OMNIDATA CASE STUDY
Clinton Public School District
Network Upgrade

THE TEAM

Frank Rossi, Director of IT at Clinton Public Schools

Frank Kondor, Founder of Omni Data

> "Making an investment now that is going to have dividends for years and have a tremendous long term impact."

Frank Rossi

BACKGROUND

The focus of this case study is regarding network infrastructure upgrades for a K – 12 Public School System in Clinton, Connecticut. The grade school and middle school are the focus of this case study as those two buildings were existing structures with category five network infrastructure. The high school is a new construction which did not need a network upgrade. This school system has 1600 students in the three buildings in total along with 300 members of faculty & staff.

Clinton is defined as a small town per the census because there are less than 1,000 people per square mile. The town's total population is 13,000 adults & children. There are around 6,000 total households in Clinton with each household containing an average of 2.4 people. 18.5% of the town's population are under 18 years old which is below the national average of 22%. The households in Clinton are slightly more technologically advantaged than the average US household as 93% have at least one computer present in the household and 90% have subscriptions to broadband internet in the home. New Haven, CT is the closest city which is a 25-minute commute.

OVERVIEW

Public schools are often tasked with using outdated technology. This was no exception in the town of Clinton. The Clinton Public School District grade school and middle school were relying on outdated category five network technology. This technology was often unreliable and could not meet the modern-day needs of students, staff, and faculty. Current network infrastructure could not keep up. The school system needed an enhanced and upgraded network infrastructure to meet the evolving needs of K – 12 education.

In 2019, Clinton Public School District decided to upgrade its network infrastructure. The original plan was to rip out the old copper of the grade school and middle school buildings and replace it with new copper wires. However, after the budget cuts, Clinton Public Schools couldn't afford that solution. Omni Data worked closely with Clinton Public Schools to find creative solutions to help the school district save money, time, energy, and resources to meet their budget limitations and provide a future-proofed network.

Problems Facing the Clinton Public School District

NETWORK CAPACITY AND RELIABILITY

The Clinton Public School District's outdated network had a few issues. During periodic standardized testing in the past, Clinton Public Schools had to segment their students into groups to conduct testing. The network did not have the capacity for all students to be online at the same time. Even when testing in smaller cohorts of students in a computer lab, they experienced significant network disruptions. Copper cabling has significant bandwidth and distance limitations.

COSTS OF REPLACING INFRASTRUCTURE

The original plan was replacing the copper wiring, however once Clinton Public School District ran the numbers, this was not feasible. There was 120,000 feet of copper wiring in each building. This would simply cost too much from a material standpoint. Additionally, the labor costs of replacing the massive amount of copper would significantly add to the cost of the project.

CLOSET SPACE

The outdated Clinton Public Schools network infrastructure took up a lot of space. Copper wiring's significant distance limitations meant that each building needed three network closets. This took up valuable space and some closets needed to have cooling units due to the conduit overheating. Additionally, the noise from these network closets could disrupt classrooms.

WORKING WITHIN A BUDGET

Ensuring that the Clinton Public School District would have the network infrastructure upgrades needed, while staying within the budget was no easy task. The Clinton Public School District either had to find more capital or cut costs. Cutting corners would result in a subpar result that would affect students for decades.

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How Omni Data Tackled the Problems

Omni Data realized the seriousness of the situation. The Omni Data team developed a comprehensive plan to tackle the budgetary constraints placed upon the project and ensure the schools had the infrastructure they needed. There were two main ways we helped alleviate the budgetary constraints of Clinton Public School District:

REDUCTION IN RAW MATERIALS COST

One area of opportunity to tackle the budget was to change the type of cables utilized. Replacing copper wires with Corning fiber technology allowed an immediate 15-20% savings in raw costs alone. We utilized 75% less materials with Corning fiber compared to typical copper cables. The raw materials cost reduction also led to significant reductions in labor costs.

## E-RATE FUNDING

Many public school districts may be aware of E-Rate, but perhaps not all of the various State and Federal programs that can help fund network infrastructure costs. E-Rate is a federal program to help eligible schools and libraries obtain affordable internet access and telecommunication services. The program can reduce the costs of eligible services anywhere from 20% to 90%. Omni Data provided guidance to the district around the E-Rate program to help them receive the highest level of funding possible to cover all eligible expenses.

