

# WAPA Powered by Fortech's ASM

## Company:

U.S Dept of Energy (WAPA)

## Solutions:

- Fortech's ASM
- ForTag (Fortech's E-Tag)
- Energy Scheduling & Accounting System
- Fortech's Consulting Services

## Industry:

Energy/Utility

## Challenge:

Meet industry regulatory requirements to handle all energy trading using Web services and SOAP/XML messaging

## Back Ground

On November 9th 1965, a faulty relay switch on the main electrical grid line in Canada triggered a domino-effect blackout that within 15 minutes had plunged the entire eastern seaboard, from Toronto to New York, into darkness. Full power wasn't restored until after 4am the following morning. This blackout was described as "causing an entire civilization to flicker." To prevent such accidents happening again, the North American Electric Reliability Council (NERC) was formed as a voluntary body, working in conjunction with government agencies such as the Federal Energy Regulatory Commission (FERC), to promote electric system reliability and security.

One goal of NERC is to help facilitate the trade of energy across the North American electric grids in an organized and efficient manner. This goal requires that the energy transactions be tracked from "source to sink", or from the point of generation, across a complex distribution network, and to the final destination where the energy is consumed or being *delivered*. The US is the largest producer and consumer of electrical energy, generating over 3,779 billion kilowatt-hours of energy in 2001. Managing transactions is a highly complex and business-critical task. NERC in 1998 came out with a process called Electronic Tagging also called as E-Tagging. Earlier to that the process managing energy transactions were manual, involving emailing MS-Excel Spreadsheets or FAX; As NERC, in 1999 moved to its first electronic system, and since then has progressively automated transactions. Most recently, has moved to an XML/SOAP messaging process in April 2001. This has helped facilitate open, seamless communications between all parties involved in the process, and has allowed energy utilities to accommodate a rapid increase in trading activities.

## Solution:

A combination of Fortech's consulting services, knowledge transfer about Web services technology, and Fortech's ASM Developer and Server Model services to create a highly reliable mechanism to create a new Web services infrastructure to handle energy transactions.

## Results:

Web service went live on time, on budget and has had no failures. Benefits include increased efficiencies and the ability to handle a marked increase in the quantity and frequency of energy transactions.

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## About Fortech:

Fortech provides Utility related Software Solutions and Services. Along with the Custom Application development Services, Fortech provides Web services infrastructure development Services. Our products make it easy for enterprises to build, deploy, manage and secure and reliable Web services & applications for the Utility Industry. Fortech has about 75 employees and is headquartered in Tempe, AZ.

## OVERVIEW

### BUSINESS PROBLEM

#### Providing a Highly Reliable and Efficient Mechanism for Tracking and Monitoring Electrical Energy Transactions.

The client is one of the largest US utility company. The company owns, manages or has a financial interest in various Federal Energy Resources.

Energy Trading is a core requirement for the business, and is heavily regulated. Consider the case where a buyer has a requirement for 50 Mega Watts of energy at a certain timeframe. The process of trading is as follows:

- The buyer or buyer's representative locates a seller with sufficient capacity at the time required
- An initial reservation is made using a national standard process from the Federal Energy Regulatory Commission (FERC) over the OASIS Node.
- An Electronic Tag conforming to NERC standards is created and disseminated to all parties involved in the transaction. The Tag is sent to the generation source, all parties that will be involved in transmission across the national electric grids, relevant regulatory agencies and intermediaries, and the final user. The Tag describes where, when and how the energy will be transmitted, and includes details about how losses will be accounted, the load profile, and so forth.
- The Tag is received and either accepted or rejected. Each participant in a schedule, which nets out an overall profile of energy flow and generation across the utilities' network, collects parsed Tag data.
- Subsequent data may alter some of the parameters of the initial Tag – for example, the generation profile – without requiring the Tag to be entirely cancelled and a new Tag application made.

## Business Challenges

### The client faced a number of business challenges:

NERC-mandated Electronic Tagging WAPA needed to meet all requirements of the NERC E-Tag Specification and Schema, which included managing communication using XML/SOAP.

#### Reliability and Scalability

WAPA needed a solution that was highly reliable, provided recovery/failover support, and was scaleable to meet an expected increase in the number and frequency of Tag requests.

