

Executive Summary of Proposal

Overview

The State of Connecticut Department of Information Technology is providing leadership to, and partnering with, Connecticut state agencies and initiatives, including the Department of Public Safety and the Connecticut Education Network, to enhance broadband access to the residents of the state of Connecticut. This proposal seeks funding to serve all of Connecticut's 3.4 million residents, while providing necessary infrastructure to underserved. This proposal includes:

- The preservation and creation of jobs and investment in infrastructure that will provide long-term economic benefits
- Spurring technological advances in education, health and public safety
- Stabilizing state and local government budgets by leveraging coordinated management and procurement efforts
- Providing improved access to broadband service to consumers residing in underserved areas of the state
- Providing broadband access, education, awareness, training, equipment, and support to community anchor institutions, to include improved access by public safety agencies
- Expanding current data networks in existing areas and creating capacity to allow for the immediate provision of services by third party providers in areas currently underserved
- Stimulating demand and enabling access for broadband and, economic growth and job creation
- Enhancing the reliability of existing broadband infrastructure
- Enabling the expanded network to connect with neighboring states to support future interstate collaboration

In all, the project will provide broadband access to community anchor institutions including 594 points of education and public safety while laying the foundation for potential future access at all the State's households, although public subscribers are not applicable to this application. The overall cost for this effort is \$109,750,451, creating 1,189 jobs as a result.

Key Participants

Connecticut Department of Information Technology (DOIT)

The mission of the Department of Information Technology is to provide quality information technology (IT) services and solutions to customers, effectively aligning business and technology objectives through collaboration, in order to provide the most cost-effective solutions that facilitate and improve the conduct of business for our state residents, businesses, visitors and government entities.

Connecticut Department of Public Safety (DPS)

The Connecticut Department of Public Safety is committed to protecting and improving the quality of life for all by providing enforcement, regulatory and scientific services through prevention, education and innovative use of technology.

Connecticut Education Network (CEN)

The Connecticut Education Network (CEN) connects the state's public K-12 school districts, colleges and universities, and many public libraries via a fiber optic backbone dedicated for education, research and public computing center use. The CEN provides access to the Internet, Internet2, iCONN - Connecticut's re-search engine, and other resources targeted to students, teachers, researchers, administrators and library patrons in Connecticut.

The Project

Connecticut Public Safety Services Data Network (CPSSDN)

Points of Int.	No. of Counties	Hshld. Poten.	Jobs Created	Total Cost
520	8	1,293,079	814	\$74,979,014

In 2005, the Connecticut General Assembly passed and Governor Rell signed into law Public Act 05-181 which enabled the Office of Statewide Emergency Telecommunications (OSET) to initiate a planning process for the investigation and requirements determination of an integrated safety data network. Surveys of current systems and needs led to the initiation of a feasibility study in 2006. The study included recommendations for network infrastructure solutions that would establish a new, integrated public safety data network, saving affected agencies substantial sustainable costs.

Additionally, the study noted that the stand-alone legacy network infrastructure systems that Connecticut public safety agencies utilize minimally met the bandwidth requirements for current use and were grossly inadequate for near or long term projected future data transmission requirements. Also, the data network utilized by the Enhanced 911 system did not have the necessary universal data connectivity to provide for next generation 911 functionality. Numerous public safety first responders and providers including police departments, fire departments, emergency management/homeland security and others did not have any data connectivity to receive or transmit critical data for emergency services. PSAP disaster recovery and business continuity needed to be improved.

Due to funding constraints, the project was divided into two phases. Phase 1 establishes the base fiber optic network topology and inter-connecting the existing 107 PSAPs, the Department of Public Safety building in Middletown and the DOIT data center. To that end, Phase 1 of the CPSSDN project is planned to be initiated in FY2010 and is scheduled for completion in FY2011. Phase 1 utilizes a fiber footprint that includes approximately 2000 miles of existing fiber installation as well as approximately 240 miles of newly constructed fiber pathways in a 6 interconnecting ring topology with DWDM technologies.

Phase 2 of the CPSSDN, seeks to implement additional coverage and capacity of the CPSSDN, expanding coverage to an additional 411 public safety related locations so as to realize the anticipated cost savings, connectivity requirements and efficiency improvements. As with Phase 1, all connectivity will be accomplished via dedicated fiber optic cabling to the planned locations utilizing appropriate fiber optic transceivers.

