transport system which will be available on a non restricted basis to last mile providers in need of middle mile backhaul to internet or other network points of presence. We believe access to affordable middle mile broadband facilities will encourage buildout of broadband last mile systems to homes and businesses by last mile providers, no longer saddled with the cost of building their own middle mile facilities. We believe many of these local last mile providers to be entrepreneurial small businesses. In addition we propose to make bandwidth available as well to anchor institutions and public safety agencies which require broadband transport from point to point. Examples of this requirement would be applications such as Next Generation 911 systems, 911 Communication Centers for backup and dispatching, and for the transport of high bandwidth public safety applications such as mug shots, in-car and surveillance video. Health care applications would include full motion video applications for telemedicine, records sharing, diagnostic image sharing and remote patient consultations between the patient's home, health care facilities and clinics. Non Discrimination The Commonwealth middle mile System will be open and available to all users on a non-discriminatory basis. Technology The technology employed by the network will vary based upon bandwidth and specific microwave hop or connection to the cell sites. The attached system diagram shows the system architecture and proposed bandwidth of each leg of the system. The core is a two loop microwave configuration. Each loop is a redundant, reversible loop which provides 99.999% reliability and availability. The current 50 Mbps microwave will be left in place to continue to carry the traffic of the PA STARNet radio system. An additional 150 Mbps microwave radio system will be placed alongside the 50 Mbps radios. The new 150 Mbps radios will share antenna dishes and site facilities, reducing the cost. Both microwave systems will share the MPLS system, currently being installed. From the system's major loops, there are point to point spurs which serve additional high towers as well as cell site towers. Some spurs are microwave and some are leased line circuits. Where a line-of-site path is available either 150 Mbps, 50 Mbps microwave or new 3.65 GHz 20 MBps WiMax microwave radios will be employed (literature on the proposed equipment is attached). Where line-of-site is not available, a network of point-to-point leased 1.54 Mbps DS1 circuits are employed. These DS1 circuits are to the Cell Sites only. These circuits are reflected in the attached network drawing. Excess capacity on the 50 Mbps hops and DS1 circuits will be available to the middle mile subscribers. Internet points of presence and providers have been and continue to be identified. It is the desire to have as many "on and off ramps" to the internet as possible, to keep the number of hops needed between the ISP and Last Mile provider to a minimum, and accommodate more traffic on the network overall. At the tower sites all of the needed facilities are in place. Environmentally controlled, secure equipment shelters and equipment rooms are in place with sufficient expansion room to accommodate the additional equipment. Likewise, standby power systems, generators, battery backup, and UPS systems are in place and have the needed additional capacity. System monitoring and alarm systems are in place. All of the proposed paths exceed the FCC broadband definition of 768 kbps

downstream and 200 kbps upstream. The Commonwealth system, as a middle mile provider is providing the same bandwidth capacity in both directions. MPLS is being implemented on each and every path.

Qualifications The Commonwealth of Pennsylvania has the in-house expertise and ability to construct, operate and manage a system of this magnitude. The tower network is already in place, and was constructed by the same management team that will have the responsibility to implement and operate the middle mile system. In addition to construction management expertise, the Commonwealth operates a Network Operations Center (NOC) which monitors PA STARNet on a 24/7 basis. The NOC will assume the additional responsibility of monitoring the Middle mile system. Fault alarm and reporting systems already in place will be expanded to accommodate the middle mile equipment. Budgeted Cost Current budget cost for this project is \$35,980,017. These budgeted costs are for a complete turnkey system, including equipment procurement, system installation, system engineering, project management, system implementation and operation. The required budgetary attachments have been completed and are included.

Subscriber Projections Current conservative loading projections indicate the 150 Mbps system will be fully loaded in 3 years following system launch. These projections consist of an estimated 180,000 last mile household subscribers, 6,725 last mile business subscribers, and a combined last mile and middle mile subscriber total of 420 anchor institutions.

Jobs Created A recent study by the Brookings Institute stated that for every 1% of broadband penetration in Pennsylvania, 6,857 non-farm jobs are created and saved.

Conclusion This project meets the requirements, goals and objectives of RUS and NTIA in bringing affordable broadband service to unserved and underserved areas of the Commonwealth and provides broadband availability to critical community anchor institutions. The system provides affordable broadband access to end mile service providers, and anchor institutions best served by a last mile provider. With aggressive last mile provider participation we anticipate having service to these unserved/underserved populations quickly. The contracts and purchasing vehicles for system procurement are in place using existing state term contracts. The towers and cell sites are built and ready. A well-qualified Commonwealth team is in place and ready to build and operate this system. The budget and business plan reflects a sustainable investment. This project is truly “shovel-ready”, reflecting the goals of ARRA.