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B2B Integration Using SAP NetWeaver® PI

- Master the implementation, development, and configuration of end-to-end process integration in B2B scenarios
- Explore the adapter framework, industry-standard support, BPM capabilities, and more
- Learn from comprehensive best practices and real-life test scenarios with SAP NetWeaver PI PI

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This chapter gives you an overview of the industry standards supported by SAP NetWeaver PI and discusses the predefined content provided by SAP and third-party vendors. It also gives you a detailed overview and key features of the industry standard adapters provided by SAP NetWeaver PI.

4 B2B and Industry Standard Support

Today’s business and economic environment presents organizations with a wide range of challenges such as globalization, extreme competition, and distributed supply chain networks. Organizations are under enormous pressure to keep costs down and productivity up. The key to achieving this is to replace redundant manual processes with repeatable, automated technologies.

In an attempt to communicate effectively and more efficiently with business partners, enterprises are driving the adoption of e-business initiatives for both internal and external integration. Because many of these business transactions with trading partners involve the transfer of legally binding documents representing a high monetary value, organizations are forced to address more stringent requirements for partner communication processes such as data and process validity, reliability, and security.

To address this in a unified approach, companies need to have support for industry standards to electronically communicate with their trading partners. These industry standards are the foundation for business process interoperability between SAP and non-SAP applications and platforms.

4.1 Overview

Standards define a common business language, which is a requirement to cost-effectively enable business process integration between systems, both inside an organization and across the value chain. Industry standards enable business process flexibility by providing concrete rules for integration that have been devel-
oped by representatives of the respective industries. These industry standards for automating business processes and for true system-to-system communication have become a critical requirement for many organizations. They are quickly moving from nice to have to being mandatory requirements for business-to-business integration. This is also because the vertical industry market is growing at such a high rate and the drive to adopt standard processes has become a prerequisite for effective collaboration.

As described in Section 2.1 Overview, SAP NetWeaver provides one platform to centrally manage the design, configuration, and execution of business processes running within and beyond the company’s boundaries. The functionality provided in SAP NetWeaver PI for business-to-business integration includes the means to maintain and manage the collaboration profiles and collaboration agreements between business partners: a Partner Connectivity Kit to enable XML document exchange between a smaller business partner and a bigger partner. It provides support for technical and business standards for various industries through preconfigured, industry-specific business content and out-of-the-box support for XML-based data exchange standards. This includes offerings for the high-tech and chemicals industries, providing native support for RosettaNet and CIDX, and preconfigured mappings for the most common EDI standards. With the support of business process management, SAP NetWeaver PI enables model-driven process flexibility and automation within and across systems.

The key capabilities that can be used for B2B integration with SAP NetWeaver PI include the following:

- **Industry standards support**
  SAP NetWeaver PI supports various industry data exchange standards such as RosettaNet for high tech, Chemical Industry Data Exchange (CIDX) for the chemical industry, Petroleum Industry Data Exchange (PIDX) for the oil and gas industry, 1Sync for retail and consumer products, Health Layer 7 (HL7) for healthcare, SPEC 2000 for aerospace and defense, SWIFT for financials, AIAG, Odette for automotive, PapiNet for mill products, ACORD for insurance, HR-XML for human resources, RAPID for agriculture, STAR for automotive, ANSI ASC X12, and so on.
SAP is also a major contributor to ebXML Core Components and believes that broad adoption of these specifications will help increase interoperability of IT systems and applications across industries. The adoption of these specifications by the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) paves the road for next-generation XML-based e-business standards.

- **Predefined integration content**
  SAP NetWeaver PI provides an open business process integration technology platform that supports process-centric collaboration between SAP and non-SAP systems and applications, both within and beyond the enterprise. It defines the interfaces and XML mappings required for specific business scenarios to manage message exchange and transform message contents between sender and receiver systems for efficient cross-system collaborative processes. It also offers the ability to deliver industry standard-compliant business scenarios as well as the ability to orchestrate industry standard-adherent business processes.

  SAP NetWeaver PI delivers predefined integration content for B2B solutions to facilitate the implementation process and thus reduce the total cost of ownership for the customers. It provides predefined integration content for SAP applications such as Supplier Relationship Management (SRM), Supply Chain Management (SCM), radio frequency identification devices (RFID), Master Data Management (MDM), Event Management (SAP EM), and so on.

  In addition, it provides predefined integration content in the form of business packages for different industry standard verticals such as the RosettaNet business package for the high-tech industry and the CIDX business package for the chemical industry. These business packages contain the collaboration knowledge as defined by the industry standards. The content includes data structures, interfaces, mapping programs, integration scenarios, integration processes, and communication channel templates and is synchronized with the related business applications and versions.

- **Central interface repository**
  As discussed in Section 2.3 Overview of Enterprise Services Repository, SAP NetWeaver PI provides the Enterprise Services Repository as the central inter-

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1 ebXML is an XML-based standard sponsored by OASIS and UN/CEFACT, and its Core Components Technical Specification provides a way to identify, capture, and maximize the reuse of business information to support and enhance information interoperability across multiple business situations.
face repository for B2B integration. This repository acts as the central storage for all data structures, interfaces, mapping programs, integration scenarios, and integration processes that are necessary for B2B integration.

- **Trading partner collaboration**
  SAP NetWeaver PI provides functions to enable you to create and manage collaboration profiles and agreements centrally between business partners for B2B integration. The collaboration profile contains all the technical options that are available to communication parties for exchanging messages. A collaboration agreement specifies the technical details for message exchange that have been agreed for a particular sender-receiver pair.

- **Adapter partner ecosystem**
  SAP NetWeaver provides out-of-the-box technical B2B adapters for high tech, chemical, and oil and gas. These adapters are based on the RosettaNet Implementation Framework (RNIF) and include the RNIF 2.0 adapter for RosettaNet and the PIDX standard, and the CIDX adapter for CIDX standard message exchange. These adapters are used to do the actual routing, transport, and packaging of the industry standard messages and business signals based on the information retrieved at runtime from the Enterprise Services Repository and Integration Directory.

  In addition to providing these industry standard adapters, SAP also relies on an ecosystem of partners to provide adapters for third-party applications and certain industry standards. These partner adapters from iWay, SEEBURGER, Informatica, and others are sold and delivered through SAP. These partner adapters provide support for other application vendors such as Oracle, PeopleSoft, Baan, Siebel, Broadvision, and so on. In addition, these adapters also provide support for industry standards such as EDI, EDIINT (AS2), SWIFT, UCCnet, and so on.