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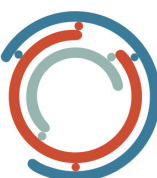
Presenting to the Board of Education

Public schools need to get approval from the Board of Education whenever making large financial investments. Omni Data and Clinton Public School District presented to the board the cost savings and upgrade path with a fiber deep solution. Omni Data and Frank Rossi worked together to showcase how the investment in new network technology was worth the capital investment:

OVERALL COST SAVINGS

We showcased the cost savings of Corning fiber versus traditional cable upgrades. The significant cost savings that we showcased versus traditional cable upgrades allowed the project to be easily approved by the board of education. Our ability to secure federal E-Rate funding and reduce our costs by using Corning fiber made the project a no-brainer to the board of education.

FUTURE-PROOFED NETWORK

Corning ensures their fiber will last for decades after installation. Customers who installed initial trial cables in the late 1970s and early 1980s are still using the technology today. Clinton Public Schools won't need to replace the network infrastructure again for decades.

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Solution

Next, we started installing the new network technology. Here's a breakdown of all of the benefits of the new installation

SIGNIFICANT COST SAVINGS

Reduction in Materials	Reduction in Labor	E-Rate Funding
Choosing fiber instead of copper enabled Omni Data to significantly reduce the amount of material used for the network infrastructure. Clinton Public School had 120,000 feet of copper in each building when we started this project. We replaced the copper with only 25,000 feet of fiber in each building. This resulted in a 75% reduction in total materials utilized simply by switching from copper to fiber.	Since we installed 75% fewer materials, we also needed about 50% less labor hours to install the upgrades versus traditional cable. Only 3 - 5 technicians were on-site at any given time to rip out the old copper and replace it with the fiber. Omni Data also had a tight timeline to install these network upgrades. The budget was approved in mid-June so we only had the month of July to upgrade the equipment. Due to the use of Corning fiber, we were able to install these upgrades quickly before school began in mid-August.	E-Rate funding allowed Clinton Public Schools to subsidize the cost of upgrading their network technology significantly. Many other school districts who are in low-income areas and are in urban or rural areas can see discounts up to 90% the cost of eligible services and equipment.

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Ease of Management

SD-LAN provides centralized network control that simplifies network configuration and management in three important ways:

| Diagnostic Ease and Troubleshooting	Increased Efficiency	Easily Add Components
SD-LAN with fiber technology allows users to troubleshoot more easily by allowing users to dive in deeper than traditional cable. This technology enables the granularity to know which port is causing issues quickly and easily. In a matter of minutes, we can see the exact port that needs troubleshooting rather than testing the wires and running new cables.	As a result of the decreased time to diagnose issues, there is a major reduction in network downtime. Additionally, less power is needed for cooling since the equipment load has been significantly reduced. These two factors increase network availability.	The platform is technology-neutral, supporting active Ethernet deep into the network and passive optical LAN over a software-defined network architecture. Since the software does all the heavy lifting, it's easy for administrators to manage traffic and customized upgrades to the network, quickly and efficiently from one centralized location. This intelligent solution reduces switches, which can help speed up network performance, and minimizes overall network complexity.
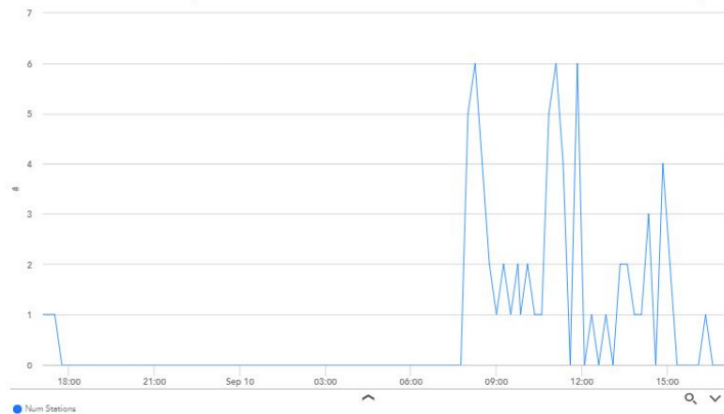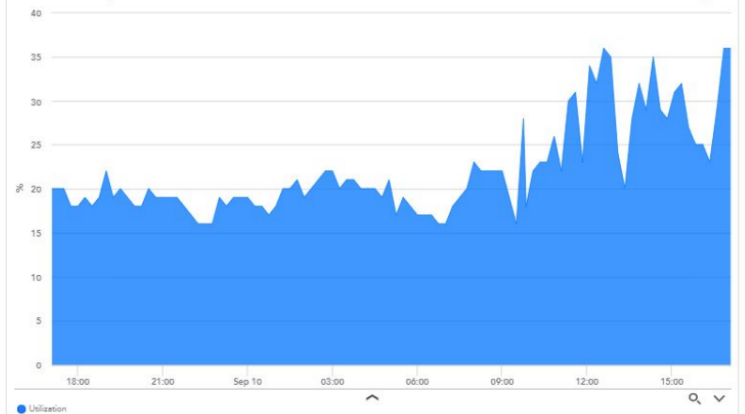
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Increased Network Functionality

