Technical Advisory B

Modular PIP Reference - Use of XML Schemas

Specification Information	
Name	RosettaNet Implementation Framework V1.1 & V2.0
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1   Document Management

1.1   Legal Disclaimer

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1.4   Related Documents

- RosettaNet Implementation Framework: Core Specification 2.0 [RNIF20]
- RosettaNet Implementation Framework: Core Specification 1.1 [RNIF11]

1.5   Purpose

RosettaNet Implementation Framework (RNIF) 2.0 [RNIF20] and 1.1 [RNIF11] either implicitly or explicitly describe the release and usage of XML Document Type Definitions (DTDs) as the single normative form for the structure and content of business documents or RosettaNet's Partner Interface Process (PIP) specifications.

Despite direct reference in Appendix E: Anticipated Futures, section E.1: Use of XML Schema of RNIF 2.0 and section 2.2: RosettaNet Message Guideline Format of RNIF 1.1 in terms of using XML Schema as the next maturing XML technology, a direct conflict is created between RosettaNet and partners' by the release of Modular PIP specification.

As such, this Technical Advisory (TA) intends to clarify confusion surrounding the release of Modular PIPs, and strengthening both sections mentioned above in the usage of XML Schema as a normative form for PIP specification under the Modular PIP Architecture.

1.6 Scope

This document contains information describing enhancements to the RNIF 2.0 and RNIF 1.1 Specifications regarding the inclusion of XML Schema as a valid normative form for the structure and content of business docume nts or PIPs.

It also intends to strengthen Appendix E: Anticipated Future, section E.1: Use of XML Schema of RNIF 2.0 and section 2.2: RosettaNet Message Guideline Format of RNIF 1.1.

This document is NOT applicable on RNIF 2.0 and RNIF 1.1 sections that provide detailed technical specifications on RNIF Header Structure and Format Specifications. A separate Technical Advisory is planned to address these aspects.

At the time of this release, RosettaNet is planning a separate RNIF Technical Advisory (TA) that will specifically address XML Schema conversion on RNIF Header Structure and Format Specifications which will include release of XML Schema based RNIF 2.0 and RNIF 1.1 Headers and Format Specifications.

Section 3.5 and 3.6 of this document provides a list of parts identified in RNIF 2.0 and RNIF 1.1 as sections that could possibly be covered under the proposed Technical Advisory detailing changes to RosettaNet Business Message Components.

1.7 Conformance Statement

Compliance to the enhancements described in this advisory is mandatory if Modular PIPs are implemented in an RNIF 2.0 or RNIF 1.1 implementation. Applications that conform to this TA MUST still conform to all requirement of [RNIF20] and [RNIF11], whichever is relevant.

1.8 Document Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

1.9 Document Version History

Version	Date	Update Information
Issue 01.00.00	02 June 2004	Initial Release

1.10 Acknowledgement

RosettaNet acknowledges the following individuals for contributing towards this document.

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1.11 Approvals

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2 Introduction

This Technical Advisory (TA) prescribes changes to the RosettaNet Implementation Framework (RNIF) 2.0 [RNIF20] and 1.1 [RNIF11] in order to support the adoption of XML Schema as the normative specification format.

2.1 Terms

The terms, RosettaNet Business Document (RNBD) and Partner Interface Process (PIP), are defined in RNIF 2.0 and RNIF 1.1 respectively.

2.2 Issue

This Technical Advisory is a response to the need to clarify the usage of XML Schema as the next evolving XML language to define RosettaNet PIPs.

Despite the direct references in Appendix E: Anticipated Futures, section E.1: Use of XML Schema of RNIF 2.0 and section 2.2: RosettaNet Message Guideline Format of RNIF 1.1 in terms of using XML Schema as the next maturing XML technology, the explicit references to "DTD" in the RNIF specifications has caused confusion among implementers.

3   Modular PIP Reference – Use of XML Schemas

3.1   Context of Modular PIP Production

RosettaNet Board Members and voters approved the new PIP Specification Format in September 2002. Two samp le PIPs, 3C3 and 4A1, were created by the PIP Specification Format (originally part of Next Generation Architecture Foundational Program) team to facilitate evaluation and approval of the new format.

