

AS4

A NEW TOOL FOR THE B2B TOOLBOX

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Introduction

Over the past decade, the platform for mission-critical business-to-business (B2B) transactions have steadily moved from proprietary networks (VANs) to Internet-based protocols free from the data transfer fees imposed by the VAN operators. This trend has accelerated by lower costs and product ownership, a maturing of technology, internationalization, widespread interoperability, and marketplace momentum. The exchange of EDI business documents over the Internet has substantially increased along with a growing presence of XML and other document types such as binary and text files.

The Internet messaging services standards that have emerged in this decade provide a variety of options for end users to consider when deciding which standard to adopt. These include pre-Internet protocols, the EDIINT series of AS1/AS2/AS3, simple XML over HTTP, government specific frameworks, ebMS 2.0, and Web Services variants. As Internet messaging services standards approach their 10 year anniversary with the experience and maturity the technology has acquired, a new standard called AS4, is emerging that leverages that knowledge for Web Services messaging.

Messaging Services Overview

A messaging service is a software implementation of a B2B standard that securely and reliably packages and routes electronic messages across the Internet. Messaging services are horizontal and are useful for any industry vertical, and their feature sets fill in the quality of service gaps left when moving from proprietary networks to the Internet. If you consider a typical business document exchange, such as the sending of a purchase order from one trading partner to another, there is a whole stack of software services that are required to complete the transmission.

Referring to Figure 1 below, messaging services sits in between the core Internet data transfer protocol (e.g. HTTP, HTTPS, SMTP, FTP, etc) and the business application level software. Typically, the business application understands and processes the message, however there are some messaging services like RosettaNet that understand the business process.

From this same figure it should be noted that messaging services provide a significant number of features necessary for business data interchange, providing the glue between the higher business application layer and the lower data transfer layer.

At the lowest level in the stack, the transfer protocols provide for the exchange of raw data and for defining the gateway endpoints (e.g., URLs) that trading partners use to communicate with one another. At the highest level in the stack, application software provides the logic to orchestrate long-running transactions and to translate received messages into business transactions such as purchase orders, invoices, advanced shipping notices, etc. At the mid-level stack, messaging services provides the infrastructure that physically generates the messages and delivers them in a reliable and secure manner.



Figure 1

The Hype of Web Services

Of the standards that emerged for Internet B2B document exchange, the use of the AS2 messaging standard has enjoyed the largest success, particularly in the retail sector where AS2 saw its first exponential adoption. As a contrast to the success of AS2, this decade has also witnessed the enormous hype and promise of Web Services (WS) and Service Oriented Architectures (SOA) as an emerging technology platform for exposing internal business services and processes to external clients – another type of interface layer glue between the low level raw data transfer protocols and the high level business application layer. However, the widespread adoption of Web Services as a viable B2B messaging service alternative has been slowed by high complexity, interoperability issues, and the challenge of composing many Web Services standards together to comprehensively address the services that the VANs and other Internet messaging services like AS2 so elegantly provide today.

While Web Services have seen increasing adoption as a technology platform for interfacing internal business processes within a single corporate environment, the challenge of connecting inter-business communication using Web Services remains significant and successes are often the result of limited scope and using single vendor customized solutions. The lack of comprehensive interoperability certification testing within the Web Services community remains an obstacle for end users.

Interoperability

Web Services adoption has suffered because the complexities are so large that interoperability testing is difficult at best. Because interoperability is a challenge, how much does installation cost? The related costs for non-interoperable products are significant.

The varied requirements of small, medium and large enterprises in supply chains are generally not met by standardizing on one product or vendor. Interoperability testing is beneficial to end users by providing a selection of interoperable software products that meet different needs for price point and feature sets. There are also other benefits of interoperability certification including driving standards adoption, reassuring the users that the products work, and allowing the vendor a wide group of products to test their products against which saves time and money.

Today, with the growth of B2B messaging products, interoperability certification has become an important service to those software vendors who develop and support these products and users who buy them. Interoperability and B2B Web Services messaging are the next frontier.

