

Load Demand Solutions for Mobile GIS Data Distribution Rappahannock Electric Cooperative

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Rappahannock Electric Cooperative (REC) is able to deliver its full GIS and related data out to its field personnel for faster and better service to its members. Its new mobile GIS delivers applications, electric network data, and application updates to its field crews via a wireless system. Wi-Fi solutions are taxed by dense data and client/server traffic loads. REC worked with consultants to find a solution that not only accommodates current system demands but also presents a foundation for future growth.

In 2006, the cooperative standardized its GIS, which is based on ESRI's platform of GIS software. REC, headquartered in Fredericksburg, Virginia, finds GIS to be an invaluable tool for maintaining nearly 12,000 miles of power lines throughout a service area that includes 100,000

connections in 16 counties, from the Blue Ridge Mountains to the mouth of the Rappahannock River. REC selected Itron's Origin GIS for its utility application and worked with Lockheed Martin (REC's IT and strategic business partner) to integrate GIS and the co-op's outage management system as well as a variety of engineering functions. REC then implemented TC Technology's GIS mobile solution GO! Sync Mapbook throughout the utility's field operations.

Lockheed Martin provides a wide variety of IT solutions to the company, and TC Technology offers a mobile GIS solution based on ESRI technology and data formats. The configuration includes ArcGIS Desktop. REC chose this system because it was simple to de-

ploy and maintain. Just as important, managers thought that field-workers at any stage of aptitude could easily learn and use the system. In addition, the co-op's multiple districts receive online database updates and GIS applications for work processes.

Prior to the mobile solution, REC's field service program had a 50-year history of working with paper maps. One district within the service area had map books weighing up to 30 pounds. Some field crews worked between several districts, so they were carrying two hefty paper map book libraries in the backs of their trucks. While on assignment, the field-worker would pull down the tailgate, prop up the map book, and locate the current job.

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This was particularly challenging when they had to deal with outage work orders during a rainstorm.

REC's goal has been to make its field personnel more efficient with a product that is easy to use and cost-effective. By doing so, management believed that the co-op could serve its customers better and faster. REC chose the GO! Sync Mobile GIS system to wirelessly deliver up-to-date data without complex user interaction to field users throughout the REC service territory. In the initial implementation, 27 service trucks were installed with laptops, quickly followed by 40 more. The goal is to install Panasonic CF30 Toughbooks in all 110 service vehicles.

Maximizing Pipeline Solutions

The microwave T-1 broadband communications

pipe between REC's four offices is limited, and there is a large amount of data to distribute. TC Technology provided the foundation for the co-op's future initiatives to pull data down, use objects from all applications, and serve data and applications to several client/servers in the service area. Every day, 110 mobile laptops will be accessing the system through the T-1 network and Internet connections for home agents. The main office has to serve up several gigabytes of data through this small communications pipe, and testing revealed that the system would always be overloaded. A revised solution was needed to solve the problem.

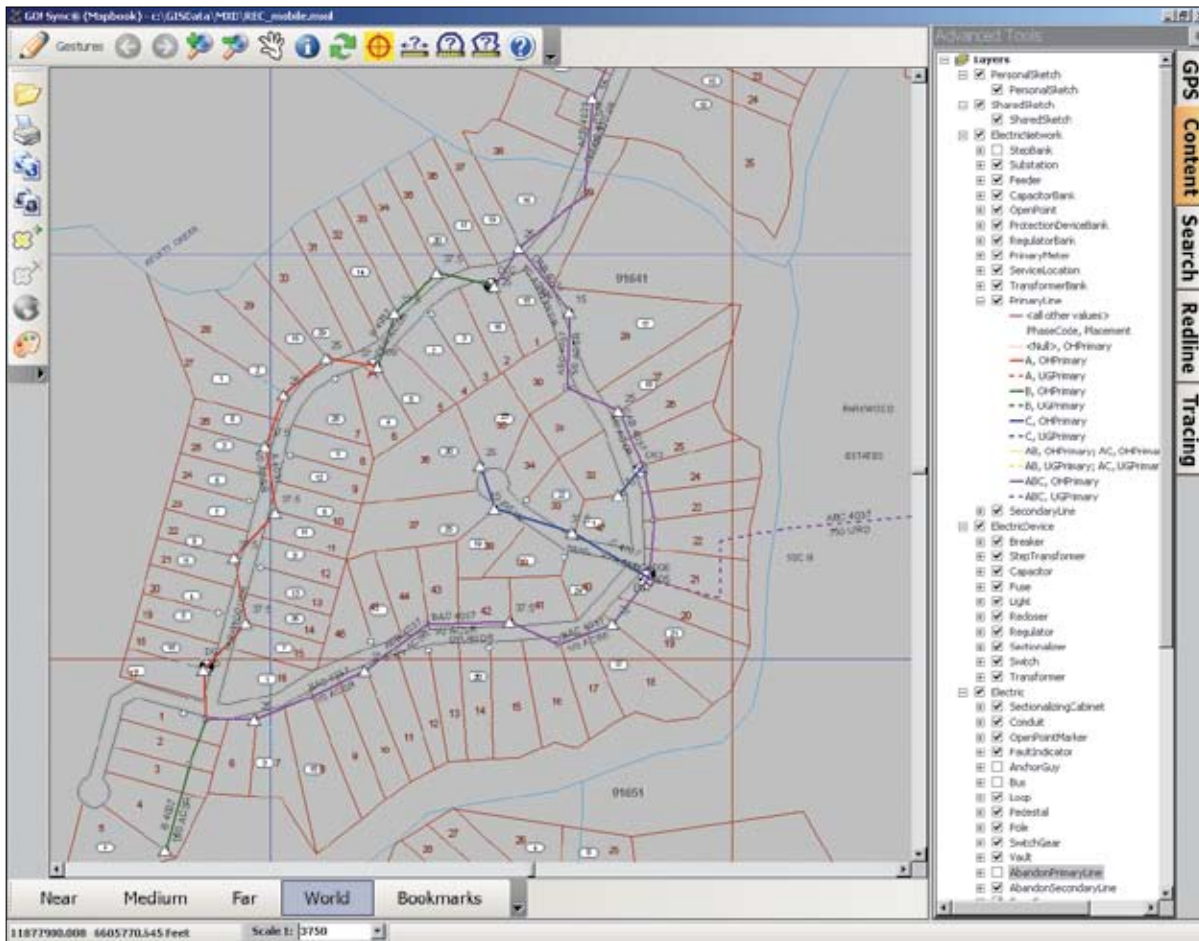
Working with TC Technology consultants, Lockheed Martin implemented multiple staging servers, and the data was then distributed from each district office site. The staging server is also able to distribute the application and any

