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XML for Retail Energy Transactions: A White Paper

Excelergy

XML for Retail Energy Transactions: A White Paper

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XML FOR RETAIL ENERGY TRANSACTIONS

Introduction

XML for Retail Energy Transactions introduces a framework of standardized business-to-business (B2B) electronic transactions using eXtensible Markup Language (XML) in the deregulated retail energy industry. This Paper articulates the evolution of energy deregulation, the introduction of the Internet and e-Commerce and ultimately, the significance and functions of XML.

It is believed that the widespread use of XML for standardized business transactions will improve the competitive landscape of the deregulated retail energy industry. Retail energy transactions among trading partners are complex, data-intensive communications that are costly to establish and maintain. The use of XML based electronic business transaction standards for the deregulated energy industry lowers the barrier to entry of Energy Service Providers (ESPs) by providing a cost efficient, reliable and "open" means of communication with Local Distribution Companies (LDCs).

Primer on Deregulation

The primary impetus for energy deregulation was to lower energy costs to consumers. To maximize profitability while lowering consumer costs, ESPs and LDCs need to develop new technologies and improve business processes. Historical evidence from other industries supports the theory that competition stimulates creativity and new technologies.

As an example, in the airline industry, American Airlines developed the Sabre™ airline reservation system. Combined with sophisticated pricing models, the Sabre information technology has allowed airlines to improve the load factor, the percentage of seats filled on a given flight, from less than 50% in 1970 to almost 70% in 1997.

	% Real Price Reduction after 10 years	Annual Value of Consumer Benefits
Long Distance Telecom	40-47%	$5 billion
Airlines	29%	$19 billion
Trucking	28-58%	$19 billion
Railroads	44%	$9 billion

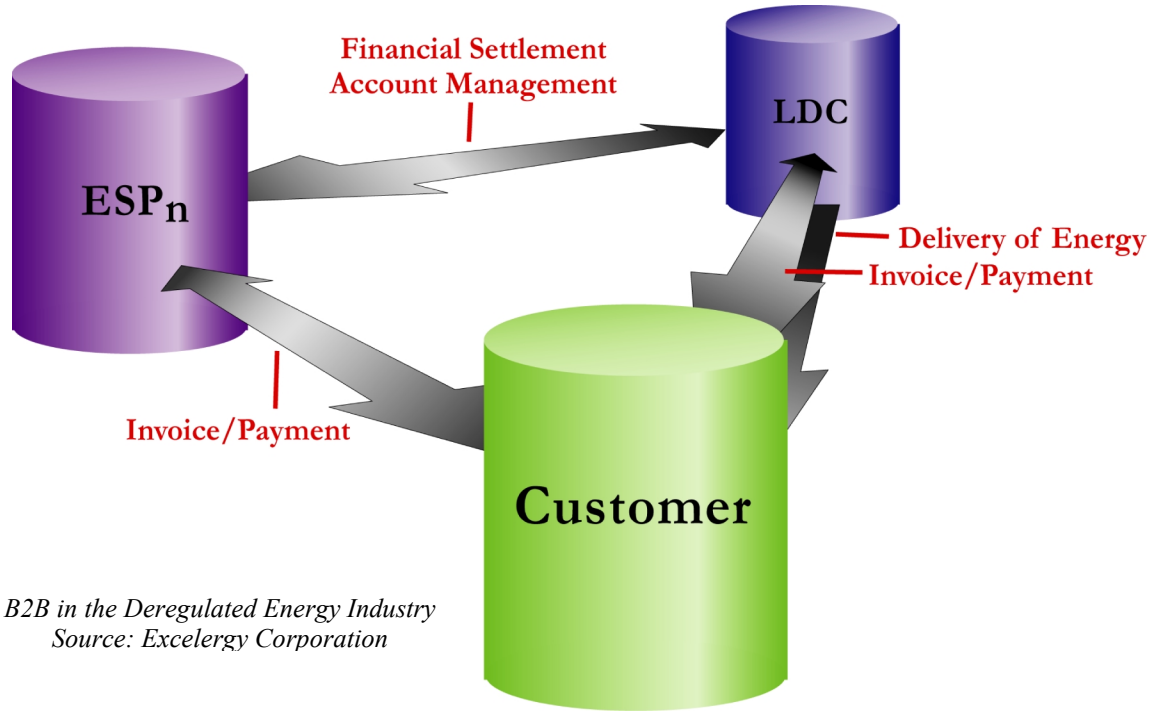
Source: Economic Deregulation and Customer Choice: Lessons for the Electric Industry, Crandall and Ellig, 1997.

Another example of competition yielding new technology and related benefits is in the banking industry. Automated Teller Machines (ATMs) have reduced the need for many retail branches, thus lowering costs while improving service through twenty-four hour access. In the telecommunications industry, digital technology and fiber optics have dramatically increased capacity and lowered unit costs, allowing significant real price declines in long distance telecommunications services. U.S. Department of Energy studies estimate that competition within the energy industry could lead to real price declines of between 19% and 43%.

B2B within the Deregulated Energy Industry

The energy industry is deregulating at both the wholesale and retail levels. At the wholesale level, competition exists among energy suppliers and financial intermediaries. At the retail level, deregulation has encouraged competition among ESPs, the entities that sell the energy commodity to end-users.