- **Secure messaging and routing**
  SAP NetWeaver PI leverages the security capabilities of SAP NetWeaver to provide secure message exchange for B2B scenarios. These features include data stream encryption via Secure Sockets Layer (HTTPS), security based on the Web service standard (WS-Security), digital signatures to authenticate sending partners and to ensure data integrity of the business document carried by a message, S/MIME support for RosettaNet scenarios, and message-level encryption for keeping the message content confidential not only on the communication lines but also in the intermediate message stores.
4.2 Industry-Specific Standard Support

SAP NetWeaver PI supports business semantic standards that provide the common understanding necessary to execute a business process, such as order-to-cash. These standards can be cross-industry or industry-specific. Cross-industry semantic standards are used to define business semantics for business messages and business objects that can be used across multiple industries, whereas industry-specific standards are defined and used by those in the specific industries. Table 4.1 lists some of the key industry-specific business semantic standards supported by SAP NetWeaver PI in the area of B2B integration either by SAP directly or via certified partner solutions. All of these standards are explained in more detail in the following section.

<table>
<thead>
<tr>
<th>Standard/Data Pool</th>
<th>Available Content</th>
<th>Available Adapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>RosettaNet</td>
<td>Support of selected processes</td>
<td>RNIF 1.1, RNIF 2.0</td>
</tr>
<tr>
<td>CIDX</td>
<td>Support of selected processes</td>
<td>CIDX adapter</td>
</tr>
<tr>
<td>PIDX</td>
<td>Support of selected processes</td>
<td>RNIF 2.0</td>
</tr>
<tr>
<td>1SYNC</td>
<td>Support via industry-specific solutions</td>
<td>AS2</td>
</tr>
<tr>
<td>ACORD</td>
<td>Support via industry-specific solutions</td>
<td>ACORD-compliant adapter</td>
</tr>
<tr>
<td>STAR</td>
<td>Support of selected processes</td>
<td>ebXML, AS2, and others</td>
</tr>
<tr>
<td>HL7</td>
<td>Support of selected processes</td>
<td>HL7-compliant adapter</td>
</tr>
<tr>
<td>SWIFT</td>
<td>Support via financial solutions</td>
<td>SWIFT-compliant adapter</td>
</tr>
<tr>
<td>SPEC 2000</td>
<td>Support of selected processes</td>
<td>EDI- and XML-based adapters</td>
</tr>
</tbody>
</table>

Table 4.1 Examples of Industry-Specific Standards Supported by SAP

4.2.1 RosettaNet (High Tech)

RosettaNet is a subsidiary of GS1 US\(^2\) and is a nonprofit standards organization aimed at establishing standard processes for sharing of business information. It

\(^2\) GS1 is a leading global organization dedicated to the design and implementation of global standards and solutions to improve efficiency and visibility in supply and demand chains globally and across multiple sectors. GS1 US, formerly the Uniform Code Council, Inc., is the GS1 member organization in the United States.
has over 500 members from a wide range of industries such as semiconductor manufacturing, telecommunications, information technology, electronic components, and logistics. RosettaNet standards form a common e-business language, aligning processes between supply chains on a global basis. These standards offer a robust nonproprietary solution, covering Partner Interface Processes, the RosettaNet Implementation Framework, and business and technical dictionaries for e-business standardization.

**RosettaNet PIPs**

The *Partner Interface Processes* (PIPs) are specialized system-to-system XML-based dialogs that define business processes between trading partners. PIPs apply to the core processes such as order management, inventory management, marketing information management, service and support, manufacturing, product information, and so on. RosettaNet divides the entire e-business supply chain domain for which PIPs are specified into *clusters*. Each cluster is further subdivided into two or more *segments*.

Each segment is composed of several PIPs. Each PIP contains several *activities*, and each activity contains one or more actions. For example, the Manage Purchase Order PIP is part of cluster 3 (Order Management), and that there it is fourth in sequence in the Quote and Order Entry (segment A). Hence, the Manage Purchase Order PIP is identified by the name PIP3A4. Figure 4.1 shows the layout of the RosettaNet PIP message.

![Figure 4.1 Layout of the RosettaNet PIP Message](image-url)
Each PIP specification is composed of three major parts:

- **Business Operational View (BOV)**
  The BOV specifies the semantics of business entities and the flow of business information between roles involved in the exchange as they perform business activities.

- **Functional Service View (FSV)**
  The FSV is derived from the BOV and specifies the network component design and the interactions between the network components during execution of the PIP.

- **Implementation Framework View (IFV)**
  The IFV specifies the action message formats and communication requirements required to run the PIP. The communication requirements include specifications on the requirement for secure transport protocols such as SSL and digital signatures.

The messages involved in a PIP business document exchange are classified as follows:

- **Business action messages**
  Business action messages are messages with contents that are of a business nature such as a purchase order or an invoice. They can further be classified into the following activities:

  - A *single-action activity* that involves the initiator sending a request action to the responder and the latter returning a business signal.
  - A *two-action activity* that involves the initiator sending a request action to the responder and the responder returning a receipt acknowledgement to the initiator. This is followed by the responder returning a response action to the initiator and the initiator returning a receipt acknowledgement to the responder.

  Single-action and two-action activities can also use either one or both of the synchronous and asynchronous modes of interaction, as prescribed by their corresponding PIP specifications.

- **Business signal messages**
  Business signals are positive and negative acknowledgement messages that are sent in response to business actions for the purpose of aligning PIP states between the partners.
**RosettaNet Implementation Framework (RNIF)**

The RosettaNet Implementation Framework defines how to transport the PIP messages. Its core specification includes the packaging, routing, transport, and security standard of RosettaNet PIP messages and business signals. The RNIF standard is based on the XML, MIME, and HTTP standards. There are two versions of RNIF, namely, RNIF 1.1 and RNIF 2.0. Both RNIF 1.1 and RNIF 2.0 rely on HTTP, SSL, and HTTPS for message transport. Business content could also be transferred over SMTP, using an S/MIME envelope for confidentiality. It uses the S/MIME construct for packaging. The RNIF core specification for security includes the authentication, authorization, encryption, and nonrepudiation requirements essential for conducting secure electronic business over the Internet.

A RosettaNet Business Message always contains a preamble header, a delivery header, a service header, and service content. Service content is composed of an action message or a signal message. If service content is an action message, one or more attachments may be included. The headers, service content, and attachments are packaged together using a MIME multipart/related construct. A RosettaNet Business Message can optionally be signed digitally, in which case the S/MIME multipart/signed construct is used to attach the signature.

