Why MultiSpeak?

MultiSpeak is a leading standard for enterprise application interoperability.

It has seen widespread adoption throughout the utility industry, beginning with the electric cooperatives and spreading to municipal and investor owned utilities as well as to international utilities. There are a number of reasons for this significant market penetration.

For utilities MultiSpeak offers the following advantages:

- Interoperability of enterprise software applications, once a desirable goal, has become a vital necessity in today’s utility environment. Software written to the MultiSpeak specification fosters interoperability on a level previously unachievable. The emphasis for MultiSpeak is true interoperability, not just adherence to a data model or compliance with a specification.

- The MultiSpeak Specification is the only specification or standard covering the distribution portions of the grid (including the smart grid) that meets all of these requirements today:
  - Is ready to implement today
  - Has been proof-tested in multiple existing installations.
  - Offers true interoperability in “off-the-shelf” products available in today’s market.
  - Allows product development that does not require extensive customization by the end user - thus significant technical or IT staffs or outside consulting support are not required.
  - Can be used either with or without messaging infrastructure (e.g. “middleware”).
  - Is extensible without compromising the basic interoperability of the interface.
  - Is scalable to allow use for any size utility or information demand.
  - Is supported by wide range of vendors.
  - Has an existing, modestly-priced commercial testing process to help utilities and vendors ensure interoperability.
  - Has a large number of individuals trained in the use of the specification.

- Through the considerable support and expertise of leading vendors supplying the utility industry, the solutions provided by MultiSpeak are fine-tuned to the specific needs of utilities. In addition to their insights about market needs, MultiSpeak vendors bring state-of-the-art knowledge of IT tools to the specification development process. This means that utilities using MultiSpeak are getting a refined and focused standard specifically addressing their current and future needs.
**Why MultiSpeak?**

- The clear documentation in Web Services Description Language (WSDL) format permits clear contracts for interface interoperability and straight-forward development.

- MultiSpeak can also be applied using an optional messaging framework over any message-oriented middleware platform, should a web services implementation not be appropriate for a specific utility.

- By providing third-party, independent testing of interoperability, the MultiSpeak effort provides an independent measure of assurance to utilities that their software purchases will perform as asserted. Also the results of the testing program are fed-interactively back into the specification development process, helping to fine-tune its features.

Any utility, regardless of size, that is entering into an integration initiative, including smart grid development, should consider adopting the MultiSpeak data model and service definitions as the foundation for their planned integration.

For software vendors MultiSpeak has the following advantages:

- Minimizes the need for developing multiple interfaces with other vendors’ software, thus reducing time spent in developing and maintaining custom interfaces.
- Reducing interface development and maintenance efforts releases programmers to improve existing products or develop new offerings.
- Eliminating the need for custom interfaces reduces complexity and time to market for new products.
- Standardizing integration reduces support headaches.
- Increasing the willingness of utilities to invest in new applications by helping assure them that integration problems are minimized.
- Ability to actively influence the development of the specification.
Why MultiSpeak?

Business Case

As more utilities apply MultiSpeak to solve their integration challenges, there is a gathering volume of data demonstrating the cost savings that can result from MultiSpeak use. Savings can be either direct or indirect, and in either case are often hard to visualize prior to the implementation with MultiSpeak. The experience of one utility is provided here as an illustration of the kinds of benefits that can accrue from MultiSpeak use.

Background

Four MultiSpeak interfaces were implemented. These are shown below.
Why MultiSpeak?

The interfaces were:

- **OA-OD (in the IVR and in the AMR)**: Outage Analysis (OA) performed by an Outage Management System and Outage Detection (OD). In this application, two different kinds of software products, the Automated Meter Reading (AMR) and Interactive Voice Response (IVR) systems, perform the outage detection service in exactly the same manner.
- **CH-OA**. This interface is between the call handling (CH) function of an IVR and the outage analysis (OA) function of the OMS.
- **SCADA-OA**. This interface is between the SCADA function of the SCADA application and the outage analysis (OA) function of the OMS.

Prior to implementing MultiSpeak integration each of these applications was a stand-alone system. Any exchange of information was done manually; an employee would have to look up information in one program and, if possible, copy and paste the information into the other system; at other times it was necessary to re-type the data into the second application. It was difficult to correlate information about customers, meters and outages in an effective manner.