Modular PIPs will be created primarily for new PIP development under new Milestone programs. Existing Monolithic PIPs will not be reworked and published in Modular format unless they come up for major revision/maintenance. Another scenario in which a Modular format may be created for a Monolithic PIP is when the creation of Modular PIPs for a new domain necessitates the rework of one or more Monolithic PIPs.

Differences between Monolithic and Modular PIP structures are explained below:

	Monolithic	**Modular**
PIP Service Content Structure	Monolithic PIP Service Content Structure: message guideline + DTD	XML Schema based PIP Service Content Structure is still Monolithic, and is created by composing Universal Structures and Domain Models
Message Exchange and Message Control Parameter Specification	UML + text (for 2 party only)	ebXML BPSS XML Schema compliant (for 2 party)
Information Sharing Model	Document interchange model	Document interchange model
Implementation	Human Labor Intensive	Machine Process-able

3.2   How RNIF should be read with regards to Modular PIP Release

In RNIF 2.0: Appendix E: Anticipated Futures lists a set of future technological developments, which RosettaNet MAY adopt based on suitability and timeline.

On that note, specifically to section E.1 Use of XML-Schemas, RosettaNet with the publication of this Technical Advisory states its official strategic announcement on the usage of XML Schemas as an added normative format to XML DTD. Over the long term, XML Schema will replace DTD, as more PIPs are released under the Modular PIP architecture.

As such, all sections (listed in Section 3.3 and 3.4 of this TA) in RNIF should be read as *"XML Schemas or DTDs"* whenever an occurrence of the phrase "Document Type Definitions (document type definitions)", "XML DTDs" or "DTDs" is encountered, and *"XML Schema or DTD"* whenever an occurrence of a phrase "DTD" or "Document Type Definition (document type definition) is encountered.

Further to the above, subsequent occurrences of the phrase "XML DTDs and [associated] Message Guidelines" or "DTDs and [associated] Message Guidelines" should be read as *XML Schemas or DTDs and [associated] Message Guidelines."*

Additionally, for certain sections in RNIF that requires detailed para-phrasing and revised recommendations to support XML Schema, Section 3.3.1 and 3.4.1 in this document lists required extensions for RNIF 2.0 and RNIF 1.1 respectively. As such, previous *find-replace* advisory MUST NOT apply.

3.3 Sections in RNIF 2.0 Specification Explicitly Discussing XML DTDs

List of sections in RNIF 2.0 Specification identified to be explicitly referencing to XML DTDs as the single normative format.

	Section Number	Section Label
1.	*1*	*Introduction*
2.	*1.2*	*Technical Background*
3.	**1.2.2**	**PIPs and the Implementation Framework**
4.	**1.2.2.1**	**Action and Signal Messages**
5.	*1.2.4*	*PIP Metamodel*
6.	**1.2.4.3**	**Implementation Framework View (IFV)**
7.	*2*	*Technical Specifications*
8.	*2.1*	*RosettaNet Business Message Components*
9.	*2.1.2*	*XML Usage*
10.	**2.1.2.2**	**Validation Rules** [Refer Section 3.3.1]
11.	**2.1.2.4**	**DTD Naming, Pathname Specification and Versioning** [Refer Section 3.3.1]
12.	*2.1.4*	*Payload Components*
13.	**2.1.4.1**	**Service Content** [Refer Section 3.3.1]
14.	**2.1.4.3**	**Referring to Attachments from within Service Content** [Refer Section 3.3.1]
15.	**2.1.4.4**	**Shipping Non-RosettaNet Service Content in the Payload**
16.	**2.5**	**Business Signal Specifications & Process Control PIPs**
17.	*Appendix B*	*Required PIP Metamodel Changes*
18.	**B.7**	**IFV and Agent/Service References**
19.	**Appendix C**	**IFV Mapping From BOV and FSV**
20.	*Appendix E*	*Anticipated Futures*
21.	**E.1**	**Use of XML-Schemas** [Refer Section 3.3.1]
22.	**Appendix G**	**References** [Refer Section 3.3.1]
23.	**Appendix H**	**Glossary** [Refer Section 3.3.1]

24.		**Technical Advisories for RNIF 2.0**

3.3.1   Sections in RNIF 2.0 Specification Requiring Para-Phrasing

Section Number		**Revised Phrase**
1.	**2.1.2.2**	**Validation Rules**
		All elements MUST be validated against the DTD or the XML Schema that contains it, based on standard grammer validation rules.
		The following is the minimum level of validation that is required on each of the XML body parts, namely, the Preamble, the Delivery Header, the Service Header, and the Service Content.
		1. The XML document MUST be compliant with its corresponding XML Schema or DTD.

