

Illinois K-12 Broadband Network

"Stepping into the Future with Digital Learning"

Category: Information Communications Technology Innovations

State: Illinois

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End Date: Project Continues



EXECUTIVE SUMMARY

In early 2019, Illinois Governor, JB Pritzker launched a statewide initiative, Connect Illinois, to expand broadband access across the entire state. Connect Illinois included \$20 million for the Illinois Century Network (ICN), to upgrade and expand the existing network, with a focus on K-12. This capital investment, together with the creation of a new state consortium provides all Illinois public K-12 students with access to secure high-speed broadband and Internet at no charge.

The statewide consortium manages the procurement of broadband connections from commercial service providers and together with the ICN is referred to as the Illinois K-12 Broadband Network.

Funding for the network is via the \$20M capital investment, state appropriation and the Federal Communications Commission (FCC) Universal Service Program for Schools and Libraries (E-rate), a federal program providing subsidy for broadband to schools in the US.

This project nomination focusses on the Illinois K-12 Broadband Network and the tremendous impact it has on the K-12 community, especially since the onset of COVID-19.

Illinois Public K-12 Benefits

The Illinois K-12 Broadband Network removes bandwidth restrictions for K-12, allowing public K-12 to use as much bandwidth as required for their digital learning needs and one to one device programs. The bandwidth is provided securely with the implementation of security services for all connected K-12 and the administrative procurement to implement broadband connections and Internet access is now centralized at the consortium, allowing teachers and students to focus on learning and innovative new applications. With all this being provided at no charge, schools can reallocate their funding to hiring additional classroom staff to better serve their communities.

Approximately 33% of Illinois public K-12 school districts are connected to the Illinois K-12 Broadband Network with the remaining school districts becoming connected as they complete their current contracts with existing providers. The consortium, and the E-rate program, will not fund duplicate connections and the consortium requires school districts to complete to term their existing contracts.

IDEA

The intent of the Illinois K-12 Broadband Network is to unburden Illinois public K-12 from having to think about how much bandwidth they are using for their Internet access and their collaborations with other schools, community colleges and universities. We wanted to unleash the creative imaginations of K-12 students and teachers, and allow them to be completely unconstrained by bandwidth, security and other network considerations. We want teachers to focus their efforts on advanced learning, with access to content and applications being a given and readily available. The use of multiple devices per student, multi-media content, collaborations with other schools and higher education, should just happen securely, without K-12 staff having to also become network and cyber security experts. Network and cyber security expertise and tools are best centralized within the ICN.

We want bandwidth use to be like electricity usage – i.e. it's never thought about.

We also wanted to unburden schools from the procurement of broadband connectivity and Internet access via the establishment of a statewide consortium. The consortium frees school districts from administrative and financial burdens by overseeing the broadband circuit procurement, as well as managing the installation and maintenance of those circuits.

To achieve these objectives required the upgrade and expansion of the Illinois Century Network (ICN) the state network, the establishment of a consortium and the participation of commercial retail providers.

The ICN is managed by the Illinois Department of Innovation & Technology (DoIT) and serves over 2,000 locations in Illinois. The ICN is a fiber backbone network providing access to the Internet and broadband connectivity throughout the state of Illinois, in addition to cloud, security and data services for all connected locations. For most locations connected to the ICN, commercial retail providers provide a broadband connection from the location (school head end site) to the nearest ICN point of presence (POP). The consortium was established to centralize broadband reimbursement from the E-rate program and unburden schools from each having to separately apply for E-rate subsidy. This is much better done at the state level.

IMPLEMENTATION

The implementation of the project included:

- Upgrade and expansion of the ICN
- Establishment of the DoIT E-rate Consortium
- Partnership with last mile providers

Upgrade and Expansion of the ICN

Core routers and ports at the ICN points of presence (POP) were upgraded to support multiple 100Gbps backbone links. Aggregation capacity was increased allowing more bandwidth and more ports available to interconnect to last mile providers.

Port capacity to the public Internet and to other peered networks was increased, supporting the additional K-12 locations.

Firewall services were upgraded ensuring “clean” Internet for all Illinois public K-12 traffic

Software Defined – Wide Area Network (SD-WAN) devices were purchased for the public K-12 head end, allowing optimal remote monitoring and management, and flexible provisioning of bandwidth

Security service capacity is implemented, ensuring all Illinois public K-12 have access to security services such as auto DDOS, firewall, intrusion detection.

