



Fire Service: Moving into the Broadband World

[Editor's note: this article was composed by Bruce Harrison, former Fire Chief, and James P. Zarek, Battalion Chief and Communications Coordinator, DeKalb (IL) Fire Department – 2/9/2012, with the help of the NIU Broadband Development Group and Illinois Fiber Resources Group. DeKalb is served by the DATA network]

Universally critical to fire departments is the ability to communicate with one another during response to emergency calls, according to former Fire Chief Bruce Harrison and Battalion Chief James P. Zarek, of the DeKalb (IL) Fire Department. Broadband will address the need for reliable communications and also allow departments to conduct important training and certification education more efficiently. Broadband can mean the difference between life and death for fire fighters or any first responder.

Overview of DFD and Legacy Systems

The DeKalb Fire Department has moved away from legacy communications, based on copper telephone connections, to broadband communications systems based on fiber optics and wireless systems. This change has provided the department with systems that allow increased service to residents and improved efficiency of the department. The old legacy network at DFD was based on copper-based telephone technology with individual links to support each service. Each telephone had a line and there were copper data links between facilities to an HTE mainframe system to support administrative processes. No automation was used within fire or emergency vehicles. Out in the field, the only links were using radio communications for dispatch and communications. This approach was very centralized and prone to interruptions because the copper media is sensitive to weather conditions likely caused by poor maintenance of the cable plant.

The Broadband Approach

The DFD and City of DeKalb have moved to newer forms of system and services that use a common shared broadband communication system. Fiber optic cables have been installed between each of the facilities to provide a high-speed link that supports voice, video and data connections within the City and Fire Department. This same fiber optic system is being used to update the connections between transmit and receive locations to support the county-wide radio system. Data links are now possible to all of DFD's vehicles using mobile data connections provided by the local cellular provider.

This new approach to communications has dramatically improved the data rates between fire department systems where the high-speeds are available to support all current and future technology needs between facilities. The mobile wireless system is provided by a local cellular provider. This system allows communications between each of the stations and computers in each vehicle. Although slower than the fiber optic links, the mobility throughout the County with adequate speeds meets the needs of DFD's automation technology.

Lessons Learned

From the moment we started to show problems with the legacy system, we should have started to plan for an upgrade to modern technology. This pre-plan would have helped with the financial end of things so we could assess the need and budget for it rather than doing it as an emergency purchase. DeKalb Fire Department advises other departments to research your options when taking on this type of project. Look at different vendors to see who can provide what you need for the best possible price. We also looked beyond the original intent at further benefits down the road that could come from this technology.

Costs Associated with Broadband

This technology has come with a combination of one-time capital costs for cable plant and equipment, along with continuing efforts to migrate from older systems to the newer systems. Some of this migration has occurred with the purchase of new equipment to replace older, obsolete equipment. This is the case with the DFD telephone system that supports broadband connections, as well as the older legacy approaches. Similar is the move from the older mainframe computer to new services and PCs at the stations and in the vehicles.

Some of the costs associated with the change to broadband were planned as part of the replacement of obsolete systems leading to operating cost savings. For example, the new telephone system supports an Ethernet connection provided by the fiber optic link between the City of DeKalb and DFD Stations. The telephones changed from those based on a copper cable to Voice over Internet Protocol (VoIP) that can be used over the fiber optic system. Other changes caused cost structure adjustments, such as lower maintenance costs, but higher capital costs and migration efforts with greater employee efficiency and greater reporting and analysis capability. This was found with the migration from the mainframe computer to the new server and PC based systems for DFD administrative systems.

Technology Changes at DFD

Technology has changed in several areas:

1. Fiber optic links between the City and each of the Fire Stations.
2. On-going improvements to the radio system throughout the County with fiber optic links.
3. Wireless links to all emergency vehicles.

Fiber optics links

- The city and three fire stations
- Ethernet can run at a variety of speeds, 100, 1,000 and 10,000 Mbps (millions of bits per second)

Applications for All Fire Departments

In addition to critical communications improvements, broadband provides:

- The technology and ability to utilize real-time tactical data and video to improve firefighter safety and save lives.
- Access to broadband gives fire departments the technology to know the layout of a building before arriving on the scene versus going into a fire blind.
- Transmission via a video from a helmet cam allows an incident commander to remotely view where the firefighter is, assess his/her situation, and when needed, send in backup to rescue or assist the firefighter.
- Transmission of real-time biometric data monitoring of bodily functions such as heart rate, breathing and skin temperature of a firefighter during an incident.
- Utilization of real-time tactical data and video to improve firefighter safety and save lives before, during and after critical incidents.
- Utilization video, pictures and data analysis of incidents for training, after action reporting, evaluation and lessons learned alone.

Benefits of the newer systems

- *Worry-free links for our radio communication system.*
- *Connection to servers for our:*
 - *Emergency medical services patient care reporting system.*
 - *Computer-aided dispatch system*
 - *Fire reporting system*
 - *Fire department data storage and management systems*
 - *Ability to have mobile computer interface back to the servers*

About DATA

When announcing the DATA project during a press conference in 2010, organizers said the average “smart phone” provides better, faster Internet service than is available at many schools in DeKalb County.

Herb Kuryliw, network and technical architect for NIU, said the DATA project has made great progress since its kick-off. It is laying 130 miles of fiber optic cable throughout DeKalb County.

“We plan to be complete by March of 2012. We’ll be ready to light up many areas in the project soon,” said Kuryliw.

DeKalb is the center-point for both the DATA and iFiber projects, he added, with NIU serving as a Point of Presence (POP) in the ICN backbone.

“This changes the whole concept of what broadband means for this region,” said Dan Halverson, vice president of DeKalb Fiber Optic, explaining that the new fiber brought by the DATA project will be capable of speeds 100-1,000 times faster than available in the county now.

“That will make DeKalb County much more competitive in the global economy, it will raise our profile and it will increase our tax base.”

Under the DATA project, NIU is providing infrastructure design, network design and sustainability for the network; DeKalb Fiber Optics LLC will maintain the fiber cable and provide services over the fiber infrastructure; those activities will be carried out under an agreement with DeKalb County, which will administer the project.

DATA will bring broadband to: 42 K-12 schools (most DeKalb and Sycamore schools are already connected); 12 municipalities; 20 county sites (including E-911 services); 2 hospitals; 5 clinics; 68 library locations; Kishwaukee College; NIU; more than 3,600 businesses (potentially); and 82,500 county residents (potentially).

The majority of the money (an \$11.8 million grant) comes from the economic stimulus bill passed in 2009 (the American Recovery and Reinvestment Act). The grant is administered by the National Telecommunications and Information Administration, which is a branch of the U.S. Department of Commerce. That agency’s Broadband Technology Opportunities Program is spending about \$4.7 billion to deploy broadband infrastructure into un-served or underserved areas of the country.

Another \$1.3 million is being provided by the State of Illinois, with DeKalb Fiber Optic also contributing \$1.3 million in cash, services and materials. Other contributors include: NIU, \$150,000; Kishwaukee Community Hospital, \$100,000; and DeKalb County, \$75,000.

For more information about DATA, visit <http://www.dekalbcounty.org/FiberOpticNetworkDATA.html>.