

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of )  
 )  
Modernizing the E-rate ) WC Docket No. 13-184  
Program for Schools and Libraries )

**INITIAL COMMENTS OF THE ILLINOIS DEPARTMENT OF CENTRAL MANAGEMENT SERVICES, A STATE AGENCY OF ILLINOIS REGARDING NOTICE OF PROPOSED RULEMAKING**

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**Date: September 15<sup>th</sup>, 2013**

Illinois Department of Central Management Services (CMS), a state agency of Illinois submits the following comments in response to the FCC's Notice of Proposed Rulemaking to modernize the E-rate Program for Schools and Libraries.

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## **1 Submission Format**

The Illinois Department of Central Management Services (CMS), a state agency of Illinois, welcomes the opportunity to respond to the Notice of Proposed Rulemaking to modernize the E-rate program for schools and libraries. Illinois welcomes this effort to modernize the E-rate program, and submits the following comments to assist the FCC in the rule making process.

The proposals and comments given in this response reflect the views of the Department of Central Management Services (CMS), a state agency of Illinois. CMS manages the Illinois Century Network (ICN) the state network in Illinois providing high speed broadband to over 6300 education locations, libraries, state agencies and other community anchor institutions.

This response is organized as follows. Section 2 provides contact information, section 3, the Executive Summary, provides an overview of the CMS proposal and the guiding principles, section 4 contains a cost estimate to connect all public K-12 schools and libraries in Illinois, Section 5 contains the implementation plan Illinois would follow if awarded capital funds for high speed broadband from federal sources and Section 6 contains responses to specific NPRM questions.

If capital funds are not made available, Section 5 provides the priorities Illinois would follow in assisting school districts and libraries for special construction funds for fiber build out.

Appendix A contains a brief introduction to Illinois Century Network, the state education network in Illinois that plays a key role in providing high speed broadband to K-12 schools and libraries in Illinois, as well as serving other Illinois community anchor institutions and commercial service providers.

## **2 Contact Information**

To discuss any aspect of this response in further detail, please contact

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## **3 Executive Summary**

Central Management Services welcomes the opportunity to respond to the E-rate NPRM providing feedback and comments based on our experience in Illinois. We fully support the FCC in updating the E-rate program, and do believe a modernization is required for E-rate.

To accelerate the deployment of high speed broadband to schools and libraries in line with the goals of the President's ConnectED initiative we believe one time capital funds as well as the ongoing funds provided by the E-rate program are required. The one time capital funds would be used to fund construction of fiber optic based broadband. The ongoing E-rate funds would be used for lit service funding, with some funds dedicated to construction for external and internal connections.

The architecture and principles guiding our response to the NPRM are given below:

- We believe funding for external connections to schools and libraries should principally be focused on deployment of fiber optic technology. We believe fiber optic technology is the long term solution for high speed broadband to schools and libraries in Illinois. Alternative broadband technologies (wireless, coax, copper) may provide short and medium term solutions depending on school size but will not provide the bandwidth capacity and long term scalability enabled by fiber optics, which we believe has a life span of decades.
- We believe one time capital funds and ongoing funds should be focused on laying the foundation for excellence in our schools and libraries, this means focusing on external and internal high speed broadband connections, and phasing out E-rate funding for application level services and legacy services. We believe high speed connections will provide the most leverage to schools and libraries allowing them and third parties to develop yet to be invented applications and new modes of teaching.
- We believe funding requests for one time capital funds or ongoing E-rate funds should be by public school districts or groups of public school districts. Both for construction and lit service requests. ie. the smallest size requesting entity should be the public school district, not an individual public school. We believe this approach will provide administrative efficiencies to schools and increase the participation rate. Concerning public libraries, we believe funding requests by library district should provide administrative efficiencies versus requests by individual libraries.
- The management of one time capital funds should be at the state level. For example, the state should prioritize the school districts requiring construction funds. The state would be responsible for issuing the Request for Proposals (RFPs) and evaluating responses. State level management will help schools and libraries that lack resources and will provide administrative efficiencies while still having competitive bidding at the school district or school district group level. Detailed information on this process is given in Section 5.
- If one time capital funds are supporting a build there should be a number of strands, for example, a minimum of four, owned by the school district via an indefinite term Indefeasible Right of Use (IRU). The initial contract for lit service could be a maximum of 5 years, after which the contract is rebid by the school district. The IRU should include fiber connectivity to an Illinois

Century Network POP location ensuring open access connectivity to the school district from an open access point.