Establishment of the DoIT E-rate Consortium

The consortium was formally created with the E-rate program in July 2019. Immediately following creation an extensive outreach campaign to Illinois public K-12 was performed, highlighting benefits to joining the consortium, and requesting Illinois public K-12 sign a “Letter of Agency” form, that is mandatory per E-rate rules. Illinois public K-12 also provided their broadband circuit information to the consortium, allowing the consortium to include the circuits in an E-rate compliant procurement. A circuit procurement was issued, containing hundreds of broadband circuits, and following bid evaluation, vendors were awarded circuits via a 5-year contract.

Partnership with Last Mile Providers

- Working with last mile providers, ICN staff facilitated the install of hundreds of last mile and WAN circuits at school districts.
- ICN installed SD-WAN nodes at the school head end site.
- ICN staff monitor and maintain the Internet bandwidth to the school locations and facilitate maintenance by the underlying service provider to the school head end site.

IMPACT

The IMPACT of the Illinois K-12 Broadband Network has been tremendous and means K-12 can use as much bandwidth connectivity as is necessary for their digital learning needs. K-12 also have access to security services, such as auto distributed denial of service mitigation, and other services.

The impact is felt by all the connected public-school districts. Approximately 33% of public school's districts are connected, with the remaining school districts to be connected as their current contracts expire. E-rate and the consortium will not provide duplicate connections, and the consortium requires school districts already in multi-year contracts to complete those contracts to term. Once completed, they can then receive circuits via the consortium.

The impact felt by school districts include:

- Increase in broadband speed between schools within a school district and increase in the Internet bandwidth from the ICN.
 - For example, at least 3 Mbps per student is available to each connected Illinois public K-12 school.
 - Schools are no longer bandwidth limited
- Reduced number of cyber-attacks on Illinois public K-12 due to distributed denial of service (DDOS) mitigation, intrusion detection, content filtering, firewall and security operations center (SOC) monitoring.
 - Each school no longer needs a cyber security expert on staff. Security expertise lies within the ICN and together with the security services is available to all connected K-12.
- With more Illinois public K-12 connecting to the ICN, there is increased availability of intranet services allowing Illinois public K-12 to connect to community colleges and universities via a fast, secure and private network, thus enabling high school students to benefit from college credit classes.
 - Collaboration can now occur using high speed connections in a private and secure manner.
- Significantly reduced burden on Illinois public K-12 for the E-rate program. The consortium files the necessary paperwork to receive E-rate subsidy. The K-12 receive service at no charge.
- With bulk purchasing of circuits via the consortium procurement, and the extremely competitive nature of the procurement, vendor pricing for point to point circuits at specified bandwidth levels is being driven very low.

GOAL: Ensure every Illinois public K-12 school district has sufficient, secure, and fully funded Internet bandwidth to support digital learning.

- 3 Mbps Internet per student
- Foundational level of security
- Leverage federal E-rate funds

YEAR 1 (FY 2020)	YEAR 2 (FY 2021)	YEAR 3 (FY 2022)	YEAR 4 (FY 2023)	YEAR 5 (FY 2024)
<ul style="list-style-type: none"> ▪ Establish E-rate Consortia ▪ Competitive Procurements ▪ ICN upgrades ▪ Unlimited Internet for 179 districts (21%) ▪ Security services 	<ul style="list-style-type: none"> ▪ ICN upgrades ▪ Unlimited Internet expanded to 223 districts (26%) ▪ Security services 	<ul style="list-style-type: none"> ▪ ICN upgrades ▪ Unlimited Internet expanded to 400 districts (46%) ▪ Security services 	<ul style="list-style-type: none"> ▪ ICN upgrades ▪ Unlimited Internet expanded to 650 districts (76%) ▪ Security services 	<ul style="list-style-type: none"> ▪ ICN upgrades ▪ Unlimited Internet expanded to 852 districts (100%) ▪ Security services

In conclusion, the impact on Illinois public K-12 has been and continues to be tremendous. As schools complete their current contracts and connect to the ICN, the impact will grow to all Illinois public K-12 in Illinois.