### 4.2.2 CIDX (Chemical)

The *Chem eStandards* were established by the trade association and standards body *Chemical Industry Data Exchange* (CIDX) to accelerate collaborative processes in areas such as logistics, order management, and invoicing. These standards align business processes between trading partners in a supply chain and are developed specifically for the buying, selling, and delivery of chemical products. Their business transactions include specification of partner business roles such as buyer, seller, and so on; activities conducted between the roles and type; content; and sequence of documents exchanged by the roles while performing these activities.

The Chem eStandards adopted the RosettaNet Implementation Framework (RNIF) at the messaging layer and are based on the RNIF 1.1 specifications. Thus, the messages themselves are enveloped as RNIF action and signal messages as specified in the RNIF 1.1 specification. The CIDX standard leverages the transport, routing, packaging, and security aspects of RNIF. CIDX messages use the message structure as specified by the RNIF 1.1 specification and contains a preamble header, a service header, and the service content stored as a multipart
MIME document as well as length fields and optional digital signature information. CIDX messages can be categorized as follows:

- An action message contains the business content such as Order Create.
- A signal message is a positive or negative message sent in response to an action message.

Each transaction in the CIDX is assigned an alphanumeric code. Table 4.2 illustrates some of the CIDX transaction codes corresponding to the CIDX requesting message. This alphanumeric transaction code indicates the Global Process Indicator code of Chem eStandard transactions.

<table>
<thead>
<tr>
<th>Requesting Message</th>
<th>Transaction Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>OrderCreate</td>
<td>E41</td>
</tr>
<tr>
<td>OrderChange</td>
<td>E45</td>
</tr>
<tr>
<td>OrderResponse</td>
<td>E42</td>
</tr>
<tr>
<td>ShipNotice</td>
<td>E72</td>
</tr>
<tr>
<td>Invoice</td>
<td>E81</td>
</tr>
</tbody>
</table>

Table 4.2 Example of CIDX Messages

### 4.2.3 PIDX (Oil and Gas)

The Petroleum Industry Data Exchange (PIDX) standard was developed by the American Petroleum Institute (API) committee on electronic business standards and processes. The core mission of PIDX is to improve business efficiency within the oil and gas industry by promoting interoperability between information systems. The PIDX Complex Products and Services Task Group (Com.Pro.Serv) has developed a set of XML schema files that enable automation of various aspects of oil and gas supply chains.

The components of a basic PIDX business message are encased in a multipart/related envelope containing headers and the business process payload. It contains a preamble header, a delivery header, a service header, and service content as specified by the RNIF 2.0 standard. RNIF 2.0 supports attachment handling by allowing attachments to be encoded as separate MIME parts in the MIME multipart/related entity. Similar to RosettaNet and CIDX messages, PIDX messages can be classified into the following:
An action message contains the business data such as purchase order data.

A signal message is a positive or negative acknowledgement in response to a PIDX action message. Signal messages can be positive receipt-acknowledgement messages or negative general exception messages.

Each transaction implemented by PIDX is assigned an alphanumeric PIP code. Table 4.3 illustrates the PIP number corresponding to the PIDX XML Schema. This alphanumeric is the PIP identifier and indicates the Global Process Indicator code in the PIDX transactions.

<table>
<thead>
<tr>
<th>PIDX XML Schema</th>
<th>PIDX PIP Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FieldTicket</td>
<td>P11</td>
</tr>
<tr>
<td>FieldTicketResponse</td>
<td>P12</td>
</tr>
<tr>
<td>Invoice</td>
<td>P21</td>
</tr>
<tr>
<td>InvoiceResponse</td>
<td>P22</td>
</tr>
<tr>
<td>OrderCreate</td>
<td>P31</td>
</tr>
<tr>
<td>OrderChange</td>
<td>P32</td>
</tr>
<tr>
<td>OrderResponse</td>
<td>P33</td>
</tr>
<tr>
<td>QuoteRequest</td>
<td>P41</td>
</tr>
<tr>
<td>Quote</td>
<td>P42</td>
</tr>
<tr>
<td>QuoteNotification</td>
<td>P43</td>
</tr>
<tr>
<td>RequestRequisitionReturn</td>
<td>P51</td>
</tr>
</tbody>
</table>

Table 4.3 Examples of PIDX Messages

PIDX schemas are originally based on the RosettaNet naming standards followed by the CIDX standard. XML schemas use the PIDX namespace for all the PIDX element names. They use the PIDX namespace prefix `pidx:` to indicate that they belong to the PIDX namespace with the following attribute assignment for the schema element: `xmlns:pidx="http://www.api.org/pidXML/v1.2"`.

PIDX XML Transport, Routing, and Packaging (TRP) requirements are based on the RNIF 2.0 specifications and are used to securely and reliably transport PIDX messages to the trading partners involved in the message exchange. These
requirements include authentication, authorization, confidentiality, data integrity, nonrepudiation, reliability, and so on.

### 4.2.4 1SYNC (Retail and Consumer Products)

The Global Data Synchronization Network (GDSN) is the process by which trading partners exchange product and service information on an ongoing basis. It is a network of certified data pools and GS1 Global Registry for communicating standardized product information between trading partners in a secure environment conforming to global standards. The Global Registry acts as a central global data repository allowing suppliers and retailers to publish and subscribe to product information.

1SYNC, a subsidiary of GS1 US, is a GDSN-certified data pool that interacts with the GS1 Global Registry and other data pools to exchange and synchronize product data information with other trading partners. It offers a data synchronization solution to aid companies in the elimination of costly data errors and increase supply chain efficiencies. It was formed in 2005 as a data synchronization organization for both retailers and manufacturers, combining the UCCnet and Transora technology platforms.

The product information that is exchanged through GDSN contains a 14-digit Global Trade Item Number (GTIN), a 13-digit unique location identifier Global Location Number (GLN), and the core attributes that define the characteristics of a trade item or product such as description, effective date, net weight, and so on. To exchange this information, suppliers first need to assemble all product information in a GDSN format and publish the information to 1SYNC or other data pools. 1SYNC then uploads this information about each item to the Global Registry on behalf of the supplier. Customers search the Global Registry through the data pool of their choice and subscribe to the information they need. The trading partners can then engage in a pub/sub process, and the information is synchronized through their respective data pools.