The deregulation of the retail energy market has created complex trading relationships among the ESPs and the LDCs. Deregulation has broken up the monopoly into discrete entities forming a triangular relationship, which requires the transfer of customer information among the participants. Previously, the energy industry was a vertically integrated monopoly that required little external sharing of customer information. The development and use of both uniform business practices and standard electronic business transactions will facilitate the sharing of information aiding the development of a robust retail market. The primary focus of this analysis is how XML may speed the adoption and utilization of standard electronic business transactions.



B2B in the Deregulated Energy Industry
Source: Excelergy Corporation

Impediments to Efficient B2B within the Deregulated Energy Industry

The existing industry computer systems are based on older legacy technology. These systems were never designed to support the information exchanges now being required by deregulation. Therefore, a substantial challenge in implementing deregulation involves modifying pre-existing information systems and business processes to facilitate retail B2B energy transactions. LDCs in particular must operate within the constraints imposed by legacy systems and specific jurisdictional requirements set by state regulatory bodies.

Today, the primary method for exchanging retail transaction information is electronic data interchange, or EDI. The Utility Industry Group (UIG) developed EDI standards specifically for the electric industry. However, the range of options available to market participants when implementing EDI standards results in multiple flavors and complexities. For example, the "814" information has ten flavors within itself and ten additional variations within a certain state. Each LDC chooses the flavor that simplifies its own legacy system interaction with the new competitive business environment.

A New York Public Service Commission study cites four different LDC-specific methods for customer account number authentication in NY State.

1. Account number + check digit (Consolidated Edison, Niagara Mohawk, Orange & Rockland, and National Fuel Gas)
2. Account number, check digit + meter number (Central Hudson, New York State Electric & Gas)
3. Account number, check digit, + service address (KeySpan Energy/Brooklyn Union)
4. Energy Marketer account number + delivery point number (Rochester Gas & Electric)

Source: "Report of the New York EDI Collaborative" Electronic Data Interchange Proceeding, Case 98-M-0667, June 30, 1999.

The number of unique translation maps grows dramatically as an ESP adds additional LDCs in new geographic regions.

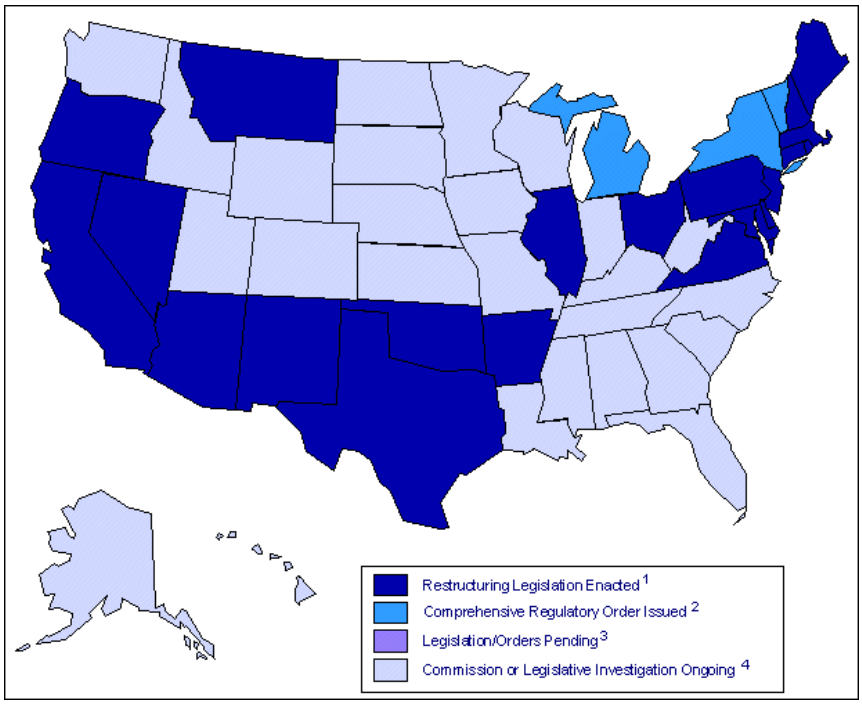
Doug Houseman, Director at Cap Gemini Hagler Bailly recently estimated the cost of implementing EDI within deregulated markets:

"Houseman estimates a retailer or energy service provider wanting to do business in a particular state must spend $500,000 to comply with the region's EDI Standards before selling the first megawatt. In addition, the company will have to spend another $50,000 per utility in the region to meet varying EDI standards."

Source: "The EDI Solution: Help or Hindrance in Billing and Metering" by Richard Stavros, Public Utility Fortnightly, p.53, October 1, 1999.

As illustrated in the Chart below, energy deregulation is proceeding on a state-by-state basis. Twenty-one states have enacted restructuring legislation opening electric markets. Virtually every state has considered or is considering restructuring its electric and gas markets in one form or another.

Status of State Electric Industry Restructuring Activity as of October 1, 1999



Source: Energy Information Administration

Given the pace of deregulation, the costs are significant for an ESP entering multiple states with varying standards. In addition to increased costs, management of EDI's complexity diverts resources from other internal activities. This highlights the fundamental business problem, which is increased transaction costs for all participants within the industry.