AS4: B2B Web Services Messaging

Within the last year or two, the emergence of the ebMS 3.0 specification represents a leap forward in Web Services B2B messaging services by meeting the challenge of composing many Web Services standards into a single comprehensive specification for defining the secure and reliable exchange of documents using Web Services. ebMS 3.0 composes the fundamental Web Services standards like SOAP 1.1/1.2, SOAP with Attachments and MTOM, WS-Security 1.0/1.1, and WS-Reliability 1.1/WS-ReliableMessaging 1.1 together with guidance for the packaging of messages and receipts along with definitions of messaging choreographies for orchestrating document exchanges.

Like AS2, ebMS 3.0 brings together many existing standards that govern the packaging, security, and transport of electronic data under the umbrella of a single specification document. While ebMS 3.0 is a major leap forward in reducing the complexity of Web Services B2B messaging, the specification contains numerous options and comprehensive alternatives for addressing a variety of scenarios for exchanging data over a Web Services platform.

In order to fully take advantage of the AS2 success story, the ebMS 3.0 specification has

recently been profiled. That is, by using ebMS 3.0 as a base, a subset of it has been used and implementation guidelines adopted based on the “just-enough” design principles and AS2 functional requirements to trim down ebMS 3.0 into a much more simplified and AS2-like version.

This profile, which is in public review at OASIS at the time of this writing, is called AS4 after its EDIINT predecessors AS1, AS2, and AS3. Furthermore, since AS4 represents a focused Web Services B2B messaging specification, a comprehensive interoperability certification program can be offered for vendor implementations in order for end user communities to have a set of interoperable turnkey products in the marketplace as solution providers for inter-business communication using their existing Web Services and SOA infrastructures.

THE AS4 PROFILE

As a profile of the ebMS 3.0 specification, AS4 leverages much of messaging services requirements defined in that standard. Message security is governed by the WS-Security specification with support for payload compression. AS4 supports both document push and pull message exchange choreographies, contains an AS2-like business non-repudiation of receipt, and has the support for reception awareness providing just enough reliable messaging without over-specifying the functionality.

1. AS4 Message Packaging

Message packaging in AS4 is governed by ebMS 3.0 support for the SOAP 1.1 and 1.2 standards. XML payloads can be packaged in the SOAP Body or in message attachments governed by the SOAP with Attachments (SwA) standard. Support for non-XML payloads are governed by SwA as well as multiple payloads.

Support for payload compression is provided by AS4 as an add-on feature beyond the ebMS 3.0 domain. There is a history of support for payload compression in both AS2 and the Automotive Industry profiles of the ebMS 2.0 predecessor. AS4 combines the traditional functional support of payload compression in a manner congruent with ebMS 3.0 message packaging norms. Payload compression must be applied in AS4 prior to the application of any message-level security such as digital signing or encryption.

2. AS4 Message Security

Support for message-level security is provided by AS4 via the support for the WS-Security 1.0 and 1.1 standards found in ebMS 3.0. This includes combinations of XML Digital Signatures and XML Encryption. X.509 security tokens for signing and encrypting are supported as the primary means for authenticating messages, ensuring privacy, and guaranteeing tamper-proof transmission of data. Additionally, AS4 supports the use of secondary username/password tokens as access control to message pull channels.

3. AS4 Document Exchange Choreographies

AS4 supports the traditional AS2 messaging exchange patterns for which both trading

partners are Internet addressable. A trading partner endpoint is Internet addressable if that endpoint has a static IP address, a listening web server capable of receiving HTTP connections, and is generally available 24x7 for the purposes of receiving messages and/or receipts.

Figure 2 below details the messaging choreography between two endpoints that are both addressable, and represents the most common AS2 message exchange pattern in which the Initiator makes a connection to the Receiver and pushes a user message containing one or more business payloads to the Receiver. At some future point, the Receiver returns a receipt by connecting to the Initiator and pushing the receipt using a separate and asynchronous HTTP channel.