The 1SYNC (UCCnet) Data Synchronization Suite uses XML schemas for standard messaging, which complies with the GDSN standards. GDSN governs the communication and data synchronization between the global registry and individual company catalogs. This establishes common electronic communication architecture for companies around the world to do business with each other more efficiently and effectively. The confidential product and service attribute information
is transmitted between the trading partners using secure EDIINT AS2-based communication.

### 4.2.5 SPEC 2000 (Aerospace and Defense)

SPEC 2000 is a set of e-business specifications administered by the *Air Transport Association* (ATA) to support the airline industry. It is the product of 12 international associations representing airlines, manufacturers, suppliers, and repair agencies. The SPEC 2000 suite of standards includes three categories of standards and the ATA Aviation Marketplace:

- **E-commerce standards**
  E-commerce standards provide the formats, data structure, and rules for exchanging electronic order administration, quotation process, customer invoices, repair orders, warranty claims placement, and so on.

- **File standards**
  File standards define the specifications for the transfer of large files between aircraft operators and suppliers. They provide specifications for provisioning, inventory consumption data exchange, performance reporting, delivery configuration, and reliability data collection and exchange.

- **Traceability standards**
  The traceability standards are bar code/RFID-based standards and include specifications for customer receipt processes, repair agency receipt processes, RFID parts identification, and traceability data.

- **ATA Aviation Marketplace**
  The ATA Aviation Marketplace is a virtual market for airline industry trading partners to display and find parts pricing, repair, and availability information. The Aviation Marketplace consists of five databases, namely, Procurement Database; Repair Database; Surplus Database; Tools, Test & Ground Equipment Database; and the Needs Database. These databases allow companies to list their products and repair services on a central file, which is accessed primarily by the world’s airlines.

The traditional SPEC 2000 standard has been adopted by EDI standards such as ANSI X12 and UN/EDIFACT and is frequently exchanged over ARINC/SITA. Today, there are many XML representations of SPEC 2000 e-commerce transactions that allow trading partners to exchange information and conduct e-business over the Internet.
4.2.6 ACORD (Insurance)

The Association for Cooperative Operations Research and Development (ACORD) is a global, nonprofit insurance association whose mission is to facilitate the development and use of standards for the insurance and related financial services industries. ACORD standards allow different companies to transact business electronically with agents, brokers, and data partners in the insurance industry. ACORD develops and maintains XML standards for life and annuity, property and casualty/surety, and reinsurance industry segments. ACORD XML for Life, Annuity & Health is based on the ACORD Life Data Model and provides a robust, industry-tested XML vocabulary. The ACORD XML for Property & Casualty/Surety standard addresses the industry’s real-time requirements. It defines property and casualty/surety transactions that include both request and response messages for accounting, claims, personal lines, commercial lines, specialty lines, and surety transactions.

4.2.7 AIAG (Automotive)

The North American Automotive Industry Action Group (AIAG) is a globally recognized organization that allows OEMs and suppliers unite to address and resolve issues affecting the world-wide automotive supply chain. It provides a forum for member cooperation in developing and promoting industry solutions. AIAG does not publish standards but rather works with other standards consortia, particularly the Open Applications Groups (OAGis) to develop and publish XML schema specifications. It has recommended the use of ebXML messaging and the use of OAG Business Object Documents (BODs) for exchange XML documents. The BOD message architecture is independent of the communication mechanism. It can be used with simple transport protocols such as HTTP and SMTP as well as with complex transport protocols such as SOAP, ebXML Transport, and Routing.

4.2.8 STAR (Automotive)

The Standards for Technology in Automotive Retail (STAR) is a nonprofit, IT standards organization that develops open, voluntary standards for the retail automotive industry. These standards are designed to support business information needs and provide secure and reliable means for dealers, manufacturers, and retail system providers to communicate with each other. The XML standards that STAR creates are referred to as Business Object Documents (BODs) and are based
on the Open Application Group Inc. (OAGi) development methodology. The
STAR BODs are developed to support multiple areas of business including cus-
tomer relationship management, parts management, vehicle management, ser-
vice and repairs, warranty, and others.

The transport methods recommended by STAR include the following two specifi-
cations for transporting the STAR messages in a secure and reliable way:

- **STAR ebMS Stack**
  ebXML provides a complete set of services for business-to-business integra-
tion. STAR specifies a reduced set of ebXML that uses message services and col-
laboration protocol to meet transport requirements. The STAR ebMS commu-
nication stack includes BODs as the messaging layer; ebMS as the security,
encryption, and reliability layer; XML; SOAP as the XML messaging layer; and
HTTP, TCP, FTP, SMTP, MQ, and so on as the transport layer.

- **STAR Web Services Stack**
  STAR adds a few more layers to the Web Services Stack to provide support for
OEM-to-DMS communication in a well-defined way. The communication stack
includes STAR BODs as the messaging layer; STAR Web service specifications
as the Web service transport layer; WS-Security and WS-Reliable messaging as
the security, encryption, and reliability layer; XML; SOAP as the XML messaging
layer; and HTTP, TCP, FTP, SMTP, MQ, and so on as the transport layer.

### 4.2.9 HL7 (Healthcare)

*Health Level Seven* (HL7) is an ANSI-accredited standards organization that focuses
on the interface requirements of the entire healthcare organization, including
clinical and administrative data. It develops standards for the electronic inter-
change of administrative, clinical, and financial information among independent
healthcare-oriented systems and to support clinical patient care and the manage-
ment, delivery, and evaluation of healthcare services. HL7 focuses on object mod-
els and message structures for healthcare information that needs to be exchanged
between systems.

In general terms, HL7 is an application protocol for electronic data exchange of
information in healthcare environments. It is a collection of standards used by
vendors of hospital information and clinical laboratory, enterprise, and pharmacy
systems. HL7 develops conceptual standards (HL7 Reference Information Model),
document standards (HL7 Clinical Document Architecture), application standards
Industry-Specific Standard Support

4.2 (HL7 Clinical Context Object Workgroup), and messaging standards (HL7 v2.x and v3.0). Messaging standards define how information is packaged and communicated from one party to another and set the language, structure, and data types required for seamless integration from one system to another.

4.2.10 papiNet (Mill Products for Paper and Forest)

*papiNet* is a global communication XML standard for the paper and forest products industries. papiNet facilitates the automation of the business processes within the industry, making it easier for business partners to agree on data definitions and formats. The set of standards is referred to as the papiNet standard.