Unlocking the Power of the Internet

The Internet is driving profound changes across all facets of society. The ability to integrate computer systems through an open standard with lower costs is particularly attractive to the business community. Companies within specific industries, such as the chemical industry, are migrating B2B transactions from proprietary networks to the open platform of the Internet.

The growth of the Internet, with over seven million registered Internet server sites world wide and the surge of companies deploying e-Commerce business Web sites are providing new electronic commerce models. The ability to combine Web based front-end processes with back-end information systems is what distinguishes e-Business from simple e-Commerce.

The migration of B2B to the Web, one must understand how the Internet is evolving to accommodate these new demands placed on it. Traditionally Internet integration has used Web forms (based on HTML) for e-Commerce systems in business-to-consumer (B2C) commerce. Now with B2B systems migrating to the Internet, HyperText Markup Language (HTML) syntax does not provide the means to represent these interchanges effectively.

XML – The Next Generation Vehicle for B2B

The XML specification (see sidebar below) was officially ratified by the World Wide Web Consortium (W3C) in February 1998 as an extension of the capabilities of HTML and Standard General Markup Language (SGML). As a close cousin of HTML syntax, software developers can quickly assimilate XML. XML contains significant design features to keep it simple and consistent and avoid the incompatibilities and complexities found in HTML. Also, XML is subject to an official International Standards Organization (ISO) standard. Support of ISO standards is essential to an EDI style use of XML, ensuring simple and consistent behavior across a broad range of systems and trading partners.

The implications of XML based B2B commerce are profound. XML enjoys the advantages of its heritage as an Internet-centric protocol. XML is easily viewable by people via applications such as desktop browsers. XML also leverages existing Internet HyperText Transfer Protocol (HTTP) based communications and security infrastructure. Moreover, XML-based communications support real-time application-to-application and Web-to-application document flow and integration. In short, XML leverages existing Internet investments.

XML allows developers to separate the presentation layer (forms) from the data interchange layer (information). XML is specifically targeted to support forms and document based interchanges via the Internet by defining the metadata details. XML's structure facilitates deployment architectures that improve Internet delivery performance, and better information manipulation via the Web over HTML. These techniques allow developers to better handle unstructured information interchanges, as well as providing the means to represent traditional fixed structured (EDI type) data interchanges.

XML provides the following benefits as a vehicle for B2B within retail energy:

- XML creates a richer structural and semantic environment to express the many roles and relationships among LDCs and ESPs.

- XML's extensibility is key to fulfilling its promise of simplified standards. Ease of parsing and validation help developers quickly adapt to changes in the industry.

- XML is designed for use on the Internet. The Internet itself provides opportunities for companies to minimize their costs by reducing their dependence on traditional Value Added Networks (VANs).

- XML has a wide acceptance across a growing number of industries, leading to a corresponding depth of tools, processes, and knowledge about XML.

- XML is designed to be readable by people and easily parsed by computers. Both of these design decisions help reduce development and quality assurance costs.

- XML's ease of development helps small and medium-size companies remain flexible while interacting with a wide range of trading partners.

The early stage of energy deregulation offers an opportunity to go beyond EDI and define energy e-Business with XML.

SIDEBAR: XML at a glance.

XML is a content markup format that is a close cousin of familiar Web HTML. XML documents contain elements that consist of start tags "<", and end tags ">", with the data content between the two tags. With XML you can define your own tags; unlike HTML where there is only a limited set of allowed tags.

PIPE 3.0

Document:

```
<Contact PartnerType="Distributor">
    <Name>
        <FullName>James Smith</FullName>
    </Name>
</Contact>
```

Valid XML messages reference a Schema. Schema list elements and attributes and how they interact with one another. The schema details valid message content and structure.

Schema:

```
<complexType>
 <element name = "Contact">
  <complexType>
   <element name = "Name">
    <complexType>
     <element name = "FullName" type ="lengthSixty"/>
    </complexType>
   </element>
   <attribute name = "PartnerType" type = "partnerType"
use = "required" />
  <complexType>
 </element>
<complexType>
```

Is XML Ready for Prime Time?

Implementing XML offers an evolutionary model for transition from static EDI mechanisms. XML adds three things to traditional EDI mechanisms to make EDI more dynamic. First, XML adds the ability to define message structures with the interchange transaction (XML linked to Document Type Definition (DTD) formats). Second, it adds the ability to model the business rules and interchange requirements (extended XML based process templates). Finally, XML adds the ability to use software technologies (HTML forms and business application components) driven from the XML formats themselves that are therefore self-adaptive and maintaining.

