

# Interoperability Frameworks for Business-to-Business E-Commerce

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## I. Introduction

Business-to-business (B2B) e-commerce is booming thanks to the ubiquity of the Internet, which dwarfs the coverage of EDI VANs. International Data Corp. (IDC) forecasts worldwide B2B e-commerce revenues to be of USD 2.2 trillion by 2004 (<http://www.idc.com/eBusiness/press/EBIZ082200pr.stm>). The Gartner Group predicts that e-marketplaces will handle 2.71 trillion Dollars by 2004 and that this will account for 37% of all B2B e-commerce (<http://www.gartner.com/public/static/aboutgg/pressrel/pr20001004b.html>).

B2B e-commerce needs to seamlessly and dynamically handle the interactions among a vast variety of organizations without ad hoc and proprietary integrations. That is, the interoperability has become the key issue where operations across business boundaries necessitate industry-wide agreements on common ontology, formats, processes, content, and system interfaces. These needs are being addressed by International consortiums and a number of B2B interoperability frameworks have emerged, most important of which are eCo framework (<http://eco.commerce.net>), RosettaNet (<http://www.rosettanet.org>), and BizTalk (<http://www.microsoft.com/Biztalk>). All of these frameworks are message oriented and based on XML. These systems with open, extensible formats capture the essentials of business processes in dynamic virtual organizations while allowing flexible internal implementations.

In the following these architectures are briefly discussed.

## II. eCo Framework

CommerceNet's eCo framework (<http://eco.commerce.net>) provides an interoperability framework. In the eCo framework, businesses agree on a common method of **describing** what they do rather than agreeing on standards of what they do and how they do it.

The eCo Framework consists of an architectural specification and a semantic specification. The Architectural Specification presents information about an e-commerce system in seven different categories (layers) as shown in Figure 1 where "networks" (layer 1) contain "markets" (layer 2) where "businesses" (layer 3) provide and use "services" (layer 4) which conduct "interactions" (layer 5) that exchange "documents" (layer 6) containing "information items" (layer 7). The eCo Semantic Specification, on the other hand, provides a sample set of business documents that can be used inside the eCo framework. These can be used as is, or extended and modified to meet specific needs. The network layer contains various eCo compliant markets for providing or obtaining specific goods and services like computers, phones, or books. In the market layer, for a specific market like computers, their participating businesses are listed like Dell, or IBM. In the business layer, the services provided by a business are listed, for example catalog browsing, ordering products, making payment, or checking order status. At the service layer, the possible interactions are listed in terms of input and output documents and an optional execution URI. For example, the interaction for purchasing a computer can take an order document as input, and produce an invoice as output defined in XML using the corresponding Common Business Library (CBL) DTDs (<http://www.commerceone.com/xml/cbl/index.html>).

A service may invoke other services in order to complete that service. These relationships among services are described in the interactions layer. In other words, this layer describes a “choreography” of interactions that may take place when a service is invoked and the types of messages which are exchanged during each interaction. The document types exchanged in an interaction are described by the document layer which lists its data elements, if any. At the data element layer, details of data elements are presented.

Each layer of an eCo-compliant e-commerce system presents information about itself. By examining this information, the users can:

- locate the system
- understand what it is for
- recognize what market(s) it participates in
- identify protocols the system uses to communicate
- discover what documents the system uses to conduct business
- learn how to interoperate with the system

