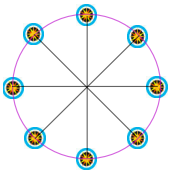

TAG Transaction Switch™

For Internet Commerce

An affordable, reliable turnkey eCommerce messaging system for exchanging XML business transactions across the Internet using HTTP or SMTP protocols.

A number of industries in North America, Europe, Japan and Taiwan are beginning to benefit from the development of XML based eCommerce standards. These benefits derive from the advantages of integrating their supply chains. Until recently, however, the cost of implementing an eCommerce standard could be justified by only very large companies. With the introduction of the family of TAG Transaction Switches™, however, the cost falls dramatically.

The TAG Transaction Switch™ is a low cost, robust, plug and play software program that can be used to exchange XML business documents between trading partners across the Internet.

The TAG Transaction Switch™ implements a subset of the RosettaNet standard, one of the most successful global eCommerce standards in the world today, As a result, the movement of business documents through the Internet using the TAG Transaction Switch™ is far more reliable than through ordinary E-mail, FTP or file transfers. It is also considerably less expensive than EDI.

The TAG Transaction Switch™ can handle any XML business document containing enough information to identify where it is going and where it is coming from. This includes, for example, all of the RosettaNet asynchronous PIP®s such as PIP 3A4 Request Purchase Order, PIP 3B2 Notify of Advance Shipment and PIP 3C3 Notify of Invoice. It also includes all ePSA compliant PIPs and TPTs as well as BizTalk, ebXML and other XML based business documents.

Reliability is achieved by the Switch through a carefully designed choreography of messages for each transaction. This choreography requires receiving partners to acknowledge each business message, sending partners to retry if a message is not acknowledged properly and both trading partners to send well defined error messages when business messages are lost, fail to conform or are damaged.

The Switch runs under the Microsoft's Windows operating systems listed on Page 4. The Internet connection to the switch can be "occasional" through a dial-up modem or "permanently connected" through cable, DSL or T1. Advanced versions run as Windows services. The Switch also runs on multiple processors.

Key Features and Benefits

Minimal Infrastructure
The Switch supports both HTTP and SMTP transport and so will operate with both dial-up (modem) connection and permanent connections to the Internet.

Rapid Connectivity
Small-medium sized businesses can be rapidly interconnected because setup time is minimal.

Easily Integrated
The Switch integrates easily with familiar accounting packages or back end systems. Integration is through simple file transfers and attended directories.

Multiple Frameworks, Multiple XML Documents
The Switch implements a subset of the RosettaNet RNIF 2.0 Framework and the ePSA Framework. It can handle any XML document containing a registered destination.

Easily Configured
Adding new transactions or changing UDDI directories is accomplished through an XML configuration file.

World Standard Registry
The Switch uses a UDDI Registry (Universal Discovery Description and Integration) for access points and services which means that all your trading partners can use a common, central directory, greatly simplifying registry level change management.

Snap-ins and the TAG Transformer™
You can modify the contents of documents as they move in, out and through the TAG Transaction Switch™ using Snap-ins and the Transformer. Snap-ins are external programs that can modify XML documents as they move through the switch. The TAG Transformer™ converts files as they move in and out of the Switch.

Scaling Up
The Switch can be run on multiple processors. This means that as traffic volumes pick up, meeting the additional demand can be as simple as adding more CPUs.

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The Architecture of the TAG Transaction Switch™

Components

The TAG Transaction Switch™ (Figure 1) runs in full duplex mode, receiving inbound messages and transmitting outbound messages during each Switch clock cycle. Inbound action messages (transactions) and signal messages (acknowledgments) are received into the **In** Directory. From the **In** Directory, action messages are unpacked and acknowledged. The extracted XML documents are then deposited into the Pickup Directory. Signal messages are also unpacked and then matched against their corresponding outbound action message.

Outbound messages are deposited into the Out Directory where they are picked up by the Message Packer. The Message Packer adds the appropriate headers and moves the packed message to the Delivery Manager. The Delivery Manager queries the UDDI Registry for the delivery access point and delivers the message using either HTTP(S) or SMTP. The Switch then waits for the corresponding signal message (i.e. acknowledgment). If the acknowledgment does not come in time, the Delivery Manager sends out another a copy of the action message. It retries three times, which is called the "Retry Count".

The Switch also includes a Transaction Database which logs the state of every transaction; an operating system file called the Event Log that records every event carried out by the TAG Transaction Switch™; a set of administrative directories and two administrative files. Both inbound and outbound paths include pre and post processing Snap-ins, which are external programs that can be invoked as each message passes through the Switch. The Switch can be purchased with an optional TAG Transformer™ that converts files from CSV to XML, XML to CSV and XML to XML files using XSLT stylesheets.