updates to the application configuration files. Originally, the T-1 data connection transfer time was between three and four minutes, but the staging solution reduced transfer time to about one minute. An updated dataset is generated every few hours, one in the early morning and a second in the afternoon, to distribute daily changes made in the GIS.

Field users have been put on a regulated download schedule, which has improved the communication traffic. Another traffic management trick is that field-workers who take their trucks home can download data from the staging server using VPN through the Internet.

Data Security Solutions

Even though REC's data is going out via a server across Wi-Fi and LAN lines, the network remains secure. The system access is protected



ArcGIS delivers system data to field-workers. They can see facility information from the substation, locate streets and parcel numbers, and view primary lines color-coded by type and phase. In the field, workers can use applications that are specific to their tasks. Easy access to current data has made this an invaluable tool for REC's crews.

by passwords that change regularly. In addition, the laptops in the trucks are firmly bolted and battened down to protect them from robbery. Finally, the company is using disk encryption software on laptops so that data is secure in the event the laptop is stolen.

Future initiatives were considered when planning the current mobile data system. A network-based intrusion-prevention system (IPS) monitors the network for potential intrusion. IPS units are in place for every substation equipped with a wireless access point across the entire territory. The system is secure for the protection of all data including e-mails, work orders, and applications.

Growing Distribution Network Solutions

Field crews that are normally assigned to a specific operating district may need to travel to other districts in the service territory. When they do, they can reliably download data from that district's staging server. This makes it easy

for workers to roam as needed and get the information necessary for that out-of-area job.

In the near future, substations will also be sites that transmit data. Another option is the ArcGIS 9.2 file base geodatabase format that offers functionality for compressing the geodatabase so that it can be served more easily across limited bandwidth connections. This will ensure network availability for use by a wide variety of additional business processes such as outage incident data and work ticket inventories. By monitoring network traffic, Lockheed Martin can evaluate performance during system growth using comparison of usage patterns, capacity, and download demand.

Rappahannock Electric Cooperative purchased servers to put in each district office and WAP (Wireless Access Points) technology in addition to the GO! Sync software. All the while, REC was thinking of the long-term benefits the system would achieve from efficiency and customer service to recuperate these costs.

The co-op's goal of having field-workers adopt the new technology was achieved. Its GIS analyst, Brent Hart, notes, "From a change management standpoint, ease of use combined with value to the user has been a huge asset for us. Our field-workers had been using paper map books for a long time, and some of them were reluctant to join the computer world. However, once we provided them with training and put laptops in their trucks, they readily saw the benefits of this conversion and were very happy with the results. The mobile GIS is really easy for them to use and helps them do their work more efficiently. This was our initial goal. It is the job of the guys in the field to keep the lights on, not to be GIS operators. This GIS tool is one that they have easily learned and are glad to be using."

Learn more about TC Technology at www.tctechnology.com. Learn more about Lockheed Martin at www.lockheedmartin.com. Learn more about Itron at www.itron.com.