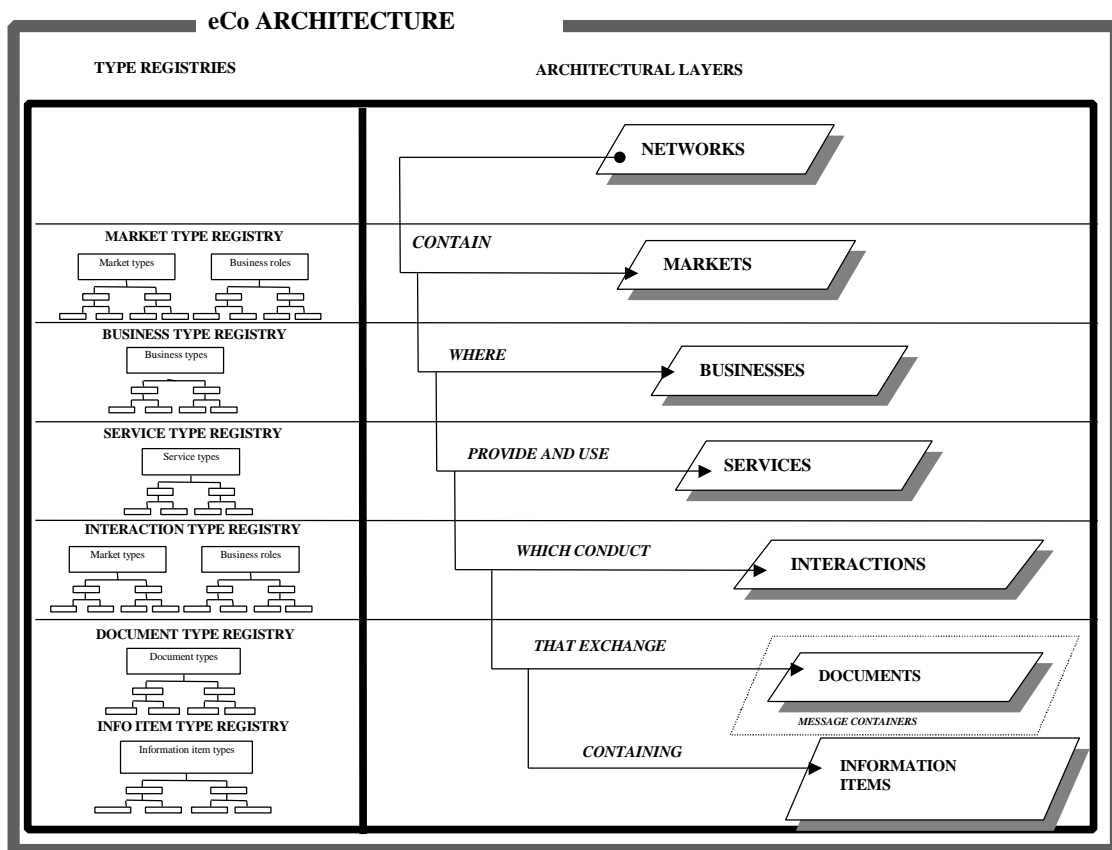


Figure 1 – eCo architecture

This information is provided through published interfaces specific to each layer which involves specific sets of queries that needs to be implemented for a system to be eCo compliant. These queries return documents (e.g. property sheets) describing each layer.

### III. RosettaNet Framework

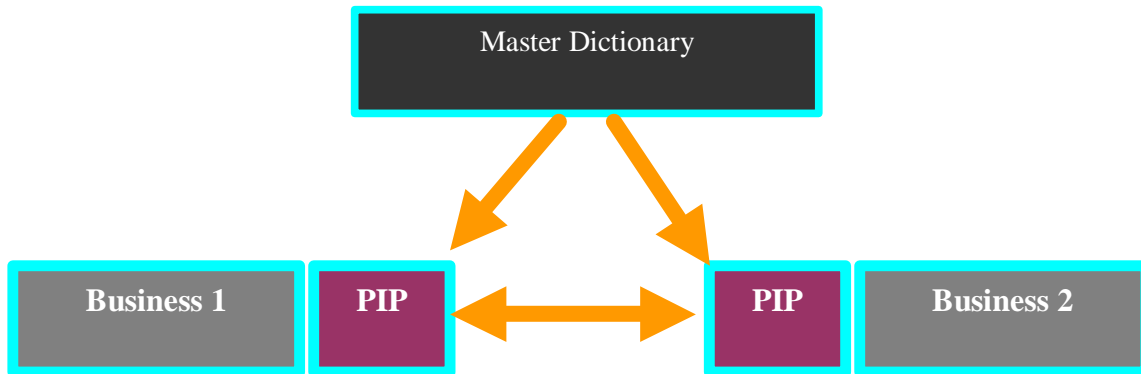


Figure 2. RosettaNet Framework

The RosettaNet consortium develops XML based e-commerce standards for supply chain management in the information technology and electronic component industries. The RosettaNet model enables supply chain business partners to execute interoperable e-business processes by developing, maintaining and distributing partner interface process implementation guidelines.

The fundamental system of exchanging sounds in a *human-to-human* business exchange is similar to the one in Internet, which enables two servers to exchange information during a *server-to-server* electronic business exchange. HTML/XML function as the alphabet, and electronic commerce applications serve as the instrument by which e-business processes are transmitted. The lack of agreement on the words, grammar and dialog that constitute e-business processes illustrates the need for standards. RosettaNet adopts existing e-business standards, guidelines, or specifications wherever possible and creates new e-business framework specifications where necessary. These frameworks are generic so that they can be used for all types of e-business applications.

