Power Quality / Reliability Reporting
At
Florida Power & Light

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Introduction

It is estimated that sixty percent of the electrical load in the United States today is controlled by electronic devices of one sort or another. Due to this large penetration and our increasing dependence on the proper operation of these devices, Florida Power & Light (FPL) customers have become more and more sensitive to disturbances on both sides of the meter. Commercial and Industrial (CI) customers' operations can easily be shut down by disturbances lasting less than half a second. The project described below describes the replacement of approximately 4000 Solid State Data Recorders (SSDR's) with Smart Meters. We call them Smart Meters because they provide features far superior to the present SSDR's. Smart meters measure, monitor, and report dozens and dozens of different electrical quantities. They are, in fact, very smart devices, smart enough to provide advanced Power Quality Monitoring and Reporting services.

As the nation moves towards deregulation, data collected by these meters provides an advantage in providing useful, cost-effective products and services that customers need, demand, and expect from their utility. In one sense, they provide a key component in assuring the ultimate survivability of FPL as a utility.

Smart Meters provide benefits that go beyond the basic function of measuring demand and consumption information for billing. Smart meters provide information used internally by a utility to better analyze events that occur on the power system. These meters also provide the opportunity to offer additional services to customers, helping to meet customer needs and differentiate us from the competition

And so today the electric power industry is being pushed and squeezed to produce more, perform more, and cost less. There are two primary forces driving a push toward with Power Quality/Reliability reporting: competition resulting from impending deregulation and customers' increasing expectations in the high tech times we live in.

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Smart Meters with Power Quality/Reliability reporting are able to provide important data as the customer sees it, not just as the utility sees it back at the substation. When a power problem occurs that is outside limits preset by FPL, the meter will initiate a call to a Power Quality master station. The master station will receive the information from the meter, process it, then initiate any number of possible actions. These actions can include:

- Paging customer, FPL account manager, or a contact of choice
- Faxing a message to a group of people
- Sending a phone message to a group of people
- Sending a file or link to FPL's Trouble Call Management System(TCMS) to automatically generate a trouble ticket for the customer
- This will also provide FPL real time data on what is actually happening at the customer site.
- Can be used to minimize wasted trips to customer sites by providing real time data on feeder voltage problems before a troubleman is sent.
- Has the ability to verify customer side problems when customers are unsure of internal or external causes

Smart meters with Power Quality Monitoring and Reporting allow FPL to offer a service that automatically notifies FPL of customer problems, gives specific feedback to customers that we are aware of their problems, and working on them, possibly before the customer even knows there are any problems. This type of pro-active service is exactly what today's customers are demanding.

Strategic Fit

The features and services available through smart meters provide a great fit between FPL and its CI customers. They give the customer something desperately needed, while also providing the utility with cost-effective means to meet those needs. Customer billing and customer service processes are enhanced. Everybody has better information. Power quality problems are readily identified, outage times are reduced, customers sleep better at night, secure in the knowledge they now possess. Everyone wins.

The services available through the smart meter also fit, and add value to FPL's EDMpro.com Energy Data Management (EDM) service. EDM service is provided in national marketplace and requires a drop-in, Load Profile and Power Quality Monitoring device.

Market Analysis

Smart meters and their enhanced services are geared to the Commercial/Industrial customer segment. The enhanced services lend themselves to a monthly service fee.

* insert more here on service fee?

The majority of FPL's commercial and industrial accounts are candidates for these services. This type of customer includes:

- Large commercial/industrial accounts including; plastic extrusion, semiconductor manufacturers, hospitals, aerospace, medium to heavy manufacturing as well as others.
- Governmental Accounts are good candidates and critical city/county accounts. This includes fire rescue/911, water/sewer plants, major lift stations, schools, as well as many others.
- Small CI & National Accounts - This can be a positive step in taking services beyond our service territory.
- The service can be expanded to include smaller businesses.

Power Quality and Outage Notification Requirements

Smart meters offer the potential for vastly improved power quality data for both FPL and the customer. Smart meters offer the potential for automated trouble ticket generation from customer outage and voltage problems.

Similar to many other large utilities, FPL incorporates a Trouble Call Management System (TCMS) to pinpoint the area affected by a power outage/problem, in order to direct personnel to the area being affected. This is accomplished by the input of trouble tickets by the Customer Care Center personnel. As the TCMS system receives calls inputted into the system, it groups the calls by where on the system the customer is and automatically narrows down the possible devices on the FPL system that could be affected. This can include a transformer affecting a few customers up to a fuse or breaker that is affecting thousands of customers.

The chief drawback in the present system is that, in most cases, FPL is unaware of any customer problems unless the customer calls in, gets through to the phone center, and gets a trouble call entered. The customer waits, not knowing the status of the restoration effort. Customers often call their FPL account manager for more information. Initially, the account manager probably knows less than the customer. Several phone calls later, a clearer picture emerges, but the customer is probably still waiting for his problem to be fixed. This level of service is unacceptable to many of our large and highly automated business customers. They can't understand why FPL is unaware of their problem. After all, we live in a high tech world of computers, the Internet, whiz-bang communications, instant everything. Why exactly, don't we know …..

Smart meters with remote Power Quality and Outage notification provide the solution. With "just a little bit of software" trouble tickets are entered directly into FPL's trouble call system (TCMS) without any human intervention. Once there, the tickets are worked at the same priority as they would have been worked, had the customer called in via phone. The big difference, however, is that the customer did not have to make the call, and further, has the assurance that his PQ needs are being attended to.

Further, the system can easily generate messages for the customer, his maintenance or operating personnel, FPL account managers, and others. Messages are generated and sent via alpha-numeric pager, fax, or e-mail. These messages can contain the following information:

- Voltages – A, B and C phase
- Reason for Message – Power outage, low voltage, power restored, etc.
- Other useful information from the Smart Meter – lots to choose from

Power Quality Specifications

The Power Quality system will be equipped to monitor and report power quality in the following two modes.

1. The first mode is the spontaneous reporting of Power Quality (PQ) events, where the meter reports these events unsolicited.

2. The second mode allows querying each meter for an archived file of PQ events..

Power Quality functions and definitions are described as follows:

Outage

An outage event is defined as a voltage drop below 50% on any phase for a user defined time (from 1 to 10 minutes).

High/Low Voltage Event

A high/low voltage event is defined as the voltage on any Phase deviating from the normal voltage on any phase by a user defined percentage (from +/- 5 to 20%) for a user defined time (from 1 to 30 minutes). The phase voltages are to be included in the response to the Master Station

Voltage Unbalance

A voltage unbalance event is a deviation of any of the three phase-to-phase voltages from the average voltage on by a user defined percentage (from 2 to 6%) for a user defined time (from 15 to 30 minutes). The average voltage is the sum of the three phase-to-phase voltages divided by three. Voltage unbalance will be calculated at a minimum every 5 minutes. The phase voltages are to be included in the response to the Master Station

Momentary Interruption/Voltage Sag

A momentary interruption/voltage sag (MIVS) is defined as the voltage on any phase deviating from the normal voltage on any phase by a user defined percentage (below 80%) for more than 3 cycles (50 ms). A MIVS event will have occurred when a user programmable number of MIVS events (1 to 10) have occurred within a user defined time window (from 1 to 60 minutes).

Conclusion

FPL has almost completed a trial of the system we have chosen to implement Power Quality/Reliability reporting and AMR for our CI customers. At this point, it looks good. We are excited about the prospects for the future that this service makes possible. It will allow FPL to compete with the best of them and we are up for the challenge.

Questions and Answers…