In order to be effective in his job, a dispatcher needed to be trained in the use of multiple software systems and be able to move fluidly between the diverse user interfaces. The requirement for additional training and the potential for confusion due to conflicting software environments further reduced the dispatcher’s efficiency. Furthermore, a dispatcher had to have a monitor in his work space for each of the systems in order to have access to all of the data necessary to perform his work. This added to the clutter and potential confusion associated with “information overload”, as well as potentially adding to the cost for hardware and software licenses.

Capabilities

The following capabilities were added by the MultiSpeak Integration:

- Outage calls taken by the IVR system automatically show up as outages in the OMS.
- The dispatcher can correlate customers, service locations and meters, directly from the OMS display.
- The dispatcher can request that the AMR system query the status of a meter (also called “ping” the meter) directly from the OMS application. This capability can be used to determine the extent of an outage or to verify that service to specific meters has been restored.
- The AMR system can locate meters electrically on the power system using information supplied by the OMS and thus is able to address and ping groups of meters that could all be potentially affected by a single outage cause.
- The OMS can obtain status of SCADA-controlled devices and thus can more quickly predict outages due to a locked-out substation breaker.
Why MultiSpeak?

Business Processes and Benefits

Six different business process changes and the resulting benefits were identified by the utility, a distribution cooperative serving about 22,000 meters. For each, (i) a brief description is given of the process prior to integration, (ii) how the process has been improved using the capabilities provided by the MultiSpeak interfaces, and (iii) benefits of the change, are presented. All benefits are expressed in 2006 dollars.

Entering customer outages into the OMS.

**Before Integration:** Prior to integrating the AMR and the OMS it was necessary to copy and paste the affected meter number from the AMR system manually into the OMS. Since this method was inefficient, the utility typically would minimize this inefficiency by waiting until customers called in to report outages. The dispatcher would then enter the outage manually into the OMS.

**After Integration:** Now customer outages detected by the IVR automatically show up in the OMS and the dispatcher can begin outage prediction even before a significant number of customer calls have been taken. It is no longer necessary to cut and paste the meter numbers from the AMR system since the AMR and OMS are integrated directly. The SCADA system monitors all breaker status and analog values and reports that information to the OMS. With a little more database building the utility will have outages reporting automatically from the SCADA to the OMS for the devices the SCADA system monitors.

**Direct Cost Savings:** Avoiding copy and paste operations.
Estimated savings = $6,083
Calculated as follows: 2 minutes each occurrence; 10 occurrences each day; dispatcher wage rate (with overheads) of $50/hour

**“Soft” Benefits:**
- Faster outage predictions
- More accurate outage predictions
- Better customer service
- Enabling the dispatcher to focus on working the outage rather than managing data
Why MultiSpeak?

Finding which meter is out of power when a customer has multiple meters.

**Before Integration:** In the case where a customer had multiple meters and didn’t know the meter number of the service that was out of power, the crew would either check all of the possible locations or meet the customer on site to be led to the problem location. Often the outage was eventually found to be part of an existing outage and did not need to be handled individually. In such cases, lack of adequate information from the customer resulted in a wasted crew trip.

**After Integration:** All of the customer’s meters can be located using the OMS, and the AMR system can be instructed to ping all possible meters, directly from the OMS application. The AMR system returns the status of all of the meters and the crew can be dispatched directly to the correct outage location if necessary without delay, saving wasted crew trips and time spent sending the crew to the wrong location. Using the OMS, the utility can perform group pings on all the meters a customer owns, and have meter status results back within seconds. This was virtually impossible before the integration because it took too much time to hunt down each meter individually and perform a ping within the AMR.

**Direct Cost Savings:** Avoiding wasted trips and reducing crew “windshield time”. Estimated savings = $2,100./year. Calculated as follows: 2 hours minimum per trip; 5 occurrences each year; crew costs (with overheads) = $210/hour

**“Soft” Benefits:**
- Faster outage predictions
- Eliminates wasted crew time
- Better customer service
- Reduces customer inconvenience
Why MultiSpeak?

Pinging meters so that the utility does not re-dispatch crews to outages that have been restored.

**Before Integration:** In some cases, customers reported an outage from their car or work location and were unaware that service had already been restored. The dispatcher, unaware that the outage being reported was the same one that had been fixed, re-dispatched a crew to the service location.