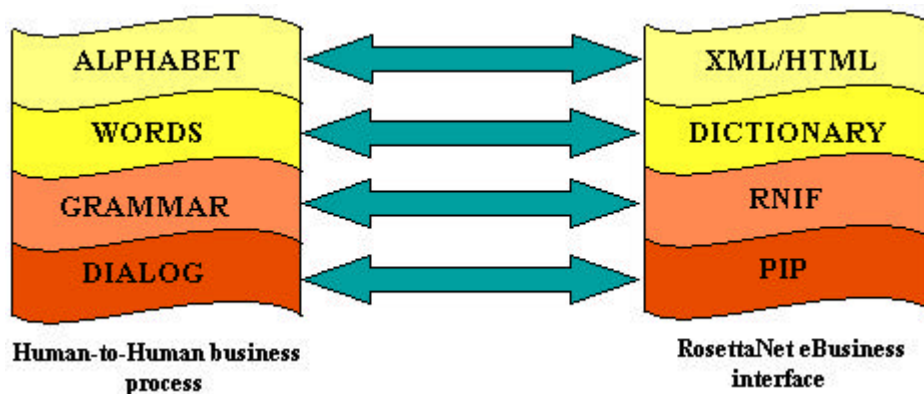


Figure 3. RosettaNet eBusiness Interface

RosettaNet Framework (<http://www.rosettanet.org>) consists of Partner Interface Processes (PIPs), a master dictionary and an implementation framework, the relationship among which are as follows: RosettaNet dictionaries provide the words, the RosettaNet Implementation Framework (RNIF) acts as the grammar and RosettaNet Partner Interface Processes (PIP) form the dialog (Figure 3). This master dictionary, coupled with an established implementation framework (exchange protocols), is used to support the eBusiness dialog known as the PIP as shown in Figure 2.

RosettaNet dictionaries provide a common platform for conducting business within the trading network. The RosettaNet Business Dictionary designates the properties for defining business transactions between trading partners, and the RosettaNet Technical Dictionaries provide properties for defining products and services.

The RNIF is an open, common networked-application which defines the protocols for exchanging messages for quick and efficient implementation of RosettaNet standards so that RosettaNet Supply Chain and Solution Partners can collaboratively execute RosettaNet PIPs. It specifies message format, message content, network architecture and security mechanism. The RNIF specifies information exchange between trading-partner servers using HTML/XML. The PIP specification model enables RosettaNet to specify partner-to-partner electronic business processes in terms of "actions," "transactions" and "execution processes". The implementation framework specification enables RosettaNet partners and solution providers to create networked applications that can execute these electronic business processes by communicating according to strictly defined protocols. These protocols specify application message formats and message exchange sequences. Also, this specification includes authentication, authorization, encryption and non-repudiation implementation aspects that are necessary for conducting secure electronic business over the Internet.

RosettaNet PIPs are specialized system-to-system XML-based dialogs that define business processes between trading partners. Each PIP includes a technical specification based on the RNIF, a Message Guideline document with a PIP-specific version of the RosettaNet Business Dictionary and an XML Message Guideline document, providing the models and documents necessary for implementation.

RosettaNet distributes PIPs in machine readable format to the trading partners who use these guidelines as a road map to develop their software applications.

#### **IV. BizTalk**

BizTalk provides an XML based application integration framework. Application integration is achieved through a message passing mechanism. For applications that do not have native XML support, BizTalk framework provides facilities that transform native data types to XML and then performs the XML document routing.

The BizTalk framework contains a technical specification, a set of XML documents, the <http://www.biztalk.org/BizTalk/default.asp> Web portal and BizTalk 2000 Server.

The biztalk.org Web portal contain the XML schemas suggested by the businesses. These schemas are validated, versioned, registered and stored in a repository at the Web portal Web site. BizTalk 2000 Server has two services: Orchestration service and Messaging service. BizTalk 2000 Server Orchestration service provides a GUI called Visio, to graphically build business processes as shown in the Figure 4. It is possible to integrate previously defined heterogeneous applications to the process. From the visual description of the process, a process definition is generated in XLANG which is a textual process definition language in XML. XLANG provides the classical workflow definition features like sequencing, branching, parallel execution as well as transactional support, persistence and monitoring. XLANG is a message based system, that is, the activity invocation is through passing messages. The message reliability is provided by the message queue product of Microsoft, MSMQ. BizTalk 2000 Server Messaging service support XML, X12, EDIFACT formats. BizTalk mapper helps to map one document format to the other and can apply transformations to data. BizTalk Management Desk administers agreements between trading partners and applications. Content based routing of the documents is also possible.