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## Understanding and using Web services

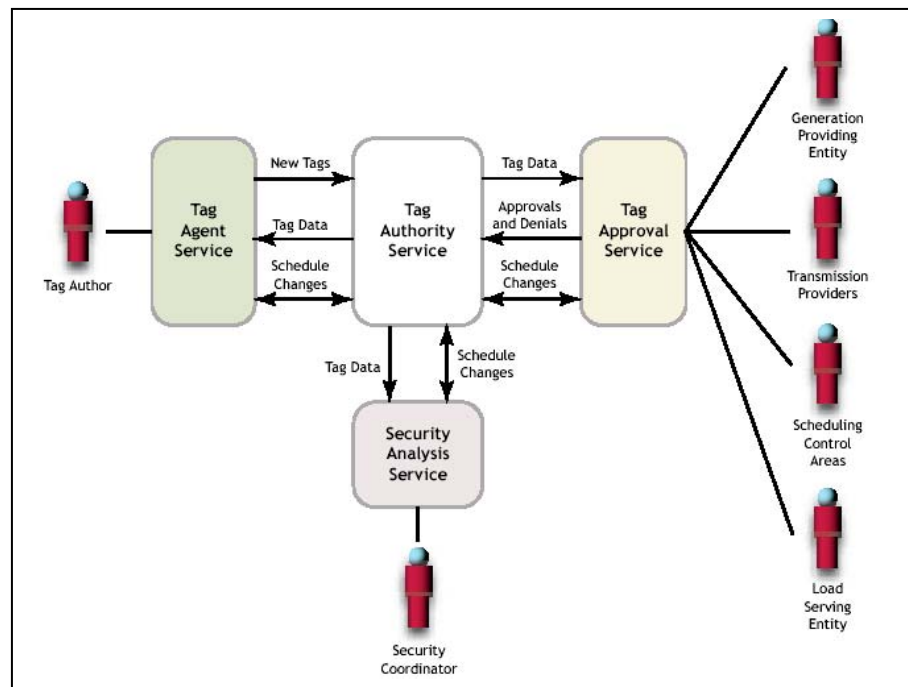
Like many organizations, the client was aware of Web services technologies but had little experience applying them.

## Deadline for development

The new system needed to be tested and live within a few months, leaving little time for experimentation and knowledge acquisition.

The client understood that the new Web service-based solution would provide considerable benefits by further automating the trading process, creating a harmonious and loosely-coupled architecture among all involved parties, and providing a flexible, technology-independent communications system that would easily scale to meet future requirements and increased demand. The challenge was to implement a system that would provide a business-critical service to the company, all within a tight and rigid deadline.

## The client was required to create a Tag Approval Services



**Figure 1:**  
*The relationship between a Tag author, Authority Services, and Approval Service.*

A Tag Authority Service provides the 'copy of record' for all Tags received within a load control area. The Tag Authority Service forwards all valid Tag requests to the Tag Approval Service associated with each entity identified in the Tag itself.

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The Tag is a detailed XML message schema that contains all the necessary information regarding the nature and transactional parameters of the energy trade.

The Tag Approval Service:

- Accepts new Tag requests and corrected/updated Tag requests
- Provides real-time parsing and syntactical validation of the data stream, then responds accordingly
- Identifies which additional entities need copies or retransmissions of the Tag data for approval
- Manages each request's state of approval
- Recognizes and negotiates with third party entities based on security criteria and ID
- Responds to Tag requests in an appropriate and timely manner
- Stores collected Tags