- Issuing an RFP for construction of external fiber optics to schools and libraries ensures a competitive bidding process to choose the service provider. We believe any entity should be able to respond to the RFP, whether a service provider, non – profit, municipality, state network or a combination of these four or the network could be built by the school district themselves if this is the most cost effective option.
- The RFP responses for external fiber connectivity will give a Non Recurring Charge (NRC) and a Monthly Recurring Charge (MRC) that equate to construction cost and monthly recurring price for the lit service. One time capital funds would contribute to the NRC, with a match being required from the school district or the state. The MRC would be eligible for funding via the ongoing e-rate funds. Further detail is given in section 5.
- Fiber overbuild should be discouraged or disallowed and with competitive bidding should be minimized. Fiber available for sale should be purchased via IRU's rather than overbuilding. The overbuild scenario here relates to the existence of available fiber for sale, not the existence of broadband over other technologies, which we believe represent short to medium term broadband solutions.
- With the recommended focus on only external and internal high speed broadband, and the removal of applications and legacy services from E-rate funding, we believe it makes sense to remove the concept of priority 1 and priority 2 funding requests for external connections and internal connections. For a particular school or library district, internal connections may be higher priority than external connections. We do believe however that the one time capital funds should first be used for external high speed broadband connections.
- Based on our estimates given in section 4 we believe the range of funding required for Illinois is between \$150M and \$350M for external connections and between \$100M and \$250M for internal connections.
- All other funding by USAC for telecommunications should focus on the level and availability of fiber being built throughout Illinois, especially in rural areas. For example, should be able to determine the level of new fiber build due to Connect America funding. We have to achieve a balance with funding legacy broadband technologies versus funding foundational fiber optic technology. Fiber will provide the most leverage since bandwidth provided over fiber is determined by the modulating electronics connected and provides essentially a limitless broadband capability that we believe will last for decades into the future.

- For one time capital funds we expect funding at approximately 70% - 75% level, with remaining funds being provided by school and state sources. Eg. the NRC would be funded by the one time capital funds at 70% - 75% level with remaining funds provided by the school or state. If the state has funded or supported fiber build to public K-12 schools and libraries within the prior year, this should contribute to the state required match for federal funds. This will ensure recent fiber builds by the state to public K-12 schools and libraries is credited against state required match for E-rate funds.

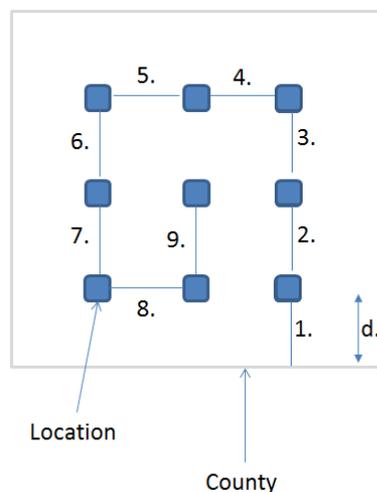
## 4 Cost Estimation for Fiber Build to Public K-12 Schools and Libraries

This section provides an estimate of the funds needed for fiber connectivity to all public K-12 schools and libraries in Illinois as well as funding for internal connections.

We estimate, assuming a 70% contribution by federal funding sources, that between \$150M and \$350M is required in one time capital funds for external connections and between \$100M and \$250M is required in one time capital funds for internal connections. This figure takes into account the presence of existing last mile broadband that can be used and takes account of the subsidy required by the awarded service provider.

### 4.1 External Connection Costs

To determine fiber connectivity per County, the land area in square miles and the number of public schools and libraries (in distinct locations) in the County are noted. If we assume an even distribution of schools and libraries in the County, as shown in the following figure and we assume connectivity to each location as shown then the route miles required to connect each school or library is as given in the formula. These route miles are “last mile” and assume middle mile fiber accessible in the County, providing backhaul to an internet gateway.



$$d = \frac{\sqrt{\text{Land area (square miles)}}}{\left[ \sqrt{\text{No. of Locations}} \right] + 1}$$

$$\text{Route miles required per location} = d$$

$$\text{Total route miles of fiber} = \text{No. of locations} \times d$$

$$\text{Build cost per County} = \text{Total route miles of fiber} \times \text{Build cost per mile}$$

This formula gives a very approximate measure of the number of route miles of fiber needed in the County to connect each school or library location. Once we have this number, we can apply a broadband

availability factor to account for the presence of already existing last mile fiber in the County. This broadband availability factor would be higher for broadband served Counties, and lower for broadband underserved Counties. For example, in the most broadband served County of the State, we may reduce the required mileage to 20% of the total due to the presence of already existing fiber, whereas for broadband underserved Counties we apply no reduction.