		2. For DTD based elements:
		  a. Where an element's data type and/or length is specified in the corresponding RosettaNet Message Guideline, the element MUST be validated against these specifications.
		  b. Where an element's allowed list of values is specified in the Entity Instance list in the corresponding RosettaNet Message Guideline, the element MUST be validated against these specifications.
		  c. Where the cardinality specification of an element in the Message Guideline is different from the corresponding specification in the DTD, the specification in the Message Guideline is more accurate and MUST be adhered to.
		  d. Where the sequence or naming of an element in the Message Guideline is different from the corresponding specification in the DTD, the specification in the DTD is more accurate and MUST be adhered to.

		3. Where a dictionary is present and the PIP requires Dictionary Validation, the Service Content MUST be validated against the dictionary as a part of action performance.
		4. If a message does not follow one or more of the above rules, then it MUST be deemed invalid.
2.	**2.1.2.4**	**XML Schema or DTD Naming, Pathname Specification and Versioning**
		All XML documents which are based on specifications that include an associated Document Type Definition (DTD) MUST reference the DTD by specifying the doctype element. Meanwhile for XML documents which are based on XML Schema, reference MUST be made using schemaLocation attribute.
		The name of the DTD or the XML Schema file as published by RosettaNet MUST be specified, and MUST NOT be renamed differently. Either the doctype element or the schemaLocation attribute MUST NOT specify any additional URL qualifiers that refer to a specific location where the DTD or XML Schema file exists. But in the case of XML Schema, schemaLocation attribute MUST have the targetNamespace of the Schema as the prefix before the original Schema file name delimited with a singe space.
		Recipients of RosettaNet XML messages are responsible for configuring their systems to find the appropriate DTD file.
		Example : <!DOCTYPE Preamble SYSTEM "Preamble_MS_V02_00.dtd">,
		<Preamble xmlns="http://www.rosettanet.org/RNIF/V02.00" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.rosettanet.org/RNIF/V02.00 Preamble_MS_V02_00.xsd">
3.	**2.1.4.1**	**Service Content**

The Service Content part of the payload contains business content that is in XML format. The Service Content is always either an action message or a signal message. The DTDs for all signal messages are specified by RosettaNet. The XML Schemas or DTDs for PIP action messages MAY be specified by RosettaNet or by other standards bodies that have been sanctioned by RosettaNet. PIPs must identify which are the allowed standards body(ies) that can supply content in the given PIP.

4.	**2.1.4.3**	**Referring to Attachments from within Service Content**

As mentioned above, attachments to Service Content are sent as separate MIME body parts in the same RosettaNet Business Message. This method packages and ships the business content and attachments together. However, RosettaNet recognizes that it sometimes would be necessary to refer to attachments from within the Service Content. Since action messages (specified by RosettaNet or otherwise) are defined independently of the RosettaNet Implementation Framework, RNIF 2.0 defines a standard mechanism to refer to attachments from within XML Service Content documents and leaves it up to the Service Content DTD or XML Schema developers to make use of this mechanism.

Each attachment MUST be identified by the MIME header "Content-ID" in the RosettaNet Business Message. All XML elements that could refer to attachments MUST have the attribute "href" defined as one of the attributes for the XML element.

For example (DTD):

```
<!ELEMENT AnyElement (#PCDATA)>
<!ATTLIST AnyElement
%miscAttribute s;
href CDATA #implied)>
```

Additional example (XML Schema):

```
<xs:element name="anyElement"
        type="tns:anyElementType"/>
<xs:complexType name=" anyElementType ">
    <xs:attribute name="href" type="xs:anyURI" />
</xs:complexType>
```

5.	**Appendix E**	**E.1 Use of XML-Schemas**

On September 2002, RosettaNet Board Members and voters approved a strategic direction to start defining PIP IFV Specification based on W3C XML Schema. This marks an official direction from RosettaNet to move away from XML DTD based specifications. Two sample PIPs, 3C3 and 4A1, were created by the PIP Specification Format (originally part of Next Generation Architecture Foundational Program) team to facilitate evaluation and approval of the new format.