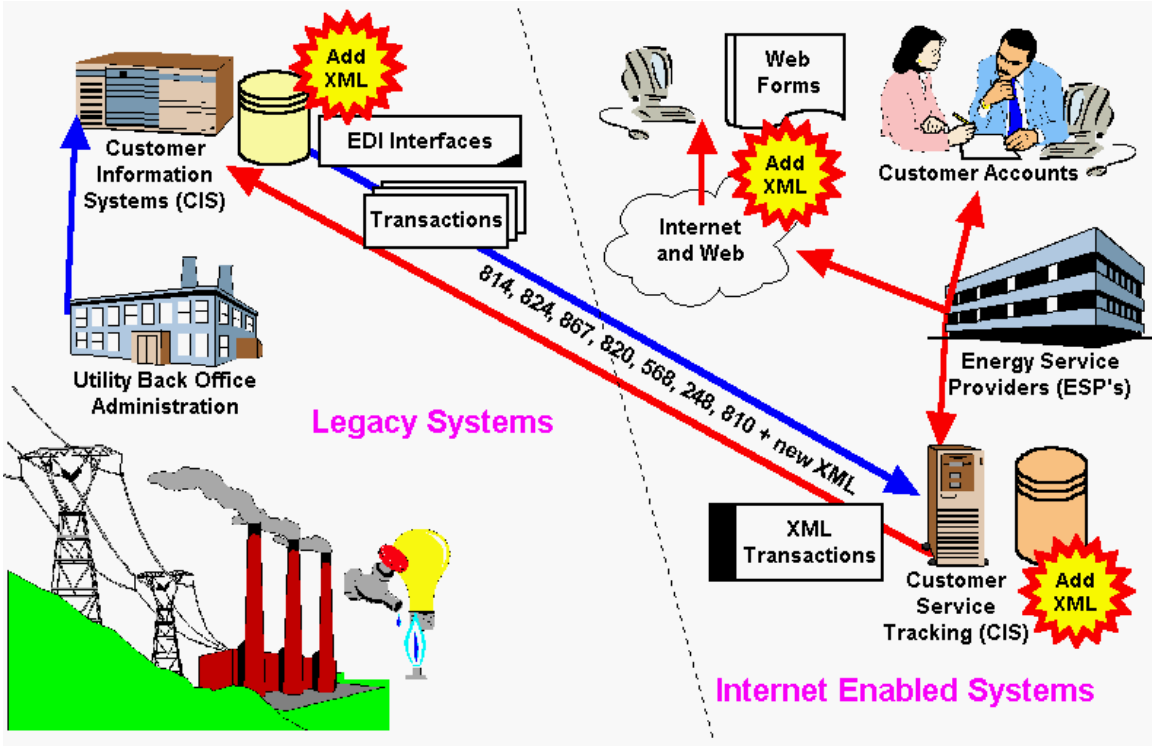
Various entities are working to combine traditional EDI with XML to create XML based syntaxes for horizontal (cross industry) use of XML. These include EDI standards bodies (DISA/X12, CEFACT, STEP and EDIFACT), industry associations (FIX, EDIX, MBA, OTA, HL7), and trade consortiums (BizTalk, OASIS, RosettaNet, CommerceNet, OFI, OTP, ICE). The W3C as a whole is working on extending and improving XML to meet the challenges of deploying interoperable e-Business systems.

The major software tool vendors have committed to and have shipped products with XML capabilities. Microsoft is investing heavily in XML technologies. An example is their new BizTalk product suite designed to provide the middleware for Internet based interchanges. Microsoft is also including XML into their Office Suite of products to provide desktop integration. Oracle Corporation introduced XML processing capabilities into their Oracle 8i database systems.

The XML standards community is encouraging industry specific groups to develop XML vocabulary appropriate for industry specific B2B requirements. With the publication of this White Paper, Excelergy makes its contribution to the implementation of XML for the deregulated energy industry.

XML within the Deregulated Energy Industry

The diagram below highlights an efficient, Web-based deregulated energy information structure powered by XML. Customer information, such as enrollment and switching may be collected via the Internet. ESPs, LDCs and related Service Providers may exchange customer, usage, billing and payment information via the Internet or Value Added Networks (VAN). Legacy system applications process electronic business transactions translated by either EDI translators or XML parsers. Under this deployment scenario, neither ESPs nor LDCs are forced into adoption of expensive, proprietary systems. ESPs and LDCs may leverage existing investments in both Internet and EDI based technologies.



XML Enabled B2B Commerce for the Deregulated Energy Industry
Source: Excelergy Corporation

Excelergy Releases Open Standards - PIPE™

In November 1999 Excelergy released an open, public use library for deregulated energy transactions called PIPE™ (Partner Interface Processes for Energy). The library contained an XML standard for several transactions currently used to enroll energy customers with ESPs. The XML standards contained in PIPE closely resemble the EDI 4010 transaction sets created by the UIG. As an Appendix to this white paper, Excelergy has attached an update to PIPE.

What is PIPE?

PIPE is an XML-based document framework used for the exchange of transactions among retail energy industry trading partners. PIPE provides a real-time, Internet Protocol (IP)-centric and extensible environment for integrated, interoperable information exchange.

PIPE defines the format and content of the transaction exchange, along with the roles and responsibilities of the trading partners involved in that exchange. PIPE also provides support for managing and tracking the exchange.

This update to PIPE builds upon the foundation established in the November 1999 PIPE release. The first release focused on customer maintenance activities such as generation service requests. This update to PIPE includes additional transactions required for the deregulated energy industry. In addition, this update includes schemas instead of the DTDs included in the initial release of PIPE.

PIPE Overview

PIPE is a document format that facilitates the exchange of transactions over the Internet and defines the content and structure of the transaction. The PIPE framework is basic and easily implemented in almost any networked environment. The PIPE XML document format is partitioned to allow subject areas to be implemented independently. In both cases the use of XML makes implementation easier and includes validation of messages and data.

The structure of the PIPE document is simple: every PIPE document must have a PIPE status response. If the status response indicates success, the PIPE document was successfully delivered. If the status response indicates failure, the PIPE document was not successfully delivered. At a minimum, PIPE implementations must log the sending of a PIPE document (for the sender), the receipt of a PIPE document (for the recipient), and the status response to a PIPE document (both for the sender and the recipient).