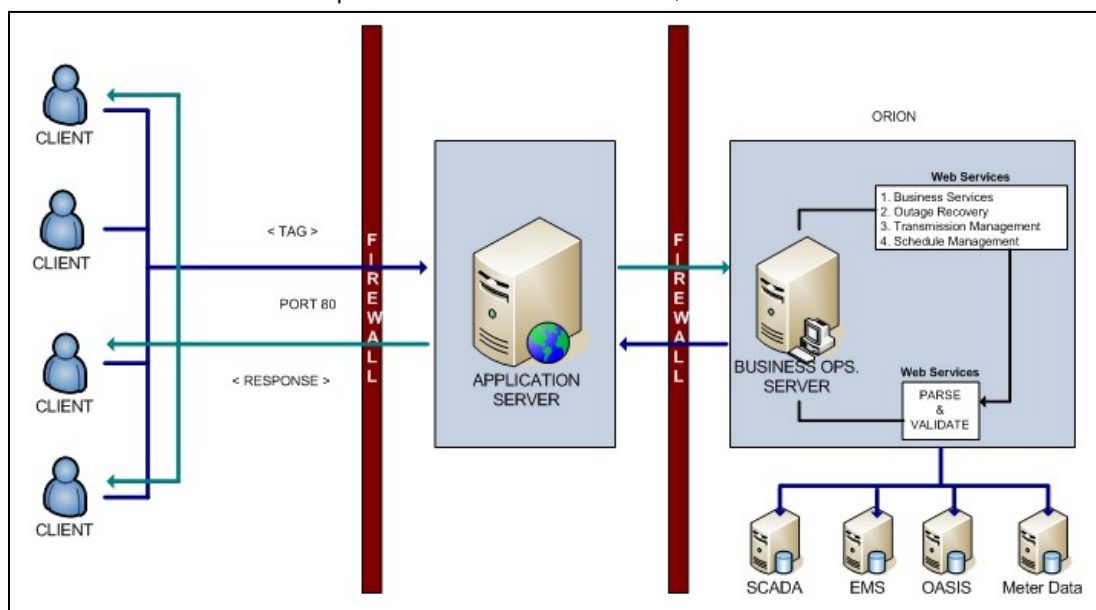
SOAP Messaging was both synchronous and asynchronous by HTTP using TCP/IP; the system needed to support a custom encryption process using public/private keys.

## Fortech's ASM Web services

The client recognized that it needed to find a partner for the project that could supply both the software to help create and deploy the Web services and the knowledge and skills-transfer that would allow the clients staff to use and expand the system going forward. The partner also needed to be flexible enough to provide on-site consulting support, plus 24/7 offsite support as needed, all on a short deadline. Figure 2, shows a simplified schematic for the chosen solution.

## Full Framework for Creating and Running Web services

Fortech's ASM provided a complete solution for creating and deploying Web services in the Java environment. The ASM framework was also flexible and extensible enough to meet all future requirements. Fortech developed a full set of tools that extended existing applications to make it simple to create Web services using ORION Application Server. ORION Server for Java was a high performance runtime environment that met the clients requirements for a field-tested, robust solution.



**Figure 2:**  
Simplified Schematic for the clients Web service

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## Full Consulting Support and Knowledge Transfer

Fortech provided support and onsite maintenance for the client, through the initial deployment and trail phase. The entire Web service was created in a day. The client met all performance requirements, going live ahead of schedule.

Fortech provided necessary development and consulting services throughout the engagement. The client and Fortech jointly deployed ASM Server which is currently running on ORION, and then created two Web services: one parsed, then validated the XML Tag payload contained within the SOAP message; the second initiated a an error-correction/ recovery process to reacquire and revalidate Tags in the event of a fault. The client have also created a hot backup system for fault tolerance. ASM was especially attractive because it is platform-independent and could easily be ported to another server. It also has excellent scalability, supporting an unlimited number of concurrent users, and has a comprehensive security framework that easily supported the encryption technology used in the Tagging process.

Fortech's ASM have allowed The client to quickly create, deploy and manage a Web service infrastructure that is critical to their business, allowing them to substantially automate the complex process of trading energy throughout continental North America. Business benefits include:

- **Enhanced efficiency**

The Web service-based architecture has further automated the Tagging process, and proved to be a relatively simple, low-cost approach to meeting the NERC and Regional standards.

- **Improved reliability**

The new system automates much of the error handling process and has reduced error rates

- **Scalability**

The new system has the ability to handle markedly increased requests for trades

- **Improved Flexibility**

The Web services-based system is flexible enough to integrate with any trading partner quickly and efficiently, with no requirement for new coding. The system also has the facility to alter a Tag transaction without having to cancel and reinitiate a complete transaction.

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