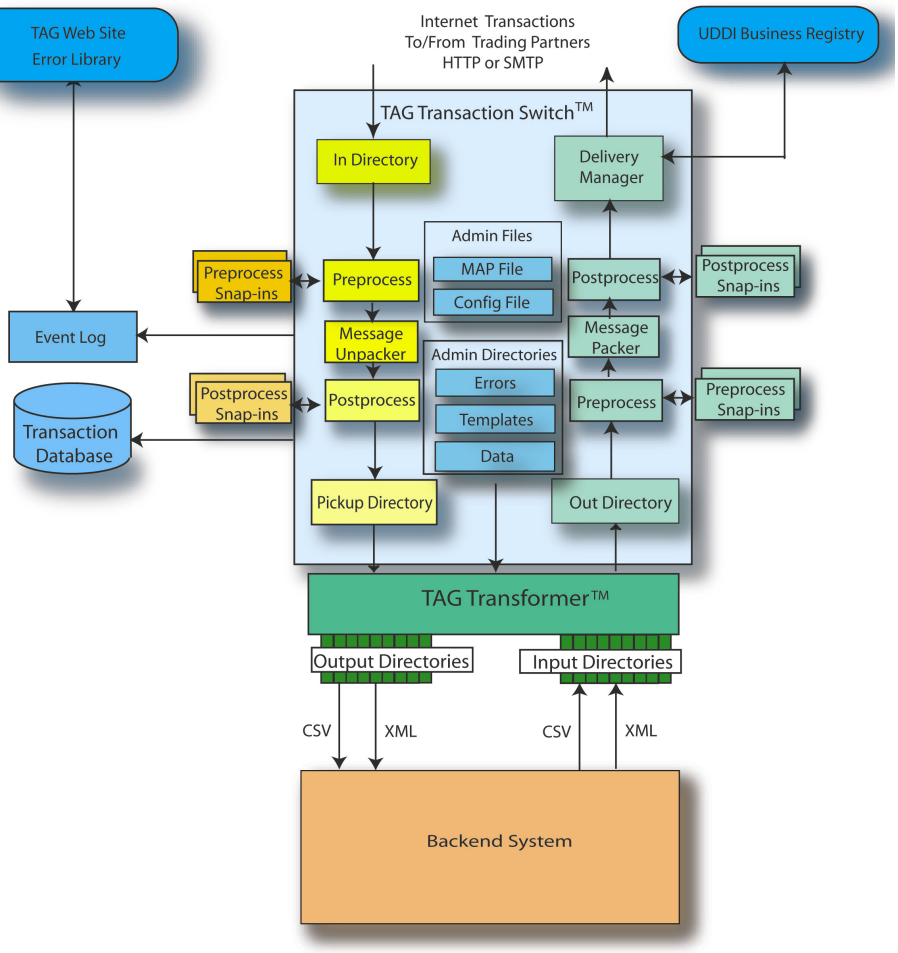

Figure 1 Architecture of the TAG Transaction Switch ™ with Transformer

Inbound Messages

In Directory

The **In** Directory accepts messages from trading partners through either an SMTP process or an HTTP process called the Grabber. It feeds its messages into the Message Unpacker and on to the Pickup Directory. If inbound Snap-ins are running, they will process the inbound message before and after the Message Unpacker.

Message Unpacker

The Message Unpacker unwraps each inbound business messages as it is received from the **In** Directory. The Message Unpacker handles both action and signal messages. It performs validity and error checking. It sends out acknowledgements for action messages and updates the state of the Transaction Database for signal messages. The Unpacker then passes the XML message on to the Pickup Directory.

Pickup Directory

The **Pickup** directory holds documents that have been received by the In Directory and processed successfully by the Message Unpacker and any Snap-ins. These XML documents are held in this directory for pickup by a back end system or the Transformer.

Outbound Messages

Out Directory

The **Out** Directory accepts files in XML format from any source. Typically, they originate from your Backend system or the Transformer. The Message Packer pulls files from this directory for outbound processing. Outbound processing includes packing and optionally, processing through one of the two Outbound Snap-ins.

Message Packer

The Message Packer wraps each inbound business messages as it is received from the **Out** Directory. It adds the three headers, Preamble, Delivery and Service and then passes the packed message to the Delivery Manager.