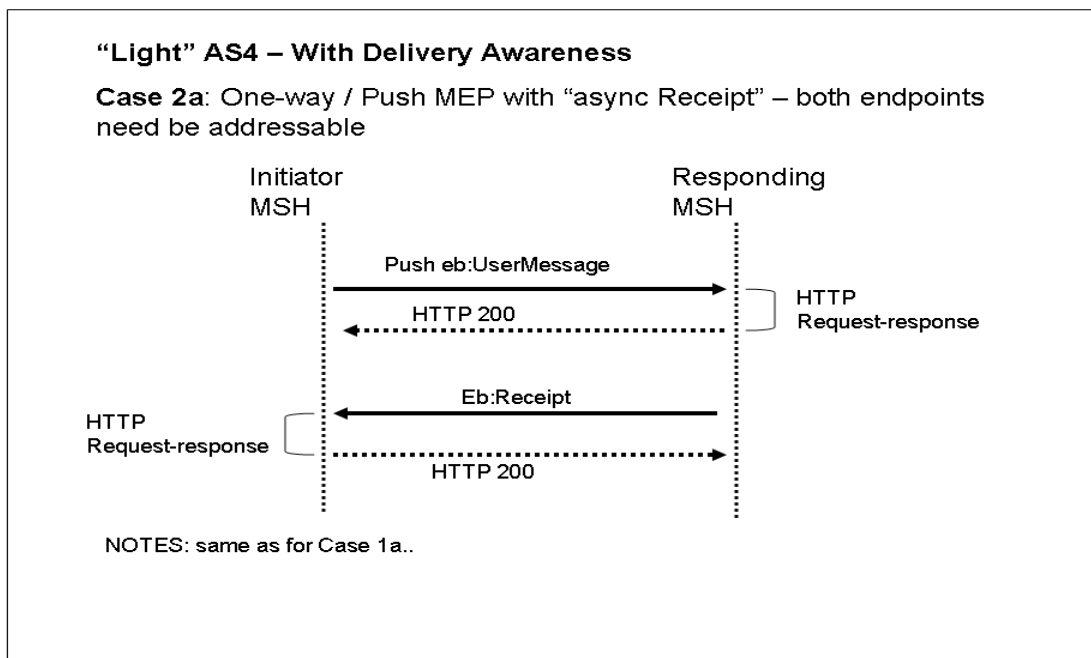


Figure 2

AS4 also supports a message choreography in which one of the endpoints is not Internet addressable. A trading partner endpoint is not addressable when it either lacks a static IP address, has firewall restrictions that prevent external incoming HTTP connections, or is generally only connected to the Internet at sporadic times. This is a common scenario in some of the emerging international markets where suppliers are located in places where the Internet infrastructure is immature or unreliable.

To support message exchange scenarios such as these, ebMS 3.0 supports a document pull choreography in which a non-addressable endpoint connects to the Internet and *pulls* their business documents from one or more message queues hosted by their trading partners. Non-addressable endpoints are also able to *push* their documents to their trading partner by HTTP connection and receive receipts via the back channel of the HTTP

request-response connection.

Figures 3 and 4 below detail the messaging choreography between a non-addressable endpoint and an addressable endpoint for both pushing and pulling to and from the addressable partner's AS4 service handler.