The papiNet standard is developed and maintained by a dedicated, international team of business and technical experts. These standards include common terminology and standard business documents such as request for quotation, purchase order, order confirmation, goods receipt, planning, product quality, scale ticket, business acknowledgement, and invoice.

The papiNet Interoperability Guidelines (IOGs) discuss the common elements related to the packaging of the message. A message that is packaged according to the papiNet IOG can be sent via any communication protocol. The message service can be viewed as a wrapper around a particular protocol (FTP, SMTP, or HTTP) that is used to transmit the message. papiNet uses the SOAP-ebXML protocol for safe and secure message delivery of messages. In addition, it also uses the S/MIME encryption standard. The papiNet IOG provides complete guidelines for safe and secure message exchange in the paper and forest industry.

4.2.11 RapidNet (Agriculture)

*Responsible Agricultural Product and Information Distribution* (RAPID) is a non-profit organization formed by the National Agricultural Chemical Association that develops and promotes commonly supported standards, transaction sets, directories, processes, and databases to enable electronic connectivity throughout the agriculture industry. RAPID’s expertise is centered on the electronic commerce needs of agricultural businesses involved in crop and plant protection products, plant nutrients, grain, feed, seed, agricultural machinery, agricultural petroleum, animal health, other agricultural products, and specialties industries. RAPID has developed and promoted a broad selection of standards and guidelines for EC transactions; databases to promote product, regulatory, and environmental stew-
ardship; and network connectivity to deliver the benefits of electronic commerce. RAPID standards are focused on order to invoice, sales and inventory reporting, and bar coding.

RAPID Agricultural eStandards were developed in collaboration with the CIDX Chem eStandards to meet Agricultural Industry needs for Internet-based B2B interactions between enterprises using XML-based standards. Agricultural eStandards utilized the Chem eStandards XML documents as the message payload and leveraged the messaging aspects of ebMS 1.0. The ebXML messaging service specification (ebMS) deals with enabling secure and reliable transport, routing, and packaging of business messages across the Internet.

The ebXML Message Service, which is based on SOAP version 1.1 and the SOAP with Attachments informational document, provides the functionality needed for two or more parties to engage in an electronic business transaction. Messaging services sit above the core Internet data transfer protocols (HTTP, SMTP, FTP) and below the business application-level software that understands and processes the message.

4.2.12 SWIFT (Financials)

The Society for Worldwide Interbank Financial Telecommunication (SWIFT) is an industry-owned organization that provides globally supported standards, messaging services, and interface software for banks, brokers and dealers, and investment managers, as well as their market infrastructures in payments, securities, treasury, and trade.

The SWIFTNet infrastructure is the latest from SWIFT, which operates using Internet protocols and provides an application-independent, single-window interface to all of the connected applications of all the institutions participating in the global financial community. Basically, SWIFTNet provides a centralized store-and-forward mechanism, with some transaction management. It provides banks with services such as the exchange of real-time messages using XML standards (SWIFTNet InterAct), the exchange of bulk messages such as nonurgent and low-value payments (SWIFTNet FileAct), a secure browser for accessing account information (SWIFTNet Browse), and online payment initiation, payment tracking, and status reporting (e-Payments plus).

SWIFTNet FIN is a secure, reliable, access-controlled, and structured store-and-forward messaging service. It includes services such as message validation to
ensure that messages are formatted according to SWIFT message standards, delivery monitoring and prioritization, message storage, and retrieval. SWIFTNet InterAct is an interactive messaging service that allows financial institutions to exchange messages in an automated and interactive way. SWIFTNet Interact messaging features include interactive exchange of messages in synchronous or asynchronous mode, standard XML message envelopes, XML syntax validation, store-and-forward mode, and so on. It also provides security features such as message authentication, data integrity, data confidentiality, and nonrepudiation support.

4.3 Cross-Industry Standards

Among many others, the following are some of the key cross-industry business semantic standards widely used in the area of B2B integration. Table 4.4 lists some of the cross-industry business semantic standards supported by SAP NetWeaver PI in the area of B2B integration either by SAP directly or via certified partner solutions.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Available Content</th>
<th>Available Adapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI ASC X12</td>
<td>Support of selected processes</td>
<td>AS1, AS2, OFTP, and other EDI-compliant adapters</td>
</tr>
<tr>
<td>UN/EDIFACT</td>
<td>Support of selected processes</td>
<td>AS1, AS2, OFTP, and other EDI-compliant adapters</td>
</tr>
</tbody>
</table>

Table 4.4 Examples of Cross-Industry Standards Supported by SAP

In addition to the standards mentioned in Table 4.4, SAP NetWeaver also supports other cross industry standards such as Open Application Group Inc. (OAGi), Enterprise Interoperability Centre (EIC), Electronic Product Code (EPCGlobal) RFID-related EPC Standards, International Organization for Standards (ISO), Object Management Group (OMG), and many others.

4.3.1 Open Application Group Inc (OAGi)

OAGi is a nonprofit open standard consortium focusing on developing the process-based XML standards called Business Object Documents (BODs) that can be used widely for B2B and A2A integration scenarios across many different indus-
tries such as automotive, manufacturing, telecommunications, human resource management, and many other vertical industries.

Generally speaking, BODs are the business messages or business documents that are exchanged between software components or applications, between or across supply chains. Each BOD consists of an Application Area and a Data Area. The BOD informs the receiving system what kind of message is in the Data Area, as well as status and error conditions.

A Data Area is structured in two parts containing a Verb and one or more Nouns. The Noun is a common business object, and actions performed on the Noun are the Verbs. BODs are designed to be extensible, while providing a common underlying architecture for integration. The current release of OAGIS (Open Application Group Implementation Specification) has over 490 BODs that address a wide variety of business applications.

The BOD message architecture is independent of the communication mechanism. It works well with ebXML transport and routing, Web services, HTTP, SMTP, FTP, RosettaNet Implementation Framework (RNIF), and any other framework that a company chooses to transport information. OAGi provides a canonical business language partnering with other standard bodies such as AIAG, STAR, and HR-XML to leverage the existing domain knowledge that each industry has and provide an overlay of the vertical information on top of that domain knowledge.

**4.3.2 ANSI ASC X12**

Electronic Data Interchange (EDI) is a widely used method of exchanging business documents electronically in a structured, predefined standard format. It contains a set of standards for controlling exchange of business documents between a company and its trading partners. The standards are designed to work across industry and company boundaries. Several EDI standards are in use today, the most prevalent ones being ASC X12 and UN/EDIFACT.