Known as Modular PIPs, this new set of specifications will be created primarily for new PIP development under new Milestone programs. Existing Monolithic PIPs will not be reworked and published in Modular format unless they come up for major revision/maintenance. Another scenario in which a Modular format may be created for a Monolithic PIP is when the creation of Modular PIPs for a new domain necessitates the rework of one or more Monolithic PIPs.

As the specifications mature, RosettaNet will continuously strive towards increased improvements in the PIP IFV deliverables in terms of increased automation and machine process-able capability. It should be noted that this would not impact the physical encoding of the Action or Signal messages but, provides more robust specification of the schemas for these specifications that support more automated schema validation to the extent facilitated by the schema standards.

6.	**Appendix G**	**References**

- *Modular PIP Specification Package User Guide*, RosettaNet, 2004. (Source: http://www.rosettanet.org)

- *XML Schema Part 1: Structures,* W3C Recommendation. Henry S. Thompson (University of Edinburgh), David Beech (Oracle Corporation), Murray Maloney (for Commerce One), Noah Mendelsohn (Lotus Development Corporation). Worldwide Web Consortium (W3C), May 2, 2001. (Source: http://www.w3.org/TR/xmlschema-1/)

- *XML Schema Part 2: Datatypes,* W3C Recommendation. Paul V. Biron (Kaiser Permanente, for Health Level Seven), Ashok Malhotra (Microsoft, formerly of IBM). Worldwide Web Consortium (W3C), May 2, 2001. (Source: http://www.w3.org/TR/xmlschema-2/)

7.	**Appendix H**	**Glossary**

Modular (PIP) Specification: In September 2002, RosettaNet Board Members and Voting Community approved the XML Schema format (also known as Modular) for its standards. The message still includes context and action information but it is built from a library of data structures. There are more consistent in structure and content. The PIP message is characterized with XML schema and is machine readable; hence the standards metadata can be automatically read, configured and aligned. The Modular PIPs are designed and developed based on an Explicit Business Information Model. In other words, the Modular PIPs are built out of reusable objects, designed in terms of small cohesive core objects to provide consistent syntax and semantics

Monolithic (PIP) Specification: A Monolithic PIP message includes both context and action information. The message is characterized with DTD and human readable documents, hence, the standard metadata of the PIP must be manually read, configured and aligned

XML Schema: specifies the XML Schema definition language, which offers facilities for describing the structure and constraining the contents of XML 1.0 documents, including those which exploit the XML Namespace facility. The schema language, which is itself represented in XML 1.0 and uses namespaces, substantially reconstructs and considerably extends the capabilities found in XML 1.0 document type definitions (DTDs)

3.4   Sections in RNIF 1.1 Specification Explicitly Discussing XML DTDs

List of sections in RNIF 1.1 Specification identified to be explicitly referencing to XML DTDs as the single normative format.

	Section Number	Section Label
1.	*1*	*Introduction*
2.	**1.2**	**Partner Interface Process (PIP) Guidelines** [Refer Section 3.4.1]
3.	*2*	*Partner Interface Process(PIP) Specifications*
4.	*2.1*	*PIP Business Message Structure*
5.	**2.1.3**	**Message Content**
6.	**2.2**	**RosettaNet Message Guideline Format** [Refer Section 3.4.1]
7.	*6*	*Technical Compliance*
8.	**6.1**	**Compliance with PIP Specifications**
9.		**Bibliography – Other Documents** [Refer Section 3.4.1]
10.		**Glossary** [Refer Section 3.4.1]
11.		**Technical Advisories both for RNIF® 1.1**

3.4.1   Sections in RNIF 1.1 Specification Requiring Para-Phrasing

Section Number		Revised Phrase
1.	**1.2**	**Partner Interface Process (PIP) Guidelines**
4. Finally, the PIP "blueprints" are used to create a PIP specification, which includes specific business message guidelines to carry out the business processes contained in the PIP and corresponding DTDs for each message guideline. Additionally, RosettaNet is also publishing Modular PIP Specifications utilizing XML Schema. : Supply chain companies and RosettaNet solution partners that wish to create open, interoperable, networked applications need to adhere to these specifications, which are distributed in both human-readable and machine-readable forms. However, the machine-readable versions (i.e., XML DTDs) are not complete specifications, due to the limitations of DTDs themselves. Hence the complete specifications only exist in the human-readable PIP specification and accompanying message guidelines (HTML format). Neverthless, in an attempt to increase machine-readability and modularized PIP components RosettaNet started to publish Modular PIP Specifications for new Milestone Programs which will allow RosettaNet member companies to create soultions that can be rapidly configured to changing supply chain business models.		
2.	**2.2**	**RosettaNet Message Guideline Format**

Specification of message guidelines is in human-readable form, using RTF and HTML formats for Monolithic PIPs. Additionally, message guidelines are provided in machine-readable formats. The preferred format is XML Schemas or XML DTDs. Message vocabulary comes from RosettaNet dictionaries; each message guideline has its own DTD or XML Schema.