Delivery Manager

The Delivery Manager accepts a message from the Message Packer. It locates the destination of that message by referencing the XML Map. It then queries the UDDI Registry for the business name, DUNs number and the PIP Code. On the bases of what is returned from UDDI, the Delivery Manager uses either HTTP or SMTP to deliver the message. The Delivery Manager then updates the Transaction Database with the status of the transaction, which will be in a pending state until the corresponding acknowledgment is received into the Inbound leg of the Switch.

Snap-ins

Snap-ins are self contained modules that communicate with the Switch through Web Service calls. There are four different snap-in ports, two for outbound (pre and post) and two for inbound (pre and post). On the outbound leg, Snap-ins can modify a document before or after the Message Packer. For example, the XML file contents may be modified before the Message Packer and then encrypted by a Snap-in after it has been packed. Or, a Postprocess Outbound Snap-in could be used to attach a file to the Payload. A pre-process Inbound Snap-in can be used to decrypt a message before the Message Unpacker; a post-process Inbound Snap-in can be used to modify the contents of the XML document after the Message Unpacker. Snap-ins are usually supplied by users or developers.

Event Log

The Event Log contains a record of every event the Switch completes. It includes both errors and successful events. Each event includes a hyperlink to a library on the TAG-Tools Web site that explains the event. The Event Log is a Windows process available by right clicking on the My Computer icon on the Desktop and clicking on Manage, then clicking on "Event Viewer" and selecting the "Transaction Switch Log".

Transformer

The Transformer converts files between formats. On the Outbound leg, the Transformer handles conversions from flat ASCII files like CSV files to XML or from XML to XML. CSV conversions can handle comma, semicolon, TAB or pipe delimiters. The resultant XML file is usually dropped into the Switch's Out Directory. The specific transformation depends on which input directory the file is placed into by the Backend System plus an entry in the Config.xml file which determines what transforms to perform on that specific directory. Input and output directories are also specified in the Config.xml file. All transforms use XSLT stylesheets which are stored in the Transforms directory. XSLT is a language for transforming the structure of an XML document. You must create your own stylesheet for each transformation type and store it in the Transforms directory.

On the Inbound leg, the Transformer takes files from the Switch's Pickup directory and converts these XML files to either flat ASCII or XML. For example, all XML documents containing ePSA compliant transactions could be converted to a set of CSV files recognized by the Backend System.

Back End Integration

There are four different methods for integrating the Switch into back-end systems:

- Active directories like the Pickup and Out directories
- The Transformer
- The Event Log
- Snap-ins.

Attended Directories

The TAG Transaction Switch™ constantly monitors the contents of an attended directory called the Out Directory. The Switch picks up files as they are added by a backend process, such as the TAG Transformer™. The Switch also deposit received files into another directory called the Pickup directory. Backend systems are expected to monitor the Pickup driectory for incoming files.

The Transformer

The TAG Transformer is the interface of choice when files must first be converted to and from backend systems.

The Event Log

This log contains a record of information useful to backend systems, such as error reports and positive response messages. The event log is part of the Windows operating system and can be accessed through Windows.

Snap-ins

Smap-ins communicate with the TAG Transaction Switch™ through Web Services. Snap-ins require custom programming.

Message Handling

Overview

The TAG Transaction Switch™ follows a subset of the RosettaNet Framework. This framework specifies the packaging, routing, transfer, security , error handling and execution of business messages that implement business transactions called PIP®s (Partner Interface Processes) and TPTs (Trading Partner Transactions). This standard is XML based so all business messages as well as all headers must be in XML before they can be packaged.