The American National Standards Institute (ANSI) has been coordinating standards in the United States since 1918. The Institute has a number of committees including the ANSI Accredited Standards Committee (ASC) X12. The standard that has been recommended by this committee is known as the ANSI ASC X12. The ASC X12 message standard was formed in 1979 and is the predominant standard in the United States and the rest of North America. ASC X12 publishes cross-indus-
try business standards, supporting syntax standards, technical reports, and guidelines. ASC X12 cross-industry standards include more than 300 individual EDI transaction sets that address five vertical industries, namely government, finance, transportation, supply chain, and insurance. It develops and maintains X12 EDI and XML standards for these industries. ASC X12 supporting syntax standards include messaging, enveloping, and security standards.

The ASC X12 EDI envelope consists of various components such as interchange segments, function groups, transaction sets, data segments, and data elements. The interchange segment begins the interchange and contains information about the sender and the recipient, date and time of transmission, and the version of X12 in use. Interchange segments start with the ISA segment (interchange header) and end with the IEA segment (interchange trailer). Each interchange consists of one or many functional groups. For example, each interchange can consist of a functional group of purchase orders and a functional group of invoices. Each functional group starts with a GS (header segment) and ends with a GE (trailer segment). Each functional group contains one or many transaction sets. Each transaction set is a business document and starts with an ST (header segment) and SE (trailer segment) and is composed of three sections, namely header, detail, and summary. It is composed of a number of data segments of variable length. Each data segment is in turn composed of a number of data elements of variable length. For example, the transaction set is analogous to the business document such as purchase order, whereas a segment is analogous to a line item in that purchase order, and a data element is analogous to a unit of information in that line item. Figure 4.2 shows the structure of the ANSI X12 envelope.

The acknowledgements in the ASC X12 include a technical acknowledgement called TA1 and a functional acknowledgement called 997. All of the ASC X12 transaction sets are identified by a three-digit numeric value assigned by the ANSI Standards committee. Table 4.5 lists some of the important ASC X12 transaction sets.

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>810</td>
<td>Invoice</td>
</tr>
<tr>
<td>812</td>
<td>Credit and debit advice</td>
</tr>
<tr>
<td>820</td>
<td>Payment order and credit advice (REMADV)</td>
</tr>
</tbody>
</table>

Table 4.5 Examples of ANSI ASC X12 Messages
### Table 4.5 Examples of ANSI ASC X12 Messages (cont.)

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>823</td>
<td>Lockbox</td>
</tr>
<tr>
<td>840</td>
<td>Request for quote</td>
</tr>
<tr>
<td>843</td>
<td>Quotation</td>
</tr>
<tr>
<td>850</td>
<td>Purchase order</td>
</tr>
<tr>
<td>855</td>
<td>Purchase order acknowledgement</td>
</tr>
<tr>
<td>856</td>
<td>Advance ship notification</td>
</tr>
<tr>
<td>860</td>
<td>Order change</td>
</tr>
<tr>
<td>862</td>
<td>Delivery schedule</td>
</tr>
<tr>
<td>997</td>
<td>Functional acknowledgement</td>
</tr>
</tbody>
</table>

**Figure 4.2** Structure of the ANSI X12 Envelope
The ASC X12 standards were designed to be independent of communication mechanism and software technologies. These can be transmitted using any methodology agreed upon between sender and recipient. This includes a variety of technologies such as value added networks (VANs), FTP, email, HTTP, Applicability Statement 1 (AS1), and Applicability Statement 2 (AS2). AS1 and AS2 are industry standard protocols for transporting the EDI and XML documents over the Internet in a secure and reliable manner.

4.3.3 UN/CEFACT

The United Nations/Centre for Trade Facilitation and Electronic Business (UN/CEFACT) is a division of the United Nations and is a chartered activity of the UN Economic Commission for Europe (UN/ECE). The UN/CEFACT mission is to support, enhance, and promote trade facilitation between developed, developing, and transitional economies. It has developed the international EDI standard called Electronic Data Interchange for Administration, Commerce, and Transport (UN/EDIFACT) and has defined a suite of standards to address a new paradigm in semantic interoperability. One such standard is the next-generation business information and collaborative standard called Core Component Technical Specifications (CCTS). In the next two paragraphs we look into these standards in detail.

UN/EDIFACT

UN/EDIFACT is an international EDI standard developed and maintained by the UN/CEFACT and was established in 1985. It has been adopted by the International Organization for Standards (ISO) as the ISO 9735. It is primarily used in Europe and Asia. The standard provides an interactive exchange protocol (I-EDI) and establishes the rules of syntax for the preparation of messages to be interchanged between partners. There are currently over 200 messages defined in the UN/EDIFACT, covering a wide variety of enterprises.

Similar to ASC X12 documents, the EDIFACT envelope consists of a hierarchical structure consisting of components such as interchange, functional groups, and messages. An interchange begins with a UNA or UNB segment and ends with a UNZ segment and contains one or many functional groups. The UNA is the optional header segment in the interchange to set structural elements such as separators, delimiters, and decimal notation. A functional group begins with a UNG segment and ends with a UNE segment and contains one or many messages. A
message is equal to a transaction set in ASC X12 and begins with a UNH segment and ends with a UNT segment. Each message is composed of three sections, namely, header, detail, and summary. Each section is made up of segment groups and segments. The acknowledgement in the EDIFACT standard is called CONTRL. Figure 4.3 shows the structure of the EDIFACT envelope.

![EDIFACT Envelope](image)

**Figure 4.3** Structure of the EDIFACT Envelope

All of the EDIFACT messages are identified by a six-character message code. SAP’s IDoc message types are based on the EDIFACT messages. Table 4.6 lists some of the important UN/EDIFACT messages.

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INVOIC</td>
<td>Invoice</td>
</tr>
<tr>
<td>CREADV</td>
<td>Credit advice</td>
</tr>
</tbody>
</table>

**Table 4.6** Examples of UN/EDIFACT Messages
Similar to ASC X12, EDIFACT messages can be transmitted using a variety of technologies such as value added networks (VANs), FTP, e-mail, HTTP, Applicability Statement 1 (AS1), and Applicability Statement 2 (AS2).

**Core Component Technical Specifications (CCTS)**

In addition to the technical connectivity using various standards, one of the biggest challenges in B2B integration today is achieving the interoperability at the collaborative business process and data level. This lack of interoperability is addressed by the UN/CEFACT CCTS specification. CCTS offers a new paradigm in syntax-independent semantic data modeling for addressing information interoperability. It is a methodology for developing semantic-based business data structures through conceptual, physical, and logical models on a syntax-independent level.