**After Integration:** The dispatcher knows the customer’s service location and can have the OMS application request that the AMR system ping the meter to detect outage status prior to disconnecting the customer call. If the outage has already been restored, no crew need be dispatched and the customer can be reassured as to their outage status before the call ends.

**Savings:** Avoiding wasted trips.
Estimated savings = $63,000/year.
Calculated as follows: 2 hours minimum per trip; 150 occurrences each year; crew costs (with overheads) = $210/hour

**“Soft” Benefits:**
- Eliminates wasted crew time
- Better customer service
- Reduces customer inconvenience
Why MultiSpeak?

Pinging meters so that crews can be released to work other outages.

**Before Integration:** The line crew working an outage would stand by at the outage location while the dispatcher called the affected customers to ensure that all customers had been restored prior to releasing the crew to work another outage.

**After Integration:** The dispatcher pings all of the affected meters to ensure that all customers have been restored and releases the crew to perform other work. The utility can then call back affected customers as desired without delaying the line crew.

**Savings:** Avoiding crew standby time:
Estimated savings: $36,750/year
Calculated as follows: 15 minutes average per outage; 700 occurrences in 2006; crew costs (with overheads) = $210/hour

**Soft Benefits:**
- Eliminates wasted crew time
- Reduces outage durations
- Better customer service
Why MultiSpeak?

Pinging meters to avoid late-night customer call backs.

**Before Integration:** The dispatcher would call back every customer affected by an outage to ensure that power was restored to all customers, regardless of time of day.

**After Integration:** The dispatcher pings all of the meters to ensure that service has been restored; the decision to call customers can be separated from the need to check power restoration. Late night calls can be eliminated, thus reducing customer inconvenience.

**Savings:** Not Applicable

**Soft Benefits:**
- Better customer service
- Reduces customer inconvenience
Why MultiSpeak?

Not dispatching crews to customer-side outages or recovering trip charges for customer problems.

**Before Integration:** Any customer call was treated as a potential outage. In some cases, service was intact to the meter and the problem lay on the customer side of the meter.

**After Integration:** The dispatcher can ping the affected meter to determine whether the meter is receiving service prior to dispatching a crew to the outage. If service has been confirmed to the meter, the customer can be given the option of checking out the problem himself or paying for a trip charge so that a utility serviceman could check out a problem on the customer side of the meter.

**Savings:** Avoiding wasted trips or recovering customer trip charges.  
Estimated savings: $3,600/year  
Calculated as follows: Trip charge = $120 per occurrence; 30 trips per year

**Soft Benefits:**
- Eliminates wasted crew time
- Recovers cost for service provided to customer
- Improved customer choice
Why MultiSpeak?

Lessons Learned

The installation and commissioning of MultiSpeak interfaces at the utility required little time and effort beyond that necessary to install the application software updates that supported the web service interfaces. For each application it was necessary to input the network location of the software product(s) with which it was to communicate. Once network communication was confirmed, the applications began exchanging information with no further modifications being required. No additional hardware or software was required to implement the interfaces and no upgrade was required to network infrastructure to handle the web service messaging traffic. It will be necessary for the utility to make minor changes in the SCADA database before device lockout status information can be exchanged with the OMS, but no other database changes were necessary in any application to accomplish the integration described in this case study.

This utility, which serves about 22,000 meters, has seen significant improvements in business processes, improved levels of customer service and enhanced employee efficiency by integrating previously stand-alone software applications. Quantifiable benefits of $111,533/year (in 2006 dollars) have been identified in the outage management processes alone. This amounts to a savings of about $5.07/customer/year. The changes required to existing software, network infrastructure and application databases to achieve these improvements have been minimal.
Why MultiSpeak?

Use Cases
The MultiSpeak Initiative has recently focused on developing a library of use cases to document how common utility business processes are supported using MultiSpeak-defined web services. Why? What are use cases? Why are they important? Why is there a growing interest in use cases across the utility industry? What use case tools are available through the MultiSpeak Initiative today?

Use Cases – Defined

Use cases are a way of defining functional requirements of an information system. They can be used to define the business processes required for all activities in a utility and represent interactions between actors, that is to say information system components or individuals that affect a business process.

Importance and Benefits of Use Cases

The development of use cases is critical to all of the stakeholders interested in the interoperability of enterprise application software and systems for a number of reasons.

