

From the Ground Up

Telepak Streamlines Fiber Backhaul Construction

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Telepak Networks is a full service provider of Internet, telecommunications, and network services. The company offers Triple Play services to residential and commercial customers, as well as backhaul network to wireless carriers in the southeastern United States. Like many wireless carriers, this company has ambitious plans to expand the availability of 4G coverage. And like many others, they realize the growing adoption of smart mobile devices and broadband data plans requires a rapid conversion from copper to fiber backhaul in a timeframe that would be unattainable using existing engineering and construction processes.



Toward that end, Telepak Networks is deploying Multiprotocol Label Switching (MPLS) packet-based networks to deliver wireless backhaul services to its customers in parts of Alabama, Mississippi, Louisiana, and Tennessee. This technology will ride on fiber networks and offer high-quality, reliable, and flexible IP-based backhaul services to help provide new 4G LTE wireless services. However, in many locations the transition requires construction of new fiber-based backhaul facilities to replace existing copper cables.

This needs to be done quickly because in an extremely competitive market, companies look at factors such as time to market, bandwidth capacity, and network security. And Telepak knows these are paramount factors in the aim to reduce churn and increase customer satisfaction in this market. Bottom line: The company must deploy this fiber network quickly or risk losing the opportunity.

By meeting these stringent requirements, Telepak will further cement its presence as the premier telecommunications provider in its service territory.

The Challenge

To meet a seemingly unrealistic deployment schedule, Telepak searched the market for a contractor that could design and install new backhaul infrastructure to support 4G LTE wireless services. The initial project covered 9 markets and needed 104 miles of fiber to be designed and constructed quickly to meet a very tight time schedule. Finding the right engineering contractor to support the build would not be easy. To win this bid, their contractor of choice needed to show that they could reduce Telepak's time to market, stay within the budgeted construction costs, and meet deployment dates.

That's where we came in. Our company, Southern Diversified Technologies (SDT), said we could meet the stringent time schedule. SDT is a multi-disciplines telecommunications infrastructure services company based in Brookhaven, MS. "Integrating a mobile GIS-based technology into the planning and design process was a new concept for us. It provided a complete turnkey solution capable of delivering from initial design through construction," said Gregg Logan, Vice President for Telepak. "This approach allowed us to deploy fiber facilities faster than ever before and still achieve normal construction costs.

You see, contractors are always looking for ways to become more competitive. We evaluate design-and-build workflows, and find ways to improve other processes. Most improvements are incremental and result in modest gains. Driven by the current demand for fast, high-quality design-and-build services, we realized a more radical approach was needed.

To summarize, we knew many of the design and engineering processes require field visits and exchanges of information between multiple organizations. That required coordination and the need to work with the various permitting agencies -- which can place many processes outside a contractor's control. To alleviate some of these issues, we decided to enroll geographic information system (GIS) technology.

Telepak found an engineering and construction firm. After a 7-year investigation into how best to improve its processes, SDT embraced GIS technology to help execute construction and engineering projects. SDT used Clearion Mobile, a mobile GIS application built by Clearion Software, and based on ArcGIS technology from Esri.

The Solution

The GIS-based solution gives field engineers access to a new base-mapping process and aerial data-capture technology. The system leverages a very powerful dataset for doing everything from generating permit and construction drawings to quantifying an accurate bill of materials and other bid documents.

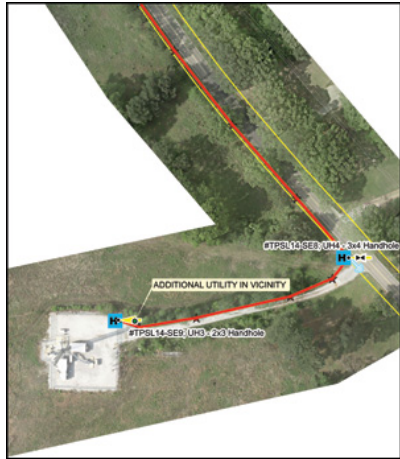


Figure 1: Orthophotography imagery information is combined with ROW and other data using GIS

On a daily basis, new information is synced from the field to the central project server that enables other members of the project team to work on permitting, right-of-way acquisition, and other key processes before the engineer even leaves the field. Integration improves efficiency and reduces the time needed to engineer and build infrastructure.

To meet that deadline, Telepak and SDT have precisely defined the optimal process that begins with Telepak identifying a tower location in need of fiber backhaul. Using GIS, SDT is able to identify an optimal route to connect the tower to Telepak's network. This path is shared with a helicopter pilot who is dispatched to fly the route and capture aerial data and imagery along the corridor. The data and imagery collected by the helicopter is used to create orthophotographs which are imported back into the GIS. Other data in the GIS includes existing right-of-ways, railroad and water crossings, location of known utility infrastructure, the projected path, and network information. (See Figure 1.)

Data and the GIS application are loaded onto mobile units with GPS capabilities. Field crews walk or drive the proposed routes. (See Figure 2.) They collect other data necessary to the engineering design process. As information is collected in the field, it is populated in a database back in the office and immediately available for use by the engineers. This data provides the basis for the initial engineering drawings. Because they have much of the real-world information at hand, engineers are able to produce designs that more accurately account for conditions in the field. This speeds the permitting and construction processes.



Figure 2: Field crews use a mobile GPS application loaded on a GPS-enabled tablet to collect data

Once the initial designs are created, they are then sent to railroads, departments of transportation, and other government agencies to get approval for build permits. When permits are received the drawings are finalized and sent to the construction group.



Figure 3: Redline edits collected in the GIS help ensure the accuracy of as-builts and provide useful notes

The construction team uses the final drawings to build the network. Because the information is already in the GIS, they have electronic access to engineering data. When necessary, they use the application to enter redline edits. (See Figure 3.) Once construction is finalized, these field edits and construction drawings are used to create as-built drawings. The redline edits collected via the GIS application ensure that the as-built drawings are accurate and provide notes that will be useful to Telepak as they manage the network going forward.

How did it work? As part of the initial development and pilot effort, Telepak saw a quantifiable improvement in project timelines, a reduction in costs, and an enhancement to the operations processes that will be in place once the new assets are in service. Field engineering on this 9-market project began in early June 2011 and all construction is expected to be completed before year's end.

Air to Ground Results

The single greatest improvement to the overall process for Telepak is a faster, more efficient field engineering process. With the ability to simultaneously kick off many critical tasks, the company realized a significant reduction in the lead time for construction of large projects and improved the overall accuracy of the design.

“Because the engineer can build accurate drawings in the field with the mobile software and GPS, it is much more likely that the civil design is going to be truly feasible without major changes at the time of construction,” said James Ezell, President for SDT. “This not only helps us quantify the plan for construction methods and materials, but helps manage risk to the project timeline and budget. We can complete turnkey projects faster than before without increasing the cost to our clients.”

SDT found a strategic and productive way to meet Telepak’s goals. They delivered a significant reduction in the overall time spent moving from the design phase to construction. By employing GIS technology both companies are reaping additional benefits. During construction, detailed daily progress is tracked in the GIS, and then reported immediately through a map-based web dashboard.

The dashboard allows operators to see detailed as-built conditions, including the construction methods and materials used at each location. When projects are completed, operators receive as-built drawings, as well as rich GIS datasets of the new assets, easements, and other landbase information.

Telepak succeeded in gaining a competitive advantage by reducing the time and costs needed to deploy a fiber backhaul network capable of supporting 4G LTE services.



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