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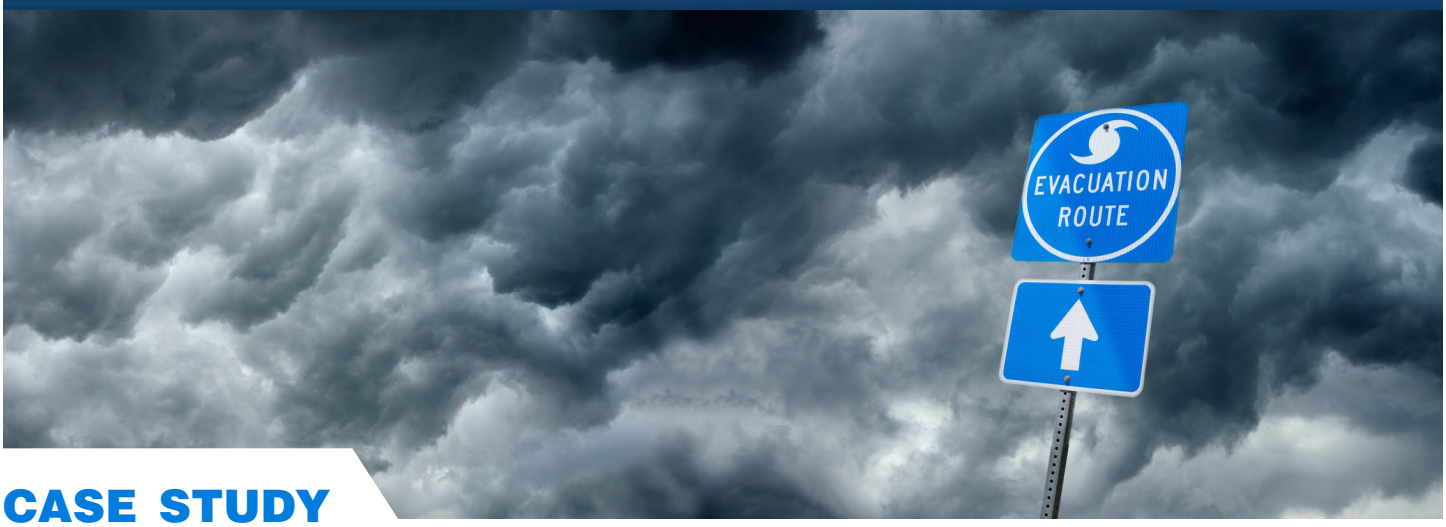

CASE STUDY

A Lesson in **Disaster Preparedness**

OVERVIEW

Franklin Telephone is an independent Telephone company that serves approximately 6700 subscribers over 10 exchanges in Southwest Mississippi. Franklin Tel takes pride in providing its customers excellent service, even in the worst conditions. They provide battery backup for Central Offices and remotes, and use generators to provide power during extended AC outages. But when Hurricane Katrina knocked out power to the region for 14 days in 2005, Franklin's network resiliency was put to the test. According to Tom Griffin, General Manager of Franklin, "*Our experience with Hurricane Katrina forced us to change our understanding of disaster preparedness; and not only change our understanding, but also change our actions.*"

CHALLENGE

In September 2005, Franklin Telephone was at the beginning of a mission to expand DSL service to its customers, with over 75 DSL cabinets deployed in virtually all 10 of its exchanges. All the cabinets were equipped with enough batteries to provide uninterrupted service for a minimum of 8 hours. In addition, portable generators were available to keep the sites up and recharge the batteries. Tom noted that "*Our customers were pleased with our service, and our network design left us feeling confident to handle any possible network outages.*"

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But when Hurricane Katrina roared ashore, creating a power outage that lasted for nearly 14 days, Franklin's network was subjected to a wave of challenges. The portable AC generators, so important for providing service during an extended outage, began disappearing, as some resourceful locals thought the generators could be better used to power their homes. Apparently, they valued keeping the lights on or their freezers operating more than they did communications.

SOLUTION

After the hurricane, Franklin began to re-evaluate its disaster preparedness and recovery plans. While they realized the importance of generators during extended outages, they also knew having their technicians babysit them was neither productive nor cost effective. They also needed to deal with another problem with gasoline generators – the need to keep refueling them and the logistics and potential safety nightmare that can ensue. They concluded that ferrying large amounts of fuel, paying technicians to watch sites and replacing missing generators was not the most cost effective means of providing network resiliency and disaster recovery.