PIPE provides a document structure to allow the exchange of PIP (Partner Interface Process) messages between trading partners. PIPE is currently being utilized in the industry. It is however, a work in progress. Feedback on PIPE is therefore encouraged. Excelergy will work with interested parties to further the development of XML standards.

Next Steps

In recognition of the importance of open standards and uniform business practices for B2B transactions within the energy industry, several industry groups have invested resources in support of the development of standards. The following groups advocate and/or contribute to the development of B2B standards.

- CUBR – Coalition for Uniform Business Rules
- EEI – Edison Electric Institute
- NEMA – National Energy Marketers Association
- GISB – Gas Industry Standards Board
- UIG – Utilities Industry Group

These organizations work with state Public Utility Commission working groups to establish B2B standards within a particular state.

Excelergy welcomes all parties that are interested in becoming involved in the development and deployment of XML-based standards for the deregulated retail energy industry. Interested parties should email xml@excelergy.com for more information.

Learn More about Excelergy Corporation

To learn more about Excelergy Corporation and its products and services, please visit us at http://www.excelergy.com/. Excelergy will continue to develop its XML knowledge base, incorporating the technology into its products.

Learn More about XML

Below is a list of sites that provide more information about XML:

http://www.xml.com/

http://www.oasis-open.org/

http://www.biztalk.org/

http://www.xml.org/

http://www.w3c.org/

http://www.xmledi.com/

Learn More about Open Standards for the Deregulated Energy Industry

Below is a list of sites that provide more information about the implementation of uniform business practices and standard electronic business transactions for the deregulated energy industry:

http://www.cubr.org/

http://www.ubpnet.org/

http://www.energymarketers.com/

http://www.gisb.org/

Glossary

Document Type Definition (DTD) – XML-based vocabulary that can be industry, application or business specific.

Electronic Data Interchange (EDI) – a collection of standard message formats and element dictionary for businesses to exchange data electronically.

Energy Service Provider (ESP) – the entity selling the energy commodity to the end use consumer.

Extensible Markup Language (XML) – the structure developed by the W3C for describing data separate from the visual presentation of data.

HyperText Markup Language (HTML) – the basic language of the Web, which tells Web browsers how to display elements such as text, headlines and graphics.

Local Distribution Company (LDC) – the regulated local utility delivering the energy commodity to the end use customers.

Partner Interface Process (PIP) – An XML transaction describing a commercial process between two businesses.

Schemas - A collection of XML statements that define the structure of the data in an XML document and the constraints of that structure.

Standard General Markup Language (SGML) – A highly complex, rigorous language with tags for structure and content.

APPENDIX A: RELEASE NOTES FOR PIPE™ 3.0

Lexington, MA

Contents

0. What is PIPE 3.0

This document is a draft of PIPE (Partner Interface Processes for Energy), an Extensible Markup Language (XML) based document framework for the exchange of electronic business transactions (EBT) among trading partners. The PIPE framework was initially released in late 1999 as specification 2.0. Since that time XML supporting technologies such as schemas and parsers have evolved significantly. Based on such technological improvements, the PIPE specification is being updated to version 3.0 to include supporting schemas.

PIPE consists of a business data structure library to be used as a point of reference when creating Utility domain EBT transactions. The library is supported by a "best practice" standard set of EBT's and supporting schema for the exchange of data between trading partners. PIPE defines the format, content, and structure of the document. PIPE has been designed to address the increasing need to be able to exchange transactions over the Internet (or private networks). The use of PIPE, XML, and supporting schema allow for enforcement of transaction content and structure and robust data validation prior to application processing.

1. Introduction

Excelergy believes that XML can improve the competitive landscape within the Energy market by lowering the barrier of entry to new competitors and unlocking the data contained in legacy customer systems. Energy transactions among trading partners are complex, data intensive communications. Today, the primary method for exchanging energy transaction information is electronic data interchange, or EDI. The Utility Industry Group (UIG) created EDI standards specifically for the energy industry. However, there is wide latitude in the application of EDI standards, resulting in multiple flavors and complexity. XML, by its nature, provides a means to simplify the exchange of information in the energy industry.

2. PIPE Message Flow

The high level flow of XML PIPE documents is simple: Each PIPE document requires a PIPE Functional Acknowledgement (FA). If the status tag on a FA indicates accept, the PIPE

document is well formed and has passed schema validation. If the status tag on a FA indicates reject, the PIPE document is not well formed and/or has not passed schema validation.

3. PIPE Document

PIPE Document – A PIPE Document must contain a Trading Partner Directory and one or many PIP Transactions. A PIP Transaction will include one Transaction type. A Transaction type will contain one or more business data structures.