We can then apply a subsidy factor that represents the support necessary for a service provider, ie. what federal, state or school district funds does a service provider require to subsidize the construction cost. It is assumed that for some areas, the service provider should not need 100% subsidy for the construction cost and depending on the provider's business case, may require less than 100%.

For the build costs, we assume higher fiber construction cost in urban areas versus lower construction cost in rural areas.

By varying the broadband availability factor, subsidy factor and build cost, we can get an idea of the range of funds needed to build a fiber based network connecting each public K-12 school and library.

By summing the estimated cost figures for all Counties, we have a total estimated cost for the state. We estimate, assuming a 70% contribution by federal funding sources, that between \$150M and \$350M is required in one time capital funds for external connections.

We welcome other commenter's input on this estimation model and welcome other factors that can be added to the model. We certainly recognize the limitations of the model, but we feel it does provide a first look at necessary costs and a range for the potential cost to connect high speed broadband to all public K-12 schools and libraries in Illinois.

Of course, in reality, schools and libraries are not distributed uniformly throughout the County. There is some clustering of schools and libraries around population centers of the County, some schools and libraries are more remote. We also recognize the fiber topologies vary based on availability of existing fiber and customer need, for example hub/spoke and ring architectures. However we believe the approach provides a simple formula to quickly estimate how many miles would be needed, based on number of schools and libraries in the County and land area of the County.

We recognize that a more accurate approach would be to perform a detailed engineering study for each County, and each location, in addition to soliciting providers to purchase available fiber IRU's.

## **4.2 Internal Connection Costs**

Internal connection costs to Illinois public schools and libraries were estimated for each school and library and were based on the following factors:

- Number of students enrolled at the school. Schools with a higher number of students will require a greater expenditure for internal connections.
- Size of library will generally determine the level of required internal connections needed.

- Current broadband availability in the County. It is assumed that schools and libraries in broadband served areas will, on average, have already performed some internal connection upgrades. More so than for schools and libraries in broadband underserved areas.

With the above three factors, the internal connection cost per school and library is estimated resulting in an estimated cost for all public schools and libraries in Illinois.

We estimate that between \$100M and \$250M is required in one time capital funds for internal connections.

## **5 Implementation of Fiber Build to Public K-12 Schools and Libraries**

Section 4 of this report estimates the capital funds required to support the build of fiber based broadband to all K-12 schools and libraries in Illinois. This section details how CMS recommends the funds be spent to achieve the desired objective. Capital funds provided by federal or state sources would subsidize and accelerate the build of fiber plant throughout Illinois.

Recommended steps for spend of one time capital funds:

1. Prioritize all public school districts in Illinois into 10 “waves” according to need with those districts in the most underserved areas taking priority. Approximately 40 - 60 school districts per wave.
2. For each wave group school districts by geography.
3. For each wave create an RFP for the construction and provision of lit service via fiber based broadband. Issue RFP and award contract to one or more service providers. Process each wave and the associated RFP. Total timeframe to process all waves is expected to be between one and two years.

### **5.1 Detailed Explanation of Process**

All school districts in Illinois are prioritized (prioritization criteria is discussed in section 5.1.1) and allocated to one of 10 waves with the first wave being the highest priority. Central Management Services (CMS) develops an RFP for all school districts in each wave and issues the RFP. There are expected to be approximately 40 to 60 school districts per wave and one RFP issued per wave. The RFP will request the provision of lit service via fiber based broadband.