CCTS is gaining widespread adoption by private and public sector organizations, as well as horizontal and vertical standards organizations. SAP uses CCTS to define SAP Global Data Types (GDTs) that serve as the basis for SAP business objects and enterprise services. This standard will enable SAP to provide the highest level of semantic interoperability possible between SAP and non-SAP applications.

**Table 4.6 Examples of UN/EDIFACT Messages (cont.)**

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>REMADV</td>
<td>Remittance advice</td>
</tr>
<tr>
<td>DEBADV</td>
<td>Debit advice</td>
</tr>
<tr>
<td>REQOTE</td>
<td>Request for quote</td>
</tr>
<tr>
<td>QUOTES</td>
<td>Quotation</td>
</tr>
<tr>
<td>ORDERS</td>
<td>Purchase order</td>
</tr>
<tr>
<td>ORDRSP</td>
<td>Purchase order acknowledgement</td>
</tr>
<tr>
<td>DESADV</td>
<td>Dispatch advice</td>
</tr>
<tr>
<td>ORDCHG</td>
<td>Order change</td>
</tr>
<tr>
<td>DELFOR</td>
<td>Delivery schedule</td>
</tr>
<tr>
<td>PRICAT</td>
<td>Prices/sales catalog</td>
</tr>
</tbody>
</table>

Similar to ASC X12, EDIFACT messages can be transmitted using a variety of technologies such as value added networks (VANs), FTP, e-mail, HTTP, Applicability Statement 1 (AS1), and Applicability Statement 2 (AS2).
4.4 Predefined Integration Content (SOA Business Content)

As described in Section 2.1 Overview, SAP NetWeaver PI provides an open business process integration technology platform that supports process-centric collaboration between SAP and non-SAP systems and applications, both within and beyond the enterprise. It delivers prepackaged integration content for B2B solutions in the form of business packages. These business packages provide business applications, technical infrastructure, and the business content all in one to match various industry standard specifications.

SAP NetWeaver provides these business packages for different industry standard verticals such as the RosettaNet business package for the high-tech industry, the CIDX business package for the chemical industry, and so on. This content includes collaboration knowledge as defined by the industry standards and contains data structures, interfaces, mapping programs, integration scenarios, integration processes, and communication channel templates and is synchronized with the related business applications and versions.

SAP NetWeaver also delivers prepackaged SOA business content that is based on the SOA design and modeling principles at SAP. This content includes Global Data Types, business objects, service interfaces, event definitions, routing conditions, mapping definitions, and implementation rules.

Predefined integration content or the SOA business content delivered by SAP can be classified into the following categories:

> **Content provided by SAP**

Content delivered by SAP can be classified into two categories:

> **SAP application content** includes generic integration content provided by SAP applications. The content provides out-of-the-box integration scenarios for each application, harmonized application and integration logic, and simplified upgrade of end-to-end scenarios. SAP NetWeaver PI provides predefined integration content for application of the SAP Business Suite such as SAP Supply Chain Management (SCM), SAP Supplier Relationship Management (SRM), SAP ERP, SAP Customer Relationship Management (CRM), SAP NetWeaver Master Data Management (MDM), and so on. Predefined integration content is composed of software components, integration scenarios, Global Data Types, event definition, business objects, service interfaces, mappings between the source and target applications, and the implementation rules.
SAP business packages provide integration content for industry standard verticals such as RosettaNet, CIDX, S95, and so on. These business packages contain the collaboration knowledge as defined by the industry standard and the technical B2B adapters that are needed for the actual transport, routing, and packaging of these industry standard messages.

**Content provided by third parties**
Many SAP partners provide integration content that extends the content offering of SAP for A2A and B2B scenarios. The content provided by third-party vendors is certified by SAP. This includes content for SAP ERP, the SAP Business Suite of applications such as SAP SCM, and SAP CRM, and vertical industry standards such as EDIFACT, ANSI X12, OAGi, EANCOM, and so on.

**Content to support EDI**
SAP NetWeaver PI provides support for Electronic Data Interchange (EDI) with content and adapter packages from its partner SEEBURGER. Industries such as automotive, high tech, aerospace, and defense will greatly benefit from direct EDI support and industry-specific content. Preconfigured mappings for the most common EDI standards such as ASC X12, EDIFACT, and Odette are provided as part of this content, which will significantly decrease EDI implementation costs and speed up deployments.

See also Section 7.3 Reusing Existing PI Content for more information on how to find predefined integration content.

### 4.5 Connectivity Using Industry Standard Adapters

SAP NetWeaver PI provides adapters that are built around the industry standards to facilitate communication among the trading partners. It provides the RNIF adapter and CIDX adapter, which support RosettaNet and CIDX based communication among trading partners. In addition to providing these standard adapters, SAP also relies on an ecosystem of partners to provide adapters for many industry standards.

#### 4.5.1 RNIF Adapter

At a high level, the RNIF (RosettaNet Implementation Framework) adapter is based on the RNIF standard and enables the exchange of business documents among the RosettaNet trading partners. As described in Section 4.2.1 RosettaNet
B2B and Industry Standard Support

(High Tech), RNIF is an open network application framework that enables business partners to collaboratively run RosettaNet Partner Interface Processes (PIPs). The RNIF standard specifies how messages should be exchanged independently of the actual message content. The Petroleum Industry Data Exchange (PIDX) standard is also based on the RNIF specifications and requires the use of the RNIF 2.0 and MIME-defined identifying wrappers.

SAP NetWeaver PI provides two flavors of the RNIF adapter: RNIF 1.1 and RNIF 2.0. These adapters meet the TRP requirements specified in the RNIF specification versions 1.1 and 2.0. The RNIF adapter executes the transport, packaging, and routing of all PIP messages and business signals based on the relevant information retrieved from the Enterprise Services Repository and Integration Directory at runtime.

The RNIF 2.0 adapter in SAP NetWeaver PI can be used for exchanging RosettaNet PIP messages as well as PIDX messages. The key features of the RNIF adapters include packing and unpacking of RosettaNet and PIDX messages, structural verification of the message headers, handling of message security, RosettaNet-defined error handling procedure, message monitoring and auditing, and reacting to failures in the backend applications. The adapters provide measures to enforce the security, authentication, authorization, nonrepudiation, and message integrity based on the RNIF 2.0 business transaction dialog.