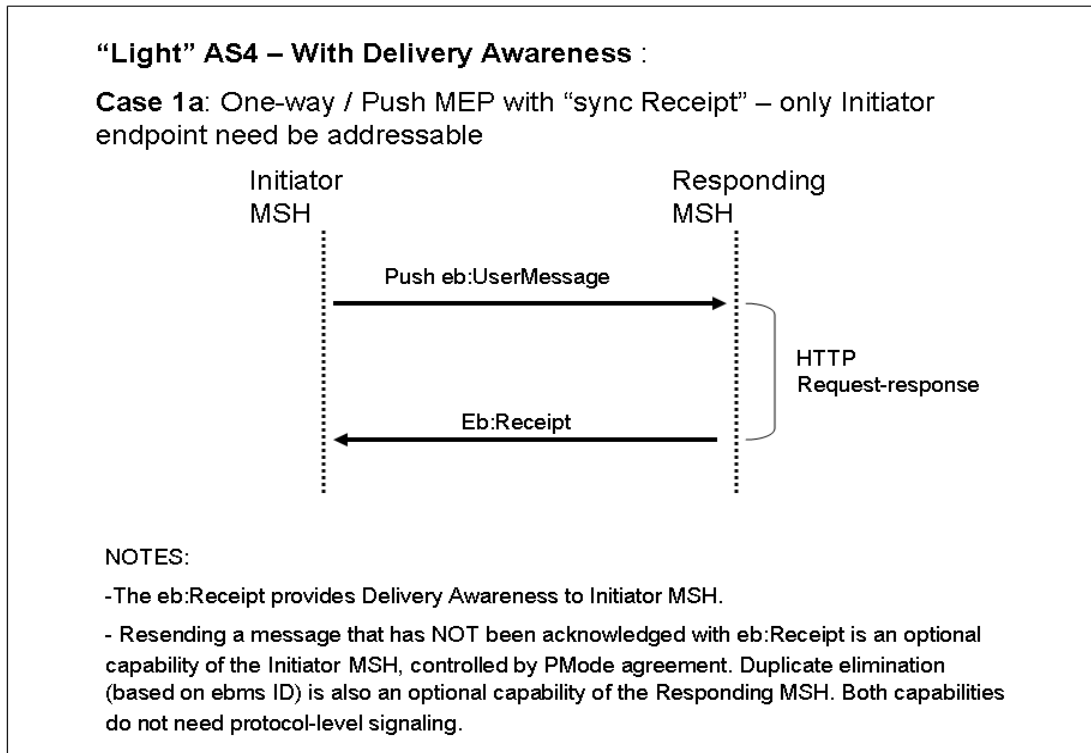


Figure 3

With the document pull choreography, non-addressable clients can access multiple document pull channels as defined by the addressable partner's AS4 service. These channels can be further screened for access control by the additional requirement to provide authorization credentials beyond that required for basic message-level security.

AS4 also defines a profile of itself in the form of a “light client” implementation designed for deployment to IT and cost challenged endpoints.