Topology will be a mixture of both hub and spoke as well as subtending rings. Each of these spokes or rings will connect to one of the 111 existing Phase 1 locations. Completion of Phase 2 will greatly enhance agency interoperability capabilities, data sharing and overall communications while improving constituent services and safety.

Connecticut Education Network (CEN)

Points of Int.	No. of Counties	Hshld. Poten.	Jobs Created	Total Cost
74	8	318,876	374	\$34,457,541

The purpose of the CEN project is to provide improved access to broadband Internet connectivity, including network equipment and user support, to Connecticut’s K-12 school districts, colleges and universities, and public libraries. These proposed sites do not directly connect to the existing CEN fiber backbone and face two major limitations: limited bandwidth capacity and lack of fiber redundancy.

This project aims to deliver 100 megabits per second service to the community anchor institutions in Connecticut that currently lack this level of connectivity as well the redundancy necessary to ensure uninterrupted broadband access, including Connecticut’s K-12 school districts, colleges and universities, public libraries and public computing centers. The project would extend 675 miles of new fiber optics, install the necessary hardware to support the 100 Mbps service, including three new hub routers and offer user support to all Connecticut Education Network members via the Connecticut State Department of Information Technology’s Help Desk and 24/7 Network Operations Center.

Connecticut Department of Information Technology POP2 Installation

Points of Int.	No. of Counties	Hshld. Poten.	Jobs Created	Total Cost
1	8	1,293,079	3	\$313,896

The purpose of this aspect is to reduce potential risk to public safety, health and economic impacts caused by a network outage. A second location (point-of presence) for all of the State’s identified critical data circuits will be created to provide network resiliency in the event of failure in the private carrier networks or catastrophic loss of the State’s Data Center at the Department of Information Technology in East Hartford, CT.

DOIT provides network access and IT services that facilitate all of the State’s government operations. These services include infrastructure and applications that support mission critical business functions for the State of Connecticut Executive Branch Government Agencies as well as the Judicial and Legislative branches of the State government. Examples of critical agencies that will directly benefit from this project include the Department of Emergency Management & Homeland Security, Department of Public Safety, Department of Motor Vehicles, Department of Public Health, Department of Revenue Services and the Department of Social Services, among others. The State network and Data Center provide access and support for an overwhelming majority of the State’s computer systems and applications. These services and

applications include Internet access (both inbound to the State's hosted websites and outbound for external connectivity), Statewide Email, access to the FBI's NCIC system and numerous Ecommerce applications.

10. Description of BTOP Project Purpose

Connecticut Public Safety Services Data Network (CPSSDN)

Problem: The current network infrastructure connecting Connecticut public safety agencies does not meet minimum requirements for broadband service. Additionally, the Enhanced 911 system does not have the necessary universal data connectivity to allow next generation functionality. Finally, DPS sees ongoing issues with disaster recovery and business continuity in relation to broadband. All of these issues have been raised as a result of system surveys and a feasibility study concluded that a new, integrated data network be constructed to allow for additional connectivity between first responder sites across the state. Due to state budget constraints, the implementation of this network has been broken into two phases, with Phase 1 (over 2,200 miles of constructed and existing fiber) scheduled to be completed in 2010. With Phase 2 left unscheduled to date due to a lack of funding, 411 first responder sites remain unconnected to the CPSSDN and are relying on outdated and insufficient connections, and in some cases no connectivity at all, to support safety-critical operations.

Solution: By implementing phase 2, sought as part of this application, the remaining 411 sites would be connected as part of the CPSSDN. By leveraging and utilizing many of the existing components and fiber of the Phase 1 CPSSDN “core backbone,” Phase 2 will provide needed connectivity at a much lower cost than would otherwise be obtainable. Additionally, by implementing Phase 2 of the CPSSDN, broadband connectivity will be increased substantially and will provide service access to over 25,000 police officers, firefighters and supporting staff members. This project has the ability to be replicated in other jurisdictions where similar connectivity is limited.