- **For improving communication between vendors and utility software users.** Use cases help improve communications between utilities and vendors by providing a checklist of capabilities that users may wish to specify in future software acquisition. They should also help users ensure that products received from vendors meet the needs outlined in requests for proposals.

- **For software development.** At the most fundamental level, explicit definition of use cases is an aid to vendor or utility software developers in developing MultiSpeak-compliant interfaces and data flows. Use cases help ensure agreement on what basic services mean within the MultiSpeak specification and hence more uniform and consistent implementations of software interfaces.

- **For improving interoperability.** True interoperability of utility software applications continues to be a high priority among all stakeholders. Tighter specification requirements and clearly defined compliance through use cases will move this effort forward.

- **For improving security.** Use cases may play a valuable role in identifying and specifying security requirements on an interface.
Why MultiSpeak?

- **For improved testing for compliance and interoperability.** A key aspect of achieving interoperability is developing testing procedures, test profiles and test data to exercise, as fully as possible, the limits of interoperability of various software products. Use cases need to be defined in order to develop profiles; testing to the use cases will improve the test process.

- **For improving product offerings.** Use cases can help vendors identify potential additional features for their product offerings. They can also help vendors who provide products in more than one standards-space.

- **For improving communication between the MultiSpeak specification and its users.** Developing use cases makes it easier for vendors new to the MultiSpeak specification as well as new utility users to identify specific MultiSpeak capabilities. For the continued development and refinement of the MultiSpeak specification. MultiSpeak inherently contains solutions to many utility business process needs. However, by defining use cases contained in current content the MultiSpeak Initiative can identify needed additional development. It also serves as a quality assurance measure to ensure that the current specification content is adequate for the intended purpose.

- **For improving harmonization with other standards.** A significant goal of the national smart grid effort is to harmonize standards-efforts among the various standards-setting organizations. A complete set of use cases will be a valuable tool in relating MultiSpeak content to other standards groups and will significantly ease harmonization with those standards such as when they build new functionality.

MultiSpeak Use Case Development

MultiSpeak is an extremely content-rich specification. Explicit definition of use cases defines the specific functionality in MultiSpeak that supports a particular utility business process. The MultiSpeak Specification itself has been under continuous development since 2002 utilizing contributions by the MultiSpeak Technical Committee. The Technical Committee has historically consisted primarily of vendors serving the utility market. They included in the specification, from its beginnings, capabilities which reflected the needs of utility customers. Thus, the capability to address specific utility business processes has always been inherent in MultiSpeak. However, explicit documentation of how MultiSpeak meets specific utility business processes, through use cases, has only been included starting with Version 4.1.

The MultiSpeak Initiative library of use cases is documented using sequence diagrams and supporting narrative materials as the best means to document how common utility business processes are supported using MultiSpeak-defined web services. A sequence diagram is one of many interaction diagrams defined in the Unified Modeling Language (UML), a standard of the Object Management Group (OMG) that can be used
**Why MultiSpeak?**

to design and document the functionality of information systems. The sequence diagram shows how applications and other actors interact with one another and the time order in which those interactions occur in order to achieve a particular functionality.

MultiSpeak use cases define the actors, interface requirements, assumed preconditions, the data exchanges to achieve a specific business process and the assumed ending state after a particular step in the business process is completed.

**Available Use Case Tools**

**For MultiSpeak Initiative Members.** For MultiSpeak Initiative members the following use case documents and products are available on the member’s website.

- The MultiSpeak use case sequence diagrams are built using Enterprise Architect (EA) software. The most current Enterprise Architect project file containing all of the current MultiSpeak use cases on all topics, including those approved and under development is available. The specific use cases can be opened to observe the use case narrative and the sequence diagrams can be used to view the underlying data payloads.

- Use cases from other standards-setting organizations such as IEC 61968 CIM, OpenSG, and ZigBee SEP V2.0 are being added to the MultiSpeak members’ SharePoint site as they become available.

- An index to all use cases including a cross-standard listing of how the MultiSpeak use cases relate to those of other standards work including the AMI-Enterprise subgroup of the Open Smart Grid User’s Group (AMI-ENT) and others as they become available.

- Minutes from Technical Committee meetings and teleconferences detailing the most current status of approved and draft use cases and sequence diagrams.