RNIF 1.1 and RNIF 2.0 adapters are significantly different. Table 4.7 lists some of the key differences between RNIF 1.1 and RNIF 2.0.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>RNIF 1.1</th>
<th>RNIF 2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport Protocol</td>
<td>HTTP/S</td>
<td>HTTP/S</td>
</tr>
<tr>
<td>Message Protocol</td>
<td>RNIF 1.1</td>
<td>RNIF 2.0</td>
</tr>
<tr>
<td>Quality of Service</td>
<td>Exactly once (EO)</td>
<td>Exactly once (EO)</td>
</tr>
<tr>
<td>Attachments</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Message Level Encryption</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Retries</td>
<td>Activity level</td>
<td>Action level</td>
</tr>
<tr>
<td>Digital Signature</td>
<td>PKCS#7</td>
<td>S/MIME</td>
</tr>
</tbody>
</table>

Table 4.7 Features of RNIF 1.1 Adapter and RNIF 2.0 Adapter
The RosettaNet Business Message is a transfer protocol-independent container that packs together business payload and the associated headers components encased in a MIME multipart/related envelope. All RosettaNet business messages must contain a preamble header, a delivery header, a service header, and a service content document. Preamble and delivery headers in RNIF 2.0 are modified and optimized versions of RNIF 1.1 equivalents. However, the delivery header is only part of RNIF 2.0.

Figure 4.4 shows the components of a basic RosettaNet message encased in a multipart/related envelope. The RNIF 2.0 message consists of the following parts:

- The *preamble header* identifies the message to be the RNIF message and the standard with which this message structure is compliant.
- The *delivery header* identifies message sender and recipient and provides the message identifier.
- The *service header* identifies the process layer and transaction layer information such as the PIP, the PIP instance, the activity, and the action to which this message belongs.
- The *service content* contains action or signal messages. If it is an action message, it may also include one or many attachments.

The RNIF adapters support the business action and business signal messages specified in the RNIF 1.1 and RNIF 2.0 standards. RNIF core specification includes the authentication, authorization, encryption, and nonrepudiation requirements essential for conducting secure electronic business over the Internet.

The RNIF 2.0 adapter 2.0 supports two levels of encryption (RNIF security settings are discussed in more detail in Chapter 10 Security Considerations):

- **Payload only**
  In this type of encryption, the service container as well as the optional message attachment is encrypted.

- **Payload container**
  In this type of encryption, the service header and the service container together with the optional message attachment are encrypted.

To exchange RosettaNet messages with the RNIF adapter, the RosettaNet-compliant system of the partner must be configured to send messages to the following URL: `http://<host>://<port>/MessagingSystem/receive/RNIFAdapter/RNIF`. 
CIDX Adapter

The CIDX adapter is one of the industry standard adapters provided by SAP NetWeaver PI. The CIDX adapter supports the Chem eStandards established by the standards body CIDX for exchanging business messages between trading partners involved in CIDX-based data exchange. As described in Section 4.2.2 CIDX (Chemical), the CIDX adapter leverages the transport, routing, packaging, and security aspects of RNIF and is based on the RNIF 1.1 specifications. The CIDX adapter executes the transport, routing, and packaging of all Chem eStandard messages and business signals based on the relevant information retrieved from the Enterprise Services Repository and Integration Directory at runtime.

**Figure 4.4** RNIF 1.1 and RNIF 2.0 Message Structure

<table>
<thead>
<tr>
<th><strong>RNIF 1.1</strong></th>
<th><strong>RNIF 2.0</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Version Number (4 Bytes)</td>
<td>Preamble Header</td>
</tr>
<tr>
<td>Content Length (4 Bytes)</td>
<td>Delivery Header</td>
</tr>
<tr>
<td>MIME multipart/related</td>
<td>Service Header</td>
</tr>
<tr>
<td>Preamble Header</td>
<td>Service Content (Action/Signal Message)</td>
</tr>
<tr>
<td>Service Header</td>
<td>Attachment1</td>
</tr>
<tr>
<td>Service Content</td>
<td>Attachment n</td>
</tr>
<tr>
<td>Signature Length (4 Bytes)</td>
<td>Digital Signature</td>
</tr>
<tr>
<td>Signature</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4.4** RNIF 1.1 and RNIF 2.0 Message Structure
The CIDX adapter is used for sending messages between the Integration Server of SAP NetWeaver PI and the trading partner’s CIDX-compliant system by transforming the SAP NetWeaver PI message format into a CIDX message format and vice versa. The CIDX adapter supports the single-action asynchronous pattern and uses the collaboration agreements configured in the Integration Directory to manage Chem eStandard messages. The key features of the CIDX adapter include pack and unpack of Chem eStandard messages, structural verification of message headers, handling of message security, message monitoring and auditing, and message choreography of business action and business signal messages.

Table 4.8 lists some of the key characteristics of the CIDX adapter.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport Protocol</td>
<td>HTTP/S</td>
</tr>
<tr>
<td>Message Protocol</td>
<td>RNIF 1.1</td>
</tr>
<tr>
<td>Quality of Service</td>
<td>Exactly once (EO)</td>
</tr>
<tr>
<td>Attachments</td>
<td>No</td>
</tr>
<tr>
<td>Message Level Encryption</td>
<td>No</td>
</tr>
<tr>
<td>Retries</td>
<td>Activity level</td>
</tr>
<tr>
<td>Digital Signature</td>
<td>PKCS#7</td>
</tr>
</tbody>
</table>

Table 4.8 Features of the CIDX Adapter

Figure 4.5 shows the components of a basic CIDX message consisting of the following parts:

- The preamble header identifies the message to be the CIDX message and the standard with which this message structure is compliant. The preamble header of CIDX is similar to the RosettaNet preamble header, except that the Global-AdministeringAuthorityCode is “CIDX,” indicating it as a CIDX message.
- The service header contains the transaction routing and processing information for a given Chem eStandard transaction.
- The service content contains the actual Chem eStandard message. The message can be a business action or a business signal message.
To exchange Chem eStandard messages with the CIDX adapter, the CIDX-compliant system of the business partner must be configured to send messages to the following URL: http://<host>:<port>/MessagingSystem/receive/CIDXAdapter/CIDX.

### 4.6 Summary

In this chapter, you have learned the various industry standards supported by SAP NetWeaver PI in detail. You have explored the predefined content provided by SAP and third party vendors and learned the key features of the RNIF and CIDX industry standard adapters.
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