Funding for the CPSSDN will directly impact the statutory purposes of improving access to, and use of, broadband service by public safety agencies; and stimulating the demand for broadband, economic growth, and job creation.

Connecticut Education Network (CEN)

Problem: Those sites that are not directly connected to CEN’s fiber face two major limitations: limited bandwidth capacity and lack of fiber redundancy. First, those sites that do not connect directly to CEN’s fiber do not have the capacity to scale beyond 10 mbps for uploading and downloading information.¹ These include approximately 60 K-12 school districts and several higher education institutions. Additionally, the public libraries in these communities are limited to frame relay and DSL-based connections, currently providing them with upload speeds of 384k to 1 Mbps and download speeds of 1.5 Mbps to 6 Mbps. With increasing high-bandwidth applications to improve and enhance teaching, learning, and research those without a direct fiber connection, remain disconnected from pedagogically sound 21st century learning activities.

¹ On a more local level, bandwidth capacity is often much less than 10 mbps in the K-12 arena, depending on whether the district chose to connect each of its school buildings to its local CEN connection point. According to a survey conducted in 2007, 40% of Connecticut elementary schools, 26% of middle schools, and 11% of high schools, have a T1 connection or less. *Statewide assessment of K-12 school connectivity to CEN, Chris Giralmo, University of Bridgeport, December, 2007*

Secondly, those sites not directly connected to CEN's backbone lack fiber redundancy. In the instance of hardware failure or a severed connection, these schools and libraries would experience immediate outages until the repairs were complete – a major threat to the disruption of the learning process.

Solution: Expansion of CEN's fiber optic footprint would bring 100 Mbps handoffs into communities that previously lacked it. Through the expansion of the leased fiber, every connected school, higher education campus, and library in the state would be able to gain effectively infinite scalability. As bandwidth consumption increases, the fiber optics would enable future bandwidth increases through end device hardware upgrades.

In addition to increased bandwidth and improved scalability, each site would obtain the redundancy needed to ensure stable, uninterrupted broadband access. Furthermore, the State Department of Information Technology would offer these newly connected sites user support via its Help Desk and dedicated team of Network Analysts. These improvements would positively impact the more than 88,000 students, 5,800 teachers, more than 350,000 registered library patrons, and more than 490,000 registered library computer users in these largely rural regions of Connecticut.

Expansion of the Connecticut Education Network into all of the state's communities would provide the opportunity for equity of access to *all* Connecticut students, teachers, administrators, and library users. The expansion would directly address the issue of the "digital divide" that still plagues some rural and lower socio-economic areas within Connecticut, the United States, and other parts of the globe.

Funding for the CEN will directly impact the statutory purposes of providing broadband education, awareness, training, access, equipment and support to public institutions; and stimulating the demand for broadband, economic growth, and job creation.

Connecticut Department of Information Technology POP2 Installation

Problem: The DOIT provides network access and IT service for all of the state's government operation. This includes critical agencies such as the Department of Public Safety, Department of Emergency Management & Homeland Security and the Department of Public Health among others. Currently, all of these agencies and branches are served with only a single POP. If critical issues occur with the DOIT's service provider or facility, the entire network would realize a cease in network service.

Solution: By creating an alternate WAN POP2, the service DOIT provides to critical state agencies and branches of government will be uninterrupted even when faced with major catastrophic events. The POP2 will have connectivity to future state data centers and provide seamless service to all Connecticut residents.

Funding for the POP2 will directly impact the statutory purposes of improving access to, and use of, broadband service by public safety agencies; and stimulating the demand for broadband, economic growth, and job creation.

Narrative Components

Readiness

The Departments of Information Technology and Public Safety are fully prepared to initiate work as soon as funds are available. Governor Rell has established by Executive Order Number 32, dated August 10, 2009, a Broadband Review Panel to evaluate projects within the State of Connecticut, providing Executive-level leadership and prioritization.

The Department of Information Technology, under Chief Information Officer Diane S. Wallace, has developed a highly-structured project management environment under a System Development Methodology. This Methodology requires all projects to move sequentially through well-documented “gates” to ensure that each of the eight phases is completed before the next phase begins. This process ensures the projects are properly funded and supported both at the executive (“Project Steering Committee”) level and the technical and business levels. Both the Connecticut Education Network (CEN) and Public Safety Data Network (PSDN) projects will be managed through this process.