Especially for DTDs, while it allows partners to determine if a message structure is valid, they will not allow partners to determine if a message is valid with respect to a message guideline for a business document (captured in the RosettaNet business document UML model). The reason is that DTDs aren't as rich as the UML and OCL (Object Constraint Language) that RosettaNet uses to describe business documents designed during PIP analysis sessions. (Note therefore that the only *complete* specification of a message guideline is in the human-readable RTF and HTML formats for Monolithic PIPs.)

Although DTDs are well understood and there are plenty of parsing tools available to validate the message structures. However, DTDs alone are not sufficient to validate a message at a higher level, such as semantics that may include constraints (absence, presence, etc.) on the elements of a message structure. Unfortunately, there are no mature and open mechanisms for specifying these constraints with commerical off-the-shelf (COTS) tools available today. (Note that schema validation tools will be able to validate more of the message than DTD validation tools.)

Opposite to DTDs, as for Modular PIPs the development in XML Schemas has enabled extended capabilities to contain rich information such as message vocabulary, constraints, data types and choreography. XML Schema enables functionalities that could validate message at a higher level, such as semantics that may include constraints, restrictions, enumerations etc. on the elements of a message structure, thus increasing automation and machine-processable capability.

Supply chain partners should review their trading partner agreements in this respect. The UN/EDIFACT and American Legal Association recommend that partners agree on the point at which a message is legally considered "received" i.e. the point at which you could send back an acknowledgement of receipt. Such agreement must take into account what partners can do with tools and must be human-validated at this point. RosettaNet is separately working on recommendations for member Trading Partner Agreements.

3.		**Bibliography – Other Documents**
	▪	*Modular PIP Specification Package User Guide*, RosettaNet, 2004. (Source: http://www.rosettanet.org)
	▪	*XML Schema Part 1: Structures,* W3C Recommendation. Henry S. Thompson (University of Edinburgh), David Beech (Oracle Corporation), Murray Maloney (for Commerce One), Noah Mendelsohn (Lotus Development Corporation). Worldwide Web Consortium (W3C), May 2, 2001. (Source: http://www.w3.org/TR/xmlschema-1/)
	▪	*XML Schema Part 2: Datatypes,* W3C Recommendation. Paul V. Biron (Kaiser Permanente, for Health Level Seven), Ashok Malhotra (Microsoft, formerly of IBM). Worldwide Web Consortium (W3C), May 2, 2001. (Source: http://www.w3.org/TR/xmlschema-2/)
4.		**Glossary**
		Modular (PIP) Specification: In September 2002, RosettaNet Board Members and Voting Community approved the XML Schema format (also known as Modular) for its standards. The message still includes context and action information but it is built from a library of data structures. There are more consistent in structure and content. The PIP message is characterized with XML schema and is machine readable; hence the standards metadata can be automatically read, configured and aligned. The Modular PIPs are designed and developed based on an Explicit Business Information Model. In other words, the Modular PIPs are built out of reusable objects, designed in terms of small cohesive core objects to provide consistent syntax and semantics **Monolithic (PIP) Specification:** A Monolithic PIP message includes both context and action information. The message is characterized with DTD and human readable documents, hence, the standard metadata of the PIP must be manually read, configured and aligned **XML Schema:** specifies the XML Schema definition language, which offers facilities for describing the structure and constraining the contents of XML 1.0 documents, including those which exploit the XML Namespace facility. The schema language, which is itself represented in XML 1.0 and uses namespaces, substantially reconstructs and considerably extends the capabilities found in XML 1.0 document type definitions (DTDs)

3.5 Additional Sections in RNIF 2.0 Focusing on RosettaNet Business Message Components

	Section Number			Section Label
1.	*2*			