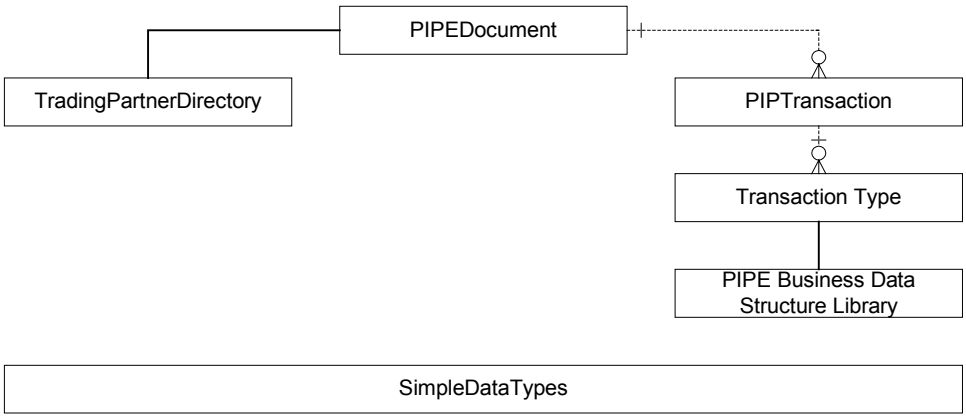
Trading Partner Directory – A Trading Partner Directory is used to identify trading partners. The Sender tag is used to identify the trading partner responsible for the origin and validity of the source data for each PIP document. The Recipient tag is used to identify trading partners who are interested in the data for each PIP document. The Trading Partner tag is used to identify the trading partner type, company name, and a unique company identifier.

PIP Transaction – A PIP Transaction is used as a container for a business process transaction type. Each PIP Transaction will include several attributes (i.e. transaction reference number) used to further uniquely define the PIP Transaction.

Transaction Type - A Transaction type holds business data structures organized to meet a specific business process, e.g. enrollment.

PIPE Business Data Structure Library – The PIPE Business Data Structure Library is an extensible XML library of business data structures designed to support both horizontal (cross industry) and vertical (Utility specific) business process EBT generation.

Simple Data Types – The Simple Data Types definitions are used to provide a single repository to define common data types and enumerated domains. These data types and enumeration will be referenced in a PIPE Document schema.


PIPEDocument
TradingPartnerDirectory
PIPTransaction
Transaction Type
PIPE Business Data Structure Library
SimpleDataTypes

SAMPLE PIPE Document

```
<?xml version="1.0"?>
<!-- Sample XML v0.0 Draft 00/00/00-->

<PIPEDocument xmlns = "http://www.definelocation.com/"
xmlns:xsi = "http://www.w3.org/1999/XMLSchema/instance"
xsi:schemaLocation = http://www.definelocation.com/ PIPEDocument.xsd

Version="1.0" ReferenceNumber="645" CreationDate="2000-02-13 01:00:12">


        <TradingPartnerDirectory>
                <Sender>
                        <TradingPartner PartnerType="EnergySupplier">
                                <CompanyName>123 Energy Supplier</CompanyName>
                                <CompanyIdentifier>87654321</CompanyIdentifier>
                        </TradingPartner>
                </Sender>
                <Recipient>
                        <TradingPartner PartnerType="Distributor">
                                <CompanyName>ABC Utility</CompanyName>
                                <CompanyIdentifier>12345678</CompanyIdentifier>
                        </TradingPartner>
                </Recipient>
        </TradingPartnerDirectory>

                <PIPTransaction ReferenceNumber="25" CreationDate="2000-02-
                15" OriginalReferenceNumber="22" Status="Accept">
                <TransactionType RequestedEffectiveDate="20000230">
                        <Customer></Customer> *
                        <Account></Account> *
                </TransactionType>
        </PIPTransaction>
</PIPEDocument>
```

*** This hierarchical element level of a PIPE Document is composed using a "building block approach" of business data structures for the purpose of meeting a business process requirement.**

PIPEDocument - Elements and Attribute Requirements

PIPEDocument

Namespace/Element/Attribute	Required/Optional	Description
• Xmlns	• Required	• Uniquely identifies the XML name space.
• xmlns:xsi	• Required	• Defines the schema instance being used.
• xsi:schemaLocation	• Required	• Associates the actual schema instance being used to the name space.
• Version	• Required	• Identifies the version of the PIPEDocument schema.
• ReferenceNumber	• Required	• Uniquely identifies this PIPEDocument.
• CreationDate	• Required	• Date the PIPE Document was created. • International Standard ISO 8601 ➢ Date expressed as yyyymmdd ➢ Time expressed as hhmmss ➢ Sample: [2000-02-15 01:00:12]

TradingPartnerDirectory

Namespace/Element/Attribute	Required/Optional	Description
• TradingPartnerDirectory	• Required	• Contains tags that define trading partners involved in a particular PIPE Document.
• Sender	• Required	• Identifies Trading Partner responsible for the origin of the source data for each transaction.
• Recipient	• Required	• Identifies Trading Partner for which the source data pertains.
• TradingPartner	• Required	• Identifies the trading partners.
• PartnerType	• Required	• Identifies the type of trading partner (for example Energy Supplier or Distributor).
• CompanyName	• Required	• Tag used to define the trading partner company name.
• CompanyIdentifier	• Required	• Tag used to define the trading partner company identifier.