The CEN project will be administered by a highly-qualified team which has been in place since the early days of the effort, ensuring both continuity and the highest levels of professionalism. John Vittner, now the State Chief Technology Officer, has been involved in CEN planning, development and operation since 2000. Robin Brown, the Senior Network Engineer, has been responsible for technical development and operations since 2003. Sarah Edson, with the project since 2007, is responsible for day-to-day program management and administration.

The PSDN project will continue to be managed by the The Office of Statewide Emergency Telecommunications (OSET), within Connecticut’s Department of Public Safety. Steve Verbil, currently serving as the Interim Director of OSET, has over 20 years of technical and managerial experience in the design, development, implementation, integration, operation, user training, testing, and maintenance of critical communications and data systems.

Gerald F. Werner, currently the Project Manager, is an independent contractual Networking Consultant and Project Manager with over 15 years of experience designing, implementing and managing multiple diverse voice and data networking infrastructure projects. He has held several technical and management positions in the Information Technology field in both the public and private sectors over his career including Technical Field Engineer, Implementation Lead, Network Services Manager and Director of Technology Services.

Both CEN and the PSDN projects are supported by the technical staff at the Connecticut Department of Information Technology. There two technical staff

members will have critical roles to play. Germain Blais developed and implemented the State Of Connecticut Enterprise Network consisting of 76 State Agencies with over 1000 Cisco Routers and Switches and over 50,000 IP nodes. He has over thirty years of networking experience with the State. He is currently a "Subject Matter Expert" in the network area, responsible for high level planning and problem resolution. Jacque Cassella is responsible for the design, implementation and troubleshooting of highly-complex networking and security infrastructures in the State Data Center in East Hartford, supporting applications and systems such as Single Sign On, Intranet (LAN) Switch Block, Internet Filtering Solution, Enterprise load balancing, Graphical Information Systems and Messaging (POP and Exchange) Environment.

The Connecticut team is experienced, prepared and eager to move high quality bandwidth out to all of the State to provide consumer services through schools and Community Anchor Institutions and increased security to citizens through development of the PSDN.

Connecticut has a Master Agreement (MA B-00-21) and long-term working relationship with Fiber Technologies Networks Fibertech, the selected network service provider, which operates as a Universal Service Provider of telecommunications services in the state of Connecticut and elsewhere. They provide underlying networks available to any and all enterprise customers and carriers alike as both lit transport services and dark fiber connectivity. They routinely operate open access networks within the state of Connecticut on their underlying infrastructure assets. They have been involved in the planning of all the Connecticut projects and have shovels in hand, ready to begin work. The State also has a Master Agreement with ePlus, a Value Added Reseller (VAR) of Cisco products. They, too, have been involved in the planning of all the Connecticut projects and are ready to provide all the necessary telecommunication equipment.

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

Quite simply, all of the proposed 485 connection points in this application will provide direct access via community anchor institutions to broadband internet enhancing services for health care delivery, education and/or children.

In an effort to strengthen emergency services and first responder emergency support, the state of Connecticut is proposing fiber extension to 411 additional sites connecting police departments, fire departments, emergency management/homeland security and others to the CPSSDN. This will enhance agency interoperability capabilities, data sharing and overall communications while improving constituent services and safety in an effort to provide superior health care services to state residents.

Additionally, the State DOIT is proposing the addition of 74 education sites, expanding the CEN from 456 sites to 530. In addition to increasing the fiber footprint of the CEN, the proposed project will provide direct access to educational and research services requiring high speed Internet for access. A product of the proposed project would be that every school and library connected to the CEN would be able to engage in Internet2, on-net video conferencing activities. Also, the CEN has made available disaster recovery services to its connected higher education institutions. Through collaboration with the Northeast Research and Education Network (NEREN), the University of Connecticut, and the CT Commission for Educational Technology, CEN-connected colleges and universities are able to utilize rack space and power at the Safe Harbor facilities in Springfield, MA for the purpose of data protection and back-up. Users of this service are able to access remotely their school equipment at the secure facility using a keyboard/video/mouse capability over the CEN. By providing direct access points to CEN's fiber in every community in the state, this project would not only vastly improve intra-state connectivity via 100 megabits per second service but also link Connecticut's schools and libraries with other education and research institutions regionally (NEREN) and nationally (Internet2).