Network Capacity	Network Reliability
Omni Data increased the school's network capacity. Copper-based cable has bandwidth and distance limitations compared to fiber. Fiber speeds are similar to the speed of photons which travel at the speed of light, whereas electrons used in copper travel at <1% of the speed of light. Fiber also provides over 1,000 times the amount of bandwidth as copper. A typical multimode fiber of 500 MHz/km can transmit 1 GHz. While category six optimized copper cabling can only transmit 500 MHz in only 20% of the distance as the fiber cabling.	Copper typically degrades in quality over a long distance, Whereas fiber optic technology has extremely reliable data transmission. Fiber can also withstand environmental factors such as temperature and electro-magnetic fluctuations which dramatically increases the reliability of the network connection.

Previously, Clinton Public Schools had to segment their students into groups to conduct testing. Now Clinton Public Schools is able to conduct standardized testing on a six grade level of 1100 students at time without a single network disruption. Instead of using computer labs to test small cohorts of students at a time, each student now has their own Chromebook or tablet. All 1100 students were using the same URL on a secure browser at the same time without a single student experiencing a disruption.

Legacy Copper Network

Fiber to the Edge

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Increased Flexibility

Reduction in Space

At the time, Clinton Public Schools had a very distributed network infrastructure housed in multiple closets. This took up significant space that could be used for other means. Copper has significant distance limitations with the ability to travel 328 feet. As a result, each of the two school buildings needed three network closets in each building.

Some closets needed to have cooling units as the large copper conduits were built for a massive amount of copper wiring and overheated frequently in small closets. One network closet was located in the back of a computer laboratory which was disruptive for a classroom setting.

After the upgraded fiber installation, the classroom regained access to their closet and didn't experience disruptions in class anymore. We were able to reduce the two schools down from 6 closets to two 42 U. This single closet in each building is only 75% full, which leaves room for expansion for new servers and equipment in the future.

Ability to Add New Features Quickly

Clinton School District installed an IP-based intercom system in 2019 after the initial installation of the Corning Fiber infrastructure. Omni Data added 179 speakers in a short amount because we didn't have to run a cable into each classroom which made the installation cheaper and easier. Upgrading to fiber technology allows us to easily connect a speaker to the network which only required a simple patch cable.

The network upgrade also delivered a service range over twice as far as traditional copper methods. Composite cabling also allows for remote powering of cameras. In the future, Clinton Public School District can easily add surveillance cameras and other new security or telecommunications technology because of this fiber backbone.
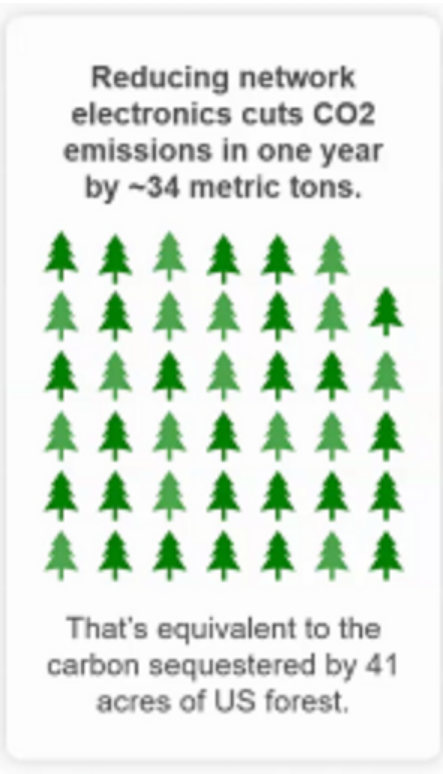