PIPTransaction

Namespace/Element/Attribute	Required/Optional	Description
• ReferenceNumber	• Required	• Uniquely identifies a PIP Transaction.
• CreationDate	• Required	• Date the PIPE Transaction was created. • International Standard ISO 8601 ➢ Date expressed as yyyymmdd ➢ Sample: [2000-02-15]
• OriginalReferenceNumber	• Optional	• Uniquely identifies the original PIP Transaction (ie: the original PIP Transaction is referenced on a response transaction)
• Status	• Optional	• Used to communicate the status of a transaction.
• CrossReferenceNumber	• Optional	• Uniquely associates this PIP transaction to an original PIP Transaction reference number.
• ReferenceType	• Optional	• Uniquely associates this PIP transaction to an original PIP Transaction Type.

TransactionType

Namespace/Element/Attribute	Required/Optional	Description
• TransactionQualifier	• Optional	• Indicates a detail level type of transaction.
• RequestedEffectiveDate	• Optional	• Indicates the requested effective date for a particular transaction type. • International Standard ISO 8601 ➢ Date expressed as yyyymmdd ➢ Sample: [2000-02-15]
• EffectiveDate	• Optional	• Indicates the effective date of the original request. • International Standard ISO 8601 ➢ Date expressed as yyyymmdd ➢ Sample: [2000-02-15]
• DueDate	• Optional	• The last date/time that information will be accepted by the billing party for processing the bill. • International Standard ISO 8601 ➢ Date expressed as yyyymmdd ➢ Sample: [2000-02-15]
• Purpose	• Optional	• Indicates the purpose for a particular transaction type.
• #MonthsRequested	• Optional	• Indicates the requested time period for a particular transaction type.
• #MonthsProvided	• Optional	• Indicates the time period response to the original request.

BusinessDataStructure (RejectInformation)

Namespace/Element/Attribute	Required/Optional	Description
• RejectInformation	• Required	• Tag used to nest information about a rejected transaction.
• Reject	• Required	• Tag wrapper for multiple occurrences.
• Reason	• Required	• Explanation of rejection or error.
• ReasonText	• Optional	• Additional details of a rejection.
• ElementInformation	• Optional	• Tag used to capture name and value of the element being rejected.
• Name	• Required	• Tag used to identifier the name of the element being rejected.
• Value	• Optional	• Tag used to identifier the value of the element being rejected.
• AttributeInformation	• Optional	• Tag used to capture name and value of the attribute being rejected.
• Name	• Required	• Tag used to identifier the name of the element being rejected.
• Value	• Optional	• Tag used to identifier the value of the element being rejected.

4. PIPE Functional Acknowledgement

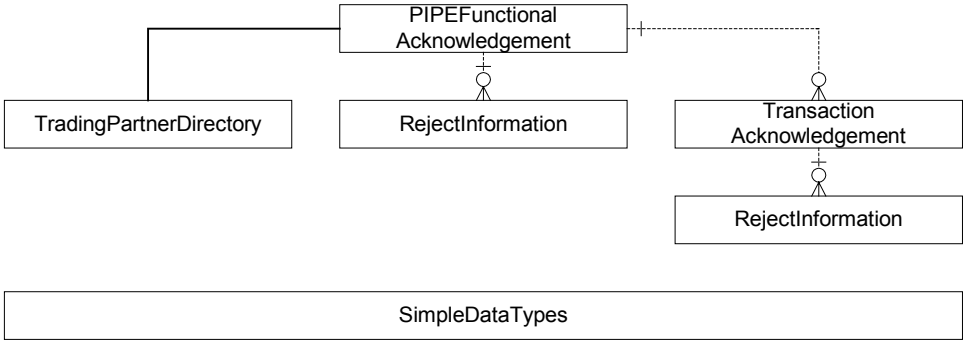
PIPE Functional Acknowledgement – A PIPE Functional Acknowledgement (FA) contains a Trading Partner Directory and optionally multiple Reject Information structures at both the PIPE Document level and also optionally at the Transaction Acknowledgement level. A PIPE FA is generated in response to every PIPE Document received and communicates complete success, partial success, or no success.

Trading Partner Directory – A Trading Partner Directory is used to identify trading partners. The Sender tag is used to identify the trading partner responsible for the origin and validity of the source data for each PIP document. The Recipient tag is used to identify trading partners who are interested in the data for each PIP document. The Trading Partner tag is used to identify the trading partner type, company name, and a unique company identifier.

Transaction Acknowledgement – Transaction Acknowledgement tag is used to define reject and/or accept information for a particular PIP transaction.

Reject Information – Reject Information is used to provide the reject reasons for a PIPE FA at both the document and/or at the PIP transaction level.

Simple Data Types – The Simple Data Types definitions are used to provide a single repository to define common data types and enumerated domains. These data types and enumeration will be referenced in a PIPE Functional Acknowledgement.