Of all the incremental costs incurred during the aftermath of the storm, labor was the biggest contributor. Due to manpower constraints, a tech would be dispatched to the site for 10 hours during which time the DSLAM cabinet would operate and the batteries would charge up to their 8 hour capacity. This meant they could keep the sites running for 18 hours a day, leaving 6 hours per night when the sites would be down. But it also meant that the technicians had to remain at the sites because

of the threat of theft of the portable generators. Franklin estimates that the cost of manning all 75 sites 10 hours a day for 14 days would have approached $787,500 (*see Figure 1*).

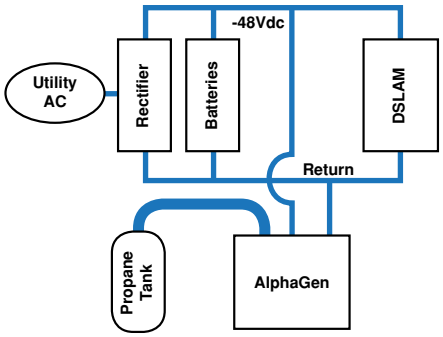
Figure 1: Hurricane Katrina Maintenance Cost Estimates

No. Technicians	1
No. Hours/Shift	10
Loaded Labor Rate	$75
No. Days	14
Cost/Site	$10,500
Total Costs	$787,500

Franklin wanted a solution to be less tempting to would-be thieves. So instead of looking at devices that supplied AC to run the cabinet, they focused devices that supplied DC power and connected directly to the DC bus. This all but eliminated the possibility of draining the batteries to the point of damage. And it also eliminated the hassle, expense and space considerations of an automatic transfer switch; a problematic single point of failure as well.

They first ruled out alternative energy options such as solar and hydrogen power due to cost, the immaturity of the technology and the sporadic availability of the diffuse sunlight in the region. That led Franklin to consider DC generators, which had little usefulness to the public, avoided the need for the transfer switch, and offered both LP and Natural Gas fueling options that satisfied logistic and safety concerns. (*See Figure 2 for a basic diagram of the DC generator configuration*).

Figure 2: Basic Block Diagram DC Generator Configuraton



After considering different vendors, Franklin selected the AlphaGen generators supplied by Alpha Technologies. The AlphaGens produced less noise, making them more desirable for deployment in residential neighborhoods. They could be powered by propane gas, but later converted to natural gas if the opportunity warranted. And the propane tanks could be enclosed in telecom style cabinets, allowing Franklin to deploy an AlphaGen self-contained propane fuel system enclosure alongside the DC genset. Refueling the units was much safer as well since conventional portable propane tanks could be managed by a single technician.

"BY THE TIME HURRICANE ISAAC HIT IN AUGUST 2012, FRANKLIN HAD OVER 50 SITES POWERED BY THE ALPHAGEN GENERATORS AND NEVER LOST A DC POWERED SITE DURING THE THREE DAYS OF POWER INTERRUPTIONS."

RESULTS

By the time Hurricane Gustav hit in 2008, Franklin had deployed six AlphaGen's in some of its more critical and remote sites. While Gustav caused extensive flooding and AC power outages, Franklin experienced no outages at the sites equipped with the Alpha DC power generators. The site reliability coupled with the fact that no dispatch of personnel was needed at those sites during the power interruption, led Tom to request funding to expand the program. While unplanned increases in capital spending can be difficult to justify, Franklin's management team understood that spending money up front to provide continuity of service plus maintain a safer work environment would payback in customer retention and employee satisfaction. In the end, the DC generators provided a lower Total Cost of Ownership than the gasoline powered AC generators, even though the upfront cost was three times more expensive.

Since gaining approval to proceed, Franklin has been adding a few sites each year. Their cost of maintaining service during power outages has continued to diminish. In fact, by the time Hurricane Isaac hit in August 2012, Franklin had over 50 sites powered by the AlphaGen generators and never lost a DC powered site during the three days of power interruptions.

Having a reliable power source that runs for days and starts automatically when the commercial power is lost has also resulted in some fringe benefits.

1. Proactive testing and replacement of battery plants.
2. Eliminating overtime charges stemming from staff having to sit in one place watching generators in the aftermath of a storm
3. Replacing fewer batteries since the batteries do not deplete their charge.
4. Reducing the size of the batteries at each site by limiting the batteries to to providing ride-through power until the DC gensets can carry the bulk of the load

CONCLUSION

With high speed data becoming such a critical need for residential subscribers as well as businesses, the deployment of DSLAMs and other distributed electronics is going to continue to expand. Franklin Telephone took the lessons learned from Hurricane Katrina and made the difficult step of considering the life cycle benefits of the technology rather than simply focusing on upfront costs. The end result was the deployment of a network power architecture that dramatically improved the reliability and resilience of its network. As Tom Griffin says, "*The conversion to DC generators was one of the best decisions we've made.*"

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