



Application Note

Remotely Detect Restoration of Utility Power Using Electroline's Status Monitoring Transponder.

Introduction

This is a discussion of a method for detection of utility power restoration after a power outage in a Hybrid Fiber and Coaxial (HFC) broadband access network.

Background

Power outages are common occurrences that must be mitigated and managed to minimize or eliminate service interruptions experienced by subscribers in broadband cable access networks. Operators of Hybrid Fiber and Coaxial (HFC) networks rely on battery backup standby power supplies to mitigate relatively short-term power outages. To enable the HFC operator to monitor and manage the power supplies and the inevitable utility power outages, a status monitoring transponder, like Electroline's DHT3 series DOCSIS 3.0 based Transponder, is used. The Transponder keeps watch over the state and condition of the batteries, the quality of input and output power, the state of operation and sends information metrics and alarms to a central managements system that ultimately provides actionable tasks to technical support staff when potential service effecting events take place.



The Scenario



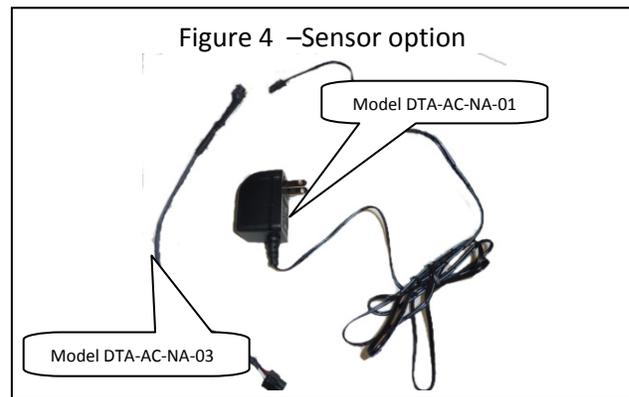
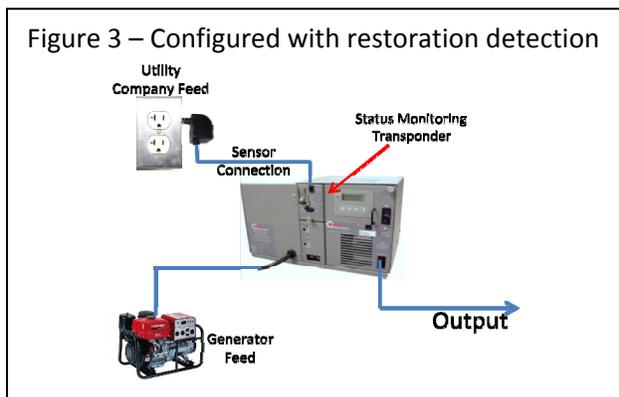
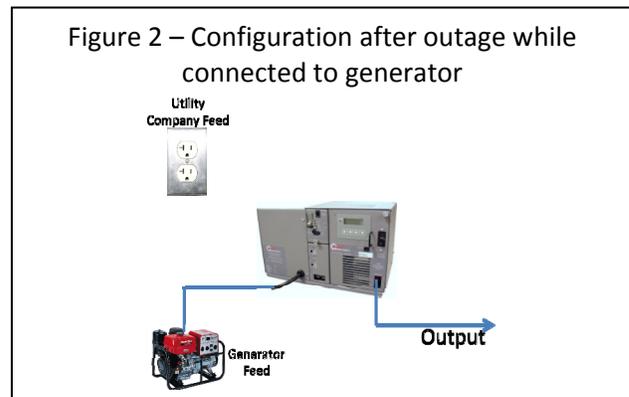
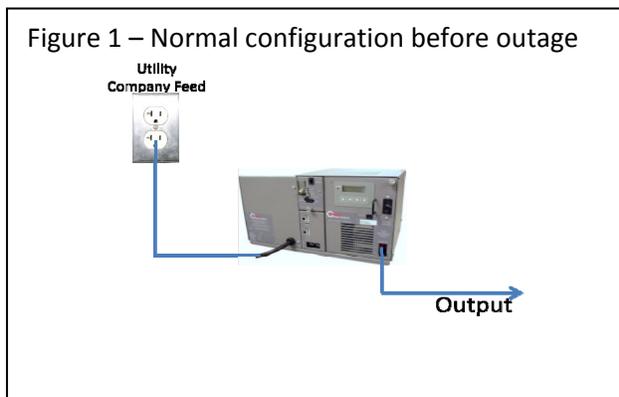
When a utility power outage occurs the standby power supply automatically switches to a battery backup mode and keeps the network operating for a relative short period of time. Perhaps 2 hours more or less depending on number of batteries and the load. When the power supply switches to battery backup mode an alarm is sent to the management system giving notice of the event and triggers a plan of action should the outage persist.