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Reduction in Carbon Footprint

Major Reduction in Use of Copper Cables

Major Reduction of AC to Cool the Conduits

Copper cables contribute to CO2 emissions. Instead of using new copper cable, the upgrade to fiber led to around a 160,000-foot reduction in copper cables used in both buildings total. That is around 10 metric tons of CO2 emissions reduced according to the EPA. Omni Data was able to reduce its environmental impact by utilizing fiber, instead of copper.

Each school building used three closets each to house the network equipment. By upgrading to fiber cable, Omni Data was able to reduce the six closets down to two. As a result, air conditioning to cool the network closers was reduced by around 66%. This is great for the environment, as well as air conditioning costs.

Eliminating
225K ft of linear cable
reduces CO2 emissions by
~16 metric tons.

x 14 road trips

That's equivalent to the carbon emissions of driving 40,000 miles in an average passenger car.

Reducing network electronics cuts CO2 emissions in one year by ~34 metric tons.

That's equivalent to the carbon sequestered by 41 acres of US forest.

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Future-Proofing

Preparing for the Unknown

Built to Enable Next-Generation Technology

No one could have seen the consequences of the pandemic. As a result of the pandemic, teachers are now working in a hybrid environment. Some students were in-person in school and some were remote at home. This greatly increased the strain on the network, but Omni Data had prepared Clinton for the unexpected.

The network can easily handle 110 teachers on the network on a given day uploading and downloading video streaming data. Thankfully this infrastructure was already in place before the coronavirus pandemic so students saw a minimal reduction in missed school days compared to peers in other school districts.

Corning fiber supports LAN, Wi-Fi, cellular, audio visual, security, building automation, and more over the lifetime of the building with little to no new cabling. This intelligent solution reduces switches, which can help speed up network performance and minimize overall network complexity. This means that Clinton Public Schools won't need to rip and replace cable again for decades. The Corning fiber used can handle 5G network speed and latency. Corning fiber can also enable Wi-Fi 7 by simply replacing the router without replacing a single cable.

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Corning Fiber Advantage:

Corning is the inventor and world leader of optical fiber technology. Corning only uses the highest quality materials and tests each strand for reliability and performance. Corning fiber is tested to ensure high quality, fiber attenuation, dispersion, bandwidth, environmental tolerances, performance, stripping and splicing attributes, strength, fatigue, and much more. Watch how Corning Fiber is manufactured and read more about SD-LAN on their website.

Conclusion

Omni Data was able to successfully upgrade Clinton Public School District's network infrastructure amidst significant budgetary and time restriction hurdles. Omni Data prides itself on our ability to partner with our customers to find creative solutions to any problem. We also guarantee any solution we implement is future-proofed to ensure a successful long-term investment that won't need constant updating.

It is key to plan for the future as much as possible, though in many cases we don't know exactly what future capabilities we will need to solve our future problems. For example, no one could have predicted the pandemic would rapidly shift the need to adopt video conferencing. Students in many school districts across the nation missed a significant number of classes in 2020. Students in Clinton Public School District were able to stay connected because they had a network infrastructure and equipment in place that was ready for remote teleconferencing

But don't just take our word for it, here's what Frank Rossi at Clinton Public Schools has to say about their partnership with Omni Data:

- "One of the questions that was asked to us by the board of ed members asked "are we going to be having the same conversation 10-15 years from now? But to definitively answer - no we're really future proofing the infrastructure in the building. Making an investment now that is going to have dividends for years and have a tremendous long term impact. That was really what sold the decision makers from our district."

Learn More Below:

Want to watch our presentation at Corning's Smart Building Summit III where we discuss Clinton Public School's network upgrade to Corning Fiber? Click Here

Curious to see how we can achieve similar goals in upgrading your network infrastructure? Call us now at 203-387-6664 or reach out via email at learnmore@myomnidata.com to schedule a free consultation

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