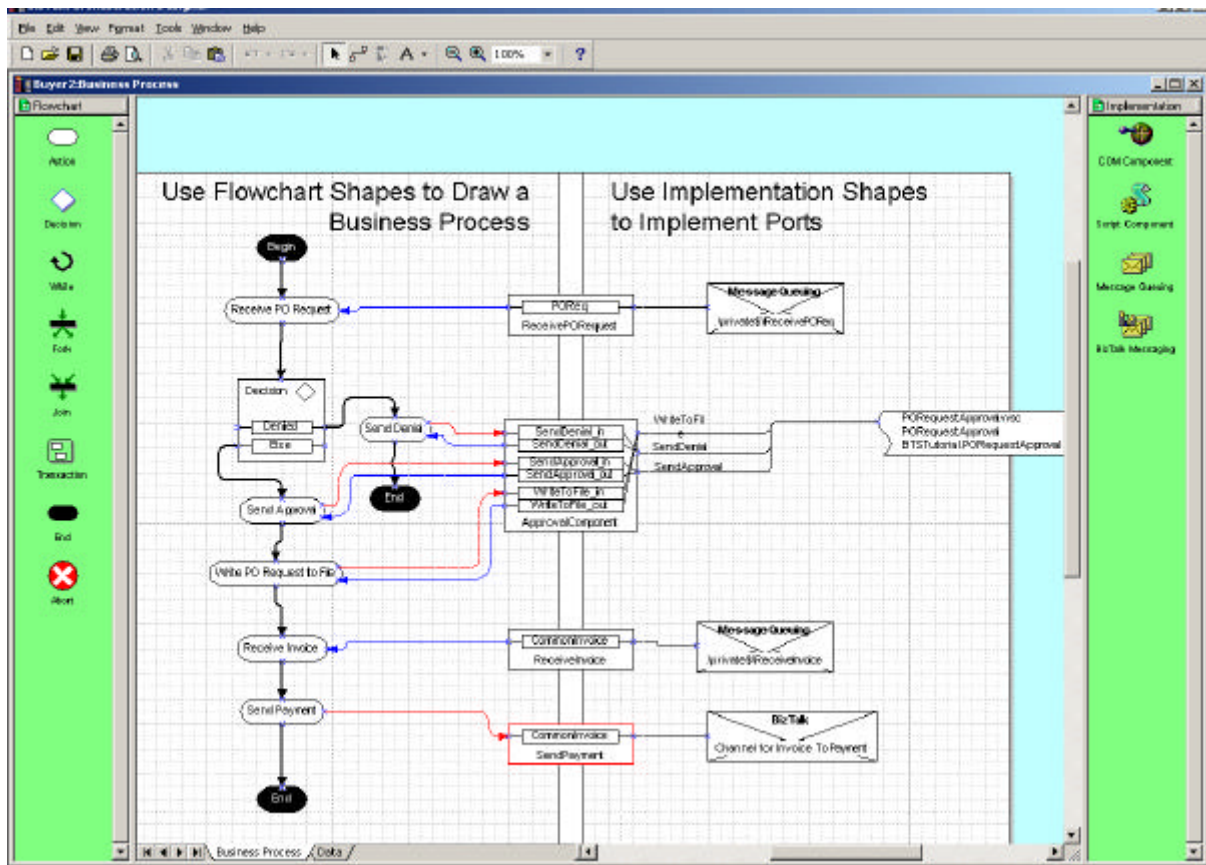


Figure 4. Visio: BizTalk 2000 Server Orchestration service's GUI

## V. A Comparison of the Frameworks

Among the frameworks described eCo is unique to provide querying interfaces to the documents in the market place which makes it possible to conduct business dynamically on the Web.

BizTalk, on the other hand, is unique to provide an implementation supporting the functionality of the framework. For example, it is possible to define and execute an inter enterprise business process by first constructing it visually through Visio which is converted to XLANG and executed. Needless to say, the components and applications to be invoked need to be defined a priori. On the other hand both eCo and RosettaNet frameworks provide the specifications; the implementation is left to the participants.