Finally, the DOIT POP2 portion of the project will provide redundancy to government operations which impact all Connecticut citizens. This project will insulate State Agencies from significant downtime due to network outages caused by failures in the carrier network or transmission mediums and will enable automatic failover of network access to alternate circuits and data centers. With responsibility to the branches of state government and including agencies such as the Department of Emergency Management & Homeland Security and Department of Social Services, the POP2 project will enhance services to CT residents, providing uninterrupted service to critical care.

22. Description of Network Openness

The proposed project, the expansion of the CEN, CPSSDN and POP2, will fulfill the NOFA's non-discrimination and network interconnection obligations.

First, the proposed expanded network will adhere to the principles within the FCC's Internet Policy Statement (FCC 05-151, adopted August 5, 2005). Users of the networks will be able to "access the lawful Internet content of their choice." No persons associated with managing the network will regulate what lawful content or applications network users will be able to access and utilize. While the CEN does make available an Internet filtering service to K-12 school districts, each district is able to customize and maintain its own filter settings, and the districts retain the ability to access any lawful Internet content that they choose. CPSSDN users will be limited to access material and content necessary for public safety official business only.

Second, the project will "not favor any lawful Internet applications and content over others." The DOIT, CEN and CPSSDN do not promote or favor any particular Internet content or applications. Network users will have equal access to all lawful content and applications.

Third, staff members will commit to displaying any network management policies in a prominent location on the DOIT, CEN and CPSSDN web sites. Furthermore, network staff will notify network users via email of any changes to these policies.

Through Border Gateway Protocol (BGP) load balancing, network staff members are able to allocate traffic to the networks' multiple Internet Service Providers in order to ensure optimal performance and allow for sufficient headroom for any bursts in network member traffic.

Network staff have the capability of limiting bandwidth utilization using features inherent in the core and edge devices deployed. It is not standard practice to limit usage; however if a network member requested this service, CEN staff would be able to accommodate this request. CPSSDN, again, will only use the network for appropriate business.

CEN makes available to public school districts access to a centralized Internet filter server that enables districts to customize filter settings according to their local policies and needs.

Fourth, the CEN is an open, inter-connected network. The CEN connects to the public Internet via core border edge routers. The state network also connects to other regional and national education and research networks (e.g., NEREN and Internet2) via the Northern Crossroads (NoX) in Boston, Massachusetts.

All networks provide interconnection of critical education and public services to residents of Connecticut.

State of CT - ARRA Quarterly	YEAR 1				YEAR 2				YEAR 3				Total 3 Year Budget
	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4	
	Fiber Completion Percentage	15%	30%	50%	70%	80%	90%	100%					
ITEM													
Fiber	15,020,995	11,168,960	11,681,918	11,681,918	6,803,968	6,803,968	4,877,950						\$ 68,039,675.00
Equipment - Transport ROADM (Phase 1 Upg)	5,300,139	0	0	0	0	0	0						\$ 5,300,139.00
Equipment - Transport Optical	694,950	3,631,015	2,394,571	2,394,571	1,197,287	1,197,288	463,178						\$ 11,972,859.60
Equipment - Core Routers (CEN)	10,260,401	0	0	0	0	0	0						\$ 10,260,401.00
Equipment - Switching	1,805,736	0	558,878	558,878	558,877	558,877	558,881						\$ 4,600,126.60
Equipment - VSAT Connectivity	1,850,300	0	0	0	0	0	0						\$ 1,850,300.00
Design/Engineering	565,000	0	0	0	0	0	0						\$ 565,000.00
Project Management	193,578	193,578	223,218	223,218	163,938	163,940	96,780						\$ 1,258,250.00
Professional Services (installation, configuration)	784,600	638,275	930,925	1,077,250	1,077,250	1,077,250	318,150						\$ 5,903,700.00
TOTALS	36,475,699	15,631,828	15,789,510	15,935,835	9,801,319	9,801,322	6,314,939						\$ 109,750,451.20