SAMPLE PIPE Functional Acknowledgement

```
<?xml version="1.0"?>
<!-- Sample XML v0.0 Draft 00/00/00-->

<PIPEFunctionalAcknowledgement xmlns = "http://www.definelocation.com/"
xmlns:xsi = "http://www.w3.org/1999/XMLSchema/instance"
xsi:schemaLocation = http://www.definelocation.com/ PIPEFunctionalAcknowledgement.xsd

Version="1.0" ReferenceNumber="88869546754" CreationDate="2000-02-31 01:00:34"
OriginalReferenceNumber="64569546754" Status="Partial">


    <TradingPartnerDirectory>
        <Sender>
            <TradingPartner PartnerType="EnergySupplier">
                <CompanyName>123 Energy Supplier</CompanyName>
                <CompanyIdentifier>87654321</CompanyIdentifier>
            </TradingPartner>
        </Sender>
        <Recipient>
            <TradingPartner PartnerType="Distributor">
                <CompanyName>ABC Utility</CompanyName>
                <CompanyIdentifier>12345678</CompanyIdentifier>
            </TradingPartner>
        </Recipient>
    </TradingPartnerDirectory>

        <TransactionAcknowledgement ReferenceNumber="25"
        CreationDate="2000-02-31" OriginalReferenceNumber="26"
        Status="Reject" CrossReferenceType="Usage">
        <RejectInformation>
            <Reject>
                <Reason>Invalid Attribute</Reason>
                <ReasonText>Forecast is an invalid attribute domain name</ReasonText>
                <ElementInformation>
                    <Name>BeginRead</Name>
                    <Value>121</Value>
                    <AttributeInformation>
                        <Name>measure</Name>
                        <Value>forecast</Value>
                    </AttributeInformation>
                </ElementInformation>
            </Reject>
        </RejectInformation>
    </TransactionAcknowledgement>
```

</PIPEFunctionalAcknowledgement>

PIPEFunctionalAcknowledgement - Elements and Attribute Requirements

PIPEFunctionalAcknowledgement

Namespace/Element/Attribute	Required/Optional	Description
• Xmlns	• Required	• Uniquely identifies the XML name space.
• Xmlns:xsi	• Required	• Defines the schema instance being used.
• xsi:schemaLocation	• Required	• Associates the actual schema instance being used to the name space.
• Version	• Required	• Identifies the version of the PIPEFA schema.
• ReferenceNumber	• Required	• Uniquely identifies this PIPEFA
• CreationDate	• Required	• Date the PIPE FA was creation. • International Standard ISO 8601 ➢ Date expressed as yyyymmdd ➢ Time expressed as hhmmss ➢ Sample: [2000-02-15 01:00:12]
• OriginalReference Number	• Required	• The reference number of the PIPE Document being acknowledged.
• Status	• Required	• Indicates the status of the PIP Transaction or PIPE Functional Acknowledgement

TradingPartnerDirectory

Namespace/Element/Attribute	Required/Optional	Description
• TradingPartnerDirectory	• Required	• Contains tags that define all the trading partners involved in the particular PIP Transaction.
• Sender	• Required	• Identifies Trading Partner responsible for the origin of the source data for each transaction.
• Recipient	• Required	• Identifies Trading Partner for which the source data pertains.
• TradingPartner	• Required	• Identifies the trading partners.
• PartnerType	• Required	• Identifies the type of trading partner (for example Energy Supplier or Distributor).
• CompanyName	• Required	• Tag used to define the name of the company a customer already has service with or would like to establish service with.
• CompanyIdentifier	• Required	• Tag used to uniquely identify a

		company.

BusinessDataStructure (RejectInformation)

Namespace/Element/Attribute	Required/Optional	Description
• RejectInformation	• Required	• Tag used to nest information about a rejected transaction.
• Reject	• Required	• Tag wrapper for multiple occurrences.
• Reason	• Required	• Explanation of rejection or error.
• ReasonText	• Optional	• Additional details of a rejection.
• ElementInformation	• Optional	• Tag used to capture name and value of the element being rejected.
• Name	• Required	• Tag used to identifier the name of the element being rejected.
• Value	• Optional	• Tag used to identifier the value of the element being rejected.
• AttributeInformation	• Optional	• Tag used to capture name and value of the attribute being rejected.
• Name	• Required	• Tag used to identifier the name of the element being rejected.
• Value	• Optional	• Tag used to identifier the value of the element being rejected.

TransactionAcknowledgement

Namespace/Element/Attribute	Required/Optional	Description
• ReferenceNumber	• Required	• Uniquely identifies a Transaction Acknowledgment.
• CreationDate	• Required	• Date the Transaction Acknowledgement was created. • International Standard ISO 8601 ➢ Date expressed as yyyymmdd ➢ Sample: [2000-02-15]
• OriginalReference Number	• Required	• Uniquely identifies the PIP Transaction being referenced (ie: a request is referenced on a response)
• Status	• Required	• Indicates the status of the PIP transaction within the PIPE Functional Acknowledgement
• ReferenceType	• Required	• Used to define the type of PIP Transaction.

BusinessDataStructure (RejectInformation)

Namespace/Element/Attribute	Required/Optional	Description
• See table above	•	•

5. Schemas Vs DTDs

This release of PIPE is defined with schemas http://www.xml-pipe.org/libraryframe.html as specified by the W3C's April 2000 schema draft(www.w3.org). XML Schema goes beyond the structural definition and validation of an XML DTD by adding many features including constraints, data types, and inheritance.

The progress of XML Schema specified by http://www.w3.org/TR/xmlschema-1/ and http://www.w3.org/TR/xmlschema-2/ is being tracked. Standards for XML Schema have not yet been finalized, and the standard is still evolving, however the W3C does not anticipate further substantial changes to the schema syntax. When the W3C issues the final recommendation for schemas, the sample schemas found on XML-PIPE.org will be modified to reflect the latest standard.

6. Contacting Us

Feedback and comments regarding XML and PIPE can be sent to:

xml@excelergy.com

Requests for information about Excelergy can be sent to:

info@excelergy.com

7. Copyright Statement