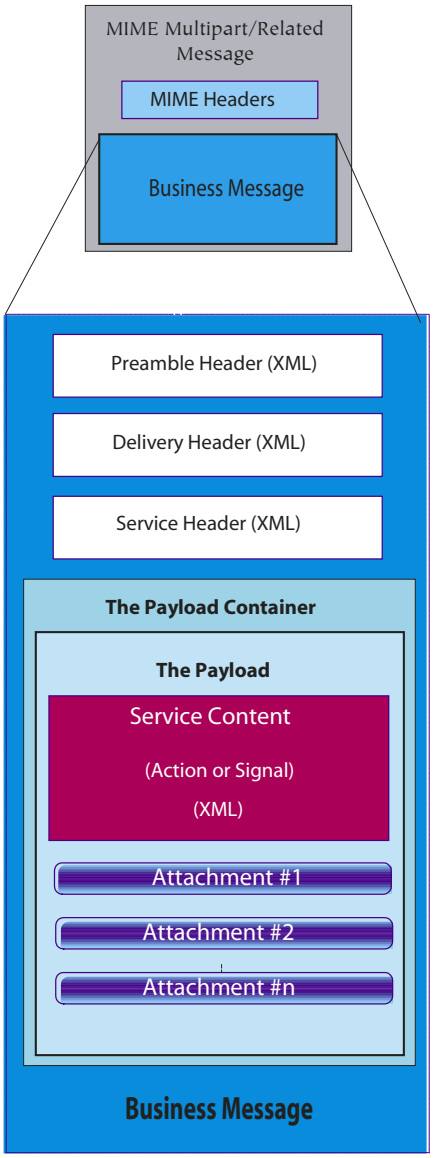

Figure 3 The RosettaNet Business Message

Packaging

Each message is packaged into a "container" that includes a number of Headers and a Payload, illustrated in Figure 1. The headers carry routing, versioning, and numbering information. The payload carries an XML document which can be a business document or a response document containing an acknowledgement or error report. The Headers and the Service Content are packaged together using a Multipurpose Internet Mail Extension (MIME) multipart/related construct. With a Snap-in, the Business Message can optionally be digitally signed or encrypted using the standard Secure/Multipurpose Internet Mail Extension (S/MIME) mechanism for digital signatures and encryption. With the exception of any attachments, all the components of a Business Message are XML documents. Security services are implemented with Snap-ins.

Attachments

Files of any format can be attached to the Business Message through an outbound Snap-in.

Routing

Routing is determined by fields in the XML document which key into a UDDI Business Registry to pick up routing access points.

Transfer

The framework currently recognizes HTTP(S) and SMTP file transport protocols.

Security

Encryption, digital signatures, authentication and non-repudiation can be supported by the Switch through Snap-ins. In addition, a simplified form of encryption can be implemented when the receiving partner is running an HTTPS service

Message Types

There are two types of messages, "Business Action" and "Business Signal". Business Action Messages carry business documents. Business Signal Messages are sent in response to Business Action Messages to carry positive or negative "receipt acknowledgements". Transactions consist of two or more of these messages.

There is one positive and one negative Business Signal Message called Receipt Acknowledgement and Exception respectively. A Receipt Acknowledgment is sent when an action message is received by the trading partner and is found to be structurally and syntactically valid. An Exception is sent when a message is received by the trading partner and is found to be structurally or syntactically invalid.

Handling Failures

Failures can occur at any point in the execution of a transaction. The TAG Switch handles failures in two ways, sending an Exception Message and issuing an E-mail message to the Switch administrator. The Switch knows when your trading partner gets your document when the Switch receives a corresponding Receipt Acknowledgement within a certain amount of time. If it fails to get it, the Switch sends the message again up to three times, (called the Retry Count). When retries are exhausted and no Acknowledgements are received, the Switch issues a Notification of Failure to the destination trading partner.

TAG Transaction Switch™ Specifications

Web Standards

UDDI
Web Services
SOAP
XML

Internet Protocols

SMTP
HTTP(S)

Operating Systems

Windows 2000 Professional
Windows 2000 Server
Windows 2000 Data Center
Windows 2000 Advanced Server
Windows 2003 Standard Edition
Windows 2003 Enterprise Edition
Windows XP Professional

XML Documents

RosettaNet (Asynchronous only)
ePSA
All Others meeting minimum XML requirements

Message Components

Preamble Header
Service Header
Delivery Header
Payload
Attachments

Messages

Business
Signal (positive and negative)

Minimal XML Requirements

- The name of the receiving business with a cor responding entry in a UDDI directory
- The name of the originating business with a corresponding entry in a UDDI directory
- A date/time stamp when the document was created
- A document tracking number

Operating Modes

Windows Application
Windows Service
Multi-Processor

Events Reporting

Events within the Switch are conveyed through the Windows Event Log. The TAG Switch creates its own log on first run. This log also contains a hyperlink to the TAG Message Reporting database that provides more information about errors.

Product Versions

TAG 120D - 120 documents per hour outbound. Transformer not included.
TAG 250DS - 250 documents per hour outbound. Transformer not included.
TAG 500S - 500 documents/hour inbound. Dedicated server only recommended, Transformer included.
TAG 2000S – 2000 documents/hou inbound - Dedicated server only recommended, Transformer included.
TAG MP10KS Multi Processor – 10,000 docs/hr -Licensing for 3 machines, Inbound, Outbound and Transaction Database.
TAG TRX-1 – Integrated transformer that converts files as they move in and out of the TAG Switch. Typically used to convert flat ASCII files to XML, XML to flat ASCII files or XML to XML. Works with all versions of the TAG Transaction Switch.

Note that all versions of the TAG Transaction Switch™ can be installed to run as a Windows service.