One such typical plan of action is to dispatch a maintenance technician with a gas powered generator to the power supply location that is in the backup mode and draining the batteries. The generator is placed near the power supply, secured to protect from theft, and started. Then the power supply input is unplugged from its utility feed and plugged in to the generator. The power supply will automatically sense the connection to the Generator and switch from battery backup mode to generator supplied power.

Now the power supply will run on the generator recharging the batteries and supplying the network until the utility power is restored by the power company.

The problem

Since the power supply input is unplugged from the utility company supply line, there is no connection that can be monitored for sensing the power restoration. Refer to figure 2. As a consequence, the cable operator's NOC is not aware when to return to the location to remove the generator and reconnect the power supply to its normal utility company feed. This leaves the network at risk. The generator could run out of gas and the power supply would again switch to the battery backup mode. Also the longer the generator is needed at the location, the longer the generator is exposed to potential theft and vandalism.



The Solution

Electroline designed functionality into its new DOCSIS based transponder to continuously monitor the utility line feed even when the power supply is disconnected from the utility outlet during a utility company power outage and while it is connected to a temporary generator for back up. Refer to figures 3 and 4.

There is usually a duplex utility outlet installed inside of the power supply cabinet. Normally the Power supply input is fed from this outlet. An Electroline supplied sensor can be plugged in to this outlet and is

connected to the status monitoring Transponder. This sensor detects the presence or absence of Utility Power at this outlet.

When the input of the power supply is temporally connected to the generator, this sensor will detect when the utility power is restored and will send a notification message to the management system to indicate that the generator can be retrieved from the field. Without this sensing the restoration of power can go unnoticed and potentially masks other issues affecting subscriber services.

Masked Service Affecting Network Issues

One of the affects during an outage is that service to the subscribers is interrupted. This is due to the fact that the subscriber's home has no power and therefore their computes, modems and TV's cannot operate due to the power outage. There are cases where power is restored but subscribers are still off line. While the power outage persists it is easy to conclude the root cause of the subscriber outage. However, knowing the utility power is restored but subscribers still remain off line, can trigger maintenance action to look for causes other than power outage as the root cause for the subscriber outage.

The Benefit

The benefits of applying this feature can be summarized as follows:

- ✓ Reduce theft and vandalism. - The technical staff can be efficiently scheduled to retrieve the generator reducing the time it needs to be exposed to the public in the field.
- ✓ Efficient use of resources – Sometimes outages are local or regional. Generators can be available for redeployment in other locations where the outage persists and battery capacity is being challenged.
- ✓ Fuel savings – When the utility company power is restored the generator keeps running and continues to consume fuel. Probably until the fuel supply is depleted. Applied restoration detection would trigger recovery of the generator sooner, this saving fuel.
- ✓ Identify RF Network Issues - Helps maintenance staff identify network issues and rule out power outage as the root cause.

Other Benefits of Monitoring with Electroline's DOCSIS 3.0 Transponder

- The only transponder with an Embedded DOCSIS 3.0 Modem and Full Band Capture.
- All Transponders come with a built in Remote Spectrum Analyzer.
- Each Power Supply is a RF network test point with a user interface accessible over your IP network and viewable with standard Web-browsers.
- Get Notice of power supply's ability to support a system during power outage.
- Provides awareness that batteries need replacement.
- Provides awareness that an inverter is non functional.
- Provide awareness of a defective charger.



There are many more reasons to monitor Standby Power with Electroline's Solutions. Contact your Electroline representative for further information and a live demonstration.

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About Electroline

Our specialty: Electroline specializes in unique DOCSIS implementations. All of our DOCSIS products are developed to be operated over the outdoor environmental temperature range. More expensive industrialize components, memory and SoCs for example, are incorporated in the design. Electroline's DOCSIS implementation is far superior and infinitely more rugged than the typical cable modem installed in homes to deliver internet and multimedia service. The products are designed to be an "always on", dependable device installed in the network. for monitoring purposes.

Electroline is a status monitoring company but we are a DOCSIS company too. In addition to status monitoring transponders, Electroline's DOCSIS line of product are hardened and embedded in our DOCSIS Rugged and Weather Proof Modems (DRM-WP). The DRM-WP is used as an HFC interface and "front-end" for third party devices requiring communication over public and private networks and for backhaul over HFC networks.

The inventor and most experienced supplier: Electroline was the first to deliver a DOCSIS certified HMS transponder. In 2001 development began and in 2003 Electroline changed the paradigm for the communications technology in Status Monitoring Transponders. Electroline invented the first Power Supply Status Monitoring transponder that used DOCSIS as the physical transport. Cablelabs certified the product and Electroline began shipping a product that now has been operating reliably for over 11 years. Electroline's DOCSIS – HMS status monitoring transponder has the lowest cost of ownership of any of the predecessor technologies.



Electroline DOCSIS 3.0
Transponders