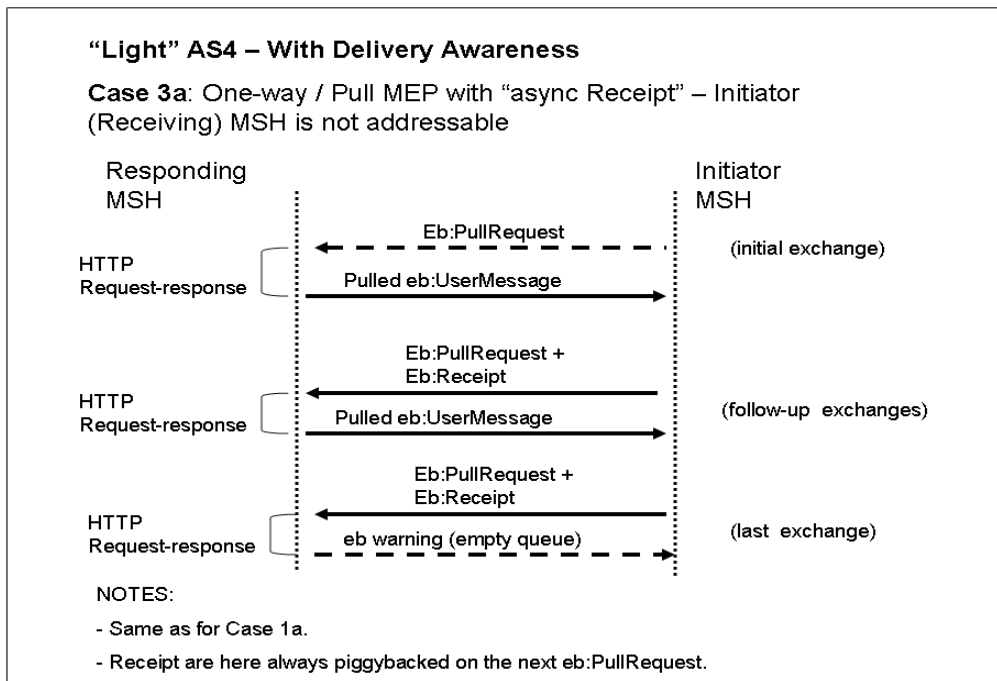


Figure 4

4. AS4 Non-Repudiation of Receipt (NRR)

AS4 provides support for NRR similar to the support for RFC3798 (MDN) found in AS2. The AS4 NRR is specified by ebXML BPSS in the form of an XML schema and contains similar information as the Message Disposition Notification in AS2 contains. This receipt is returned using a special signal message and defaults to requiring message recipients to return a signed receipt containing the digests necessary for NRR. The receipt may also contain error handling information if there was some problem with the document exchange.

5. AS4 Reception Awareness

AS4 makes use of the message receipt as a signal to the original message sender that the recipient of the message has received the business payload. This is similar to the reliable messaging guidance defined by the AS2 optional profile for AS2 Reliability. AS4 supports duplicate message detection and message retry/resending scenarios for when receipts for messages are not received by the sender.

CONCLUSION

The emergence of the ebMS 3.0 specification composing and simplifying the Web Services landscape for messaging services represents a critical leap forward in the convergence of not only Web services specifications, but of Internet-based messaging services in general.

The path to widespread adoption of Web Service B2B messaging services requires more work. AS4 provides a variety of benefits by merging the lessons learned and success story from AS2 in a simplified and value-added profile of ebMS 3.0. Some highlights include:

- Reduces Web Services complexity by providing an on-ramp for end user communities to use Web Services based inter-business communication,
- Supports a document pull choreography which enables emerging markets with unreliable Internet connections to gain access to documents,
- Supports message level security with XML Digital Signatures and XML Encryption along with a secondary username/password authentication for the pull choreography, and
- Defines a profile of itself in the form of a “light client” implementation designed for deployment to IT and cost challenged endpoints

Although there have been many accomplishments, the path to widespread adoption of Web Service B2B messaging services requires more work. A critical step is setting up an environment whereby comprehensive interoperability certification of vendor implementations can feed the marketplace with turnkey plug-and-play solutions for messaging services. As this work is accomplished, AS4 will emerge as a viable standard for secure B2B document exchange using Web Services, adding a new tool to the B2B messaging toolbox.

Background

Drummond Group (DGI) is the trusted interoperability test lab offering global testing services through the product life cycle. Auditing, QA, conformance testing, custom software test lab services, and consulting are offered in addition to interoperability testing. Founded in 1999, DGI has tested over a thousand international software products used in vertical industries such as automotive, consumer product goods, healthcare, energy, financial services, government, petroleum, pharmaceutical and retail.

In the spring of 2007, Drummond Group invited a large group of B2B software vendors to come together for a series of technical discussions to explore what Web services B2B might look like. Those series of technical discussions produced a high level list of business functionality. A general broad brush consensus on some Web services functionality around packaging, security, non-repudiation, error handling, etc was agreed upon.

In reviewing these requirements after consensus, the interested parties realized that there was ample common ground with the AS2 functional requirements as well as common ground with the ebMS 3.0 specification development that was ongoing. Eventually, agreement was reached that the best plan was to profile the ebMS 3.0 specification at OASIS as an "entry-level on-ramp" to Web services B2B. This is when the work on the standard of AS4 really began.

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Drummond Group's AS4 Interoperability Certification starts September 7, 2009.

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