Service providers will be required to respond to the RFP with a non-recurring charge (NRC) and monthly recurring charge (MRC). The NRC is the non recurring charge the service provider requires to subsidize the cost of constructing fiber optic based network. The MRC is a monthly recurring charge that pays for the lit service the provider sells to the school. The one time capital funds are used only for the NRC. The MRC would be paid for by the school district directly. With multiple respondents to the RFP, the response with the lowest NRC and MRC, assuming other technical factors are acceptable will win the business. In other words, the service provider that requires the lowest subsidy (NRC) to build out the

network and the lowest MRC will win. A point scoring mechanism will be implemented to ensure service providers cannot respond with a low NRC and high MRC. It is expected that in many areas, there are alternative sources of revenue from businesses, residences and other types of anchor institutions that can help with the business case thus resulting in a subsidy that is lower than the complete cost to build out the network. For the most unserved areas of the state, it may require 100% subsidy to build out a fiber solution if there are no or minimal other sources of revenue. The term “service provider” for this section refers to any entity that wishes to respond to the RFP, for example a service provider could be a private company, a non-profit, a municipality, the state network or a combination of these four.

Issuing the RFP results in a competitive bidding process that should mean the lowest cost solution is awarded and should promote the purchase of existing fiber via IRU rather than overbuild.

There may be some very remote rural locations where even if the build is 100% subsidized the service provider is not interested in providing service and maintaining the network due to the low revenue from the schools and the lack of alternative revenue sources. To address this, a service provider may have an NRC that is greater than the construction cost, to compensate for the ongoing operations required. In these scenario’s Illinois Century Network (ICN), the state education network, may have a role to play to manage the build of fiber network and offer lit service.

The MRC will be paid for by the school district and will be available for E-rate subsidy under the standard E-rate rules.

The RFP will require service providers to have a connection from the school district to an ICN POP location thus ensuring that all schools have access to ICN education based services.

The above approach requires coordination at the state level to ensure funds reach those school districts most in need, and to ensure consortia are established where they make the most sense. Efficiencies are obtained by developing a standardized RFP. With small / minority business goals specified in the RFP, we can ensure large service providers responding to the RFP will provide sub contracts to small or minority Illinois service providers. Without state coordination, it would be up to local school districts to establish their own consortia and issue their own RFP’s. The majority of school districts in Illinois do not have experience in fiber based broadband RFP’s, agreements and contracts, and would need assistance in developing the RFP and evaluating RFP responses, and then subsequently negotiating final contracts. Taking a state level coordinated approach will mean a standardized best in class RFP and RFP process is followed for each school district group and means school districts are not required to each develop experience in telecommunications RFPs and contracts.

We expect the RFP process for all waves to be complete within 1 to 2 years.

If a school district group wishes to develop their own RFP, this is possible assuming certain conditions are met and the RFP is approved by CMS before it is issued.

This section is focused on the use of one time capital funds, if made available. If no one time funds are made available this process can still be used for the top priority school districts using special

construction funds from the ongoing E-rate funds, with the funds provided amortized over 3, 5 or 10 years. This approach of course means to deploy high speed broadband to all schools and libraries would take significantly longer than utilizing one time capital funds. The service provider would respond to the RFP, with an NRC that is also amortized over the same period. When the FCC receives multiple requests for special construction they can look to the Illinois school district priority list to determine where funds should be spent.

For any fiber construction, there will need to be at least 4 fiber strands owned by each school district via indefinite term IRU, with the IRU providing connectivity directly to an ICN POP location. This ensures open access broadband connections from the ICN POP location to the school district. After 5 years of lit service by the service provider to the schools and libraries, the lit service will need to be rebid, ensuring the best value solution is selected for the subsequent 5 years. The current service provider will compete against alternate providers.

### 5.1.1 Prioritization of School Districts

In Illinois there are over 860 public school districts with many school districts already connected via fiber due to BTOP projects. Those school districts not already served via fiber based broadband will be prioritized into 10 waves with approximately 40 – 60 school districts per wave. The school districts will be put into waves based on school district priority, with the first wave having the highest priority school districts.

The factors that will determine the wave of the school district are the following:

- Type of current connection to the school district, for example, DSL, T1, wireless, coax
- The number of students in the school district
- If the school district is in a broadband served area or a broadband underserved area (with the underserved area having priority for funds)

## 6 Specific E-Rate NPRM Responses

We provide comment on the following paragraphs of the NPRM. The NPRM paragraph number we are commenting on is given at the start of each paragraph below. We have provided comment on selected paragraphs, not all.

65. We agree with the FCC to phase out and ultimately defund service associated with legacy applications and services that have little direct educational impact and focus only on funding to provide high capacity broadband to school and library buildings and the equipment that disseminates high capacity broadband within school buildings.

66. We recognize voice service as an application that can be delivered over broadband platforms. In line with our response to 65, we believe funding for applications should be phased out, and instead funding made available for high capacity broadband to school and library buildings and the internal connections within the school and library buildings. We believe funds should be directed towards the

foundational technology of high speed broadband to and within schools and libraries, and not be directed to applications.

67. For Illinois we believe fiber technology is the most efficient technology for long term needs, both in terms of future proof and level of available speed. Construction of fiber technology if placed underground should be inside conduit, allowing if necessary a later upgrade and replacement of fiber without extensive digging. Alternative technologies, for example, coaxial cable, copper, wireless we believe may provide a short and medium term solution for small schools.

68. While we agree that smaller schools and libraries may not need the bandwidth provided by fiber connectivity in the short or medium term, we believe in the long term, only fiber based technologies will provide the required bandwidth. Wireless, copper and coaxial technologies may provide a short to medium term solution but long term, even for small schools, we believe fiber based technology is necessary. A balance has to be achieved between directing funds upgrading legacy technology and directing funds to construct fiber based technologies that we believe will remain the predominant transmission technology for decades to come.

69. Schools typically purchase connectivity as a lit service that may involve some construction. Schools will typically pay a monthly lit service fee and may also pay a one time upfront fee. If construction of fiber is required, schools will typically be under contract with the service provider for 5, 10+ years, to ensure the service provider receives a return on its construction build. After the initial term the provider typically requires the school commit to another 5 year term or accept steep rate increases. The service provider typically owns all broadband assets of the network. Experience from ICN is that some school districts purchase dark fiber IRU's particularly when the fiber is used to connect schools within the same school district. Or dark fiber IRUs are purchased for connectivity to a data center. In these scenarios the school lights their own fiber. For access to the public internet, schools will typically look to a third party service provider and pay a monthly fee.

70. In our experience school districts use dark fiber for inter school connectivity or school district to data center connectivity.

71. We support the treatment of dark fiber and lit fiber being more consistent. We agree with the FCC in providing priority one support for the modulating electronics necessary to light leased dark fiber.

72. We support fully the proposal by the FCC in allowing funding for special construction charges for dark fiber, beyond the school property line, thus achieving parity with lit service. In Illinois there are some school districts that have already purchased dark fiber for the WAN network and we believe there remain school districts that wish to purchase dark fiber IRU's for their school WAN connectivity.

73. If funding allows, having costs allocated in one up front charge would be beneficial. However, we believe there are service providers that are flexible to receive payment over several years. For municipalities and school districts building their own fiber network, amortizing the construction cost over a number of years may strain the finances of these entities – since they would need to fund the full

cost of construction day 1. We recommend the cap could be increased to \$1M, and beyond \$1M have the cost amortized over several years.

74. For construction, we believe a school district or school district group should be the recipient of construction funds, with the smallest entity being a school district. It is recommended to have a school district group be the recipient of construction funds, rather than a single school district for administrative and economic efficiencies. It is likely that if the normal discounts are applied to the construction cost, even a 10% obligation could be too high for schools especially in very rural, remote areas. We would propose a separate discount scheme for construction. In very rural, very remote areas, there may be no desire by the private providers to serve the school or library and in this case the state network, ICN, could play a role.

76. We certainly believe the state has an important role to play in setting the priority of funds for capital infrastructure projects. Factors that should be considered for the priority include (i) number of students at the school or number of patrons served by the library (ii) the current connectivity at the location and the availability of fiber (iii) the ability of the school or library to pay for an upgrade to their current connectivity (iv) geographic location of school district in a school district group. Efficiencies result when school districts are grouped for fiber builds.

We believe the state is a natural entity to provide the priority of school districts, rather than at the federal level.

If funding is provided for construction, then at least 4 strands should be owned by the public school district via an indefinite term IRU. Since additional fiber strands are a minimal portion of the overall cost of construction, there will be many more strands laid that can be used for other purposes, owned by the service provider. Eg. 48, 96, 144+ or higher.

77. Fiber technology should be prioritized above other technology solutions, certainly for new builds. If infrastructure upgrades are possible to non fiber technologies to increase speed for small rural schools then this should be possible, to a certain extent and based on the technical limits with respect to their broadband capability. There should not be an excessive amount of money spent to maintain legacy networks. Certainly, if new construction is taking place the technology deployed should be fiber.

78. Funding for initial fiber upgrades should be treated differently than ongoing services. We recommend a portion of the total funds dedicated to initial fiber upgrades, and the remaining funds dedicated to ongoing services. The funding for fiber upgrades could be allocated to the states, and then allocated to the school districts or school district group within the state that are high priority – as determined by the state. Due to the high cost of fiber construction, it is likely that different discount levels would be needed.

80. We believe the rules should be relaxed allowing school districts to build their own WAN networks if they so choose. School districts that desire to build and run their own network should be allowed to do so. We anticipate this could provide significant cost savings for the school district.

Connectivity to the external public internet could be provided by a private service provider or also managed via IRU to the public internet gateway.

83. Please see section 4.2 for estimated internal connection costs for Illinois public schools and libraries.

93. We support the phasing out of all services not directly related to the provision of high speed broadband connectivity to and within schools, hence, we agree with the FCC to phase out E-rate support for paging services and directory assistance.

95. We agree with the proposal to phase out funding for voice service and supplementary services.

97. We believe the focus and priority should be on external and internal connectivity of schools and libraries, and not on applications that utilize this external and internal connectivity. This approach ensures a foundation of high speed broadband exists for all schools and libraries, once completed. Hence, we believe funding for email service and web hosting should be phased out.

100. We believe E-rate funding should first be prioritized towards locations that provide a direct educational service and not administrative functions.

107. We agree with the phasing out of voice service and agree with the proposed plan for the phase out.

109. We recommend phasing out support for all voice services, including VoIP service, such that funds can be used for external and internal connections for high speed broadband.

111. We recommend beginning immediately in funding year 2014.

112. We recommend phasing out support for these services completely, not at a reduced priority and not at a lower discount. Any money that would be spent on these services is not being spent on needed external and internal connections for high speed broadband.

113. There should not be different discount rates based on the service, but rather, services with the same discount rate and same priority, with all the services focused on providing internal and external connectivity to schools and libraries.

126. We support the submission of applications by school district with the school district being the smallest entity type that can apply. We believe this would reduce significantly the burden on individual schools and increase the participation rate of schools and libraries in Illinois.

147. We support eliminating the distinction between priority one and priority two services thus allowing schools and libraries to choose from one consolidated menu of services.

164. It certainly needs to be recognized that to add additional fiber strands beyond those initially needed for the school district represents a minimal portion of the overall construction cost. And these additional fiber strands can be used to serve other entities in the community and serve as revenue

generators for the service provider. We support service providers deploying more strands than are initially needed for the school district to improve their business case and to lower the burden (ie. lower the NRC) on school districts.

The Commission can best coordinate with and support state efforts to increase broadband access to schools and libraries by noting state input on school district priority and level of need. A coordinated approach to broadband deployment in the state, addressing first those school districts and areas most in need will best serve school districts and the state.

167. We support coordination with other universal service programs with a focus on fiber based deployment and the quantity of fiber based deployment. We believe a broadband served state will have an extensive system of fiber routes connecting anchor institutions, businesses, residences and any collaboration with other universal service programs to expand the deployment of fiber based broadband will be to the benefit of the school students and patrons of the library.

179. We support consortium purchasing to help lower prices and ensure the efficient use of shared facilities both for use of one time capital funds and on-going E-rate funds. Certainly, as described in section 5, use of capital funds for fiber builds should take advantage of groups of school districts helping to lower prices and provide administrative efficiencies. The smallest size entity requesting funds should be the school district for one time capital funds and on-going E-rate funds.

## 7 Appendix A

The Illinois Century Network was established in 1999 to serve the needs of Illinoisans for education, training and information technologies. Today ICN, managed by CMS, is a broadband network providing high speed access to data, video and audio communications to more than 6,300 schools, libraries, colleges, universities, museums, local government, state agencies, hospitals and health centers. In August 2010, ICN was awarded a BTOP grant and state match of over \$96M to expand and upgrade the existing ICN state network. The Illinois Broadband Opportunity Partnership project has constructed 1035 miles of new fiber and upgraded or purchased an additional 740 miles of fiber network.

For the 1035 miles of new construction, 144 strand count fiber is deployed on the backbone. Electronics have been purchased or upgraded for the total 1775 miles of network.

The new construction and upgraded network completes in Fall 2013, after which there will be dark fiber and lit services available to the commercial sector in addition to community anchor institutions.

The fiber route map is shown in the figure below.



**Green:** Constructed Fiber Network, **Blue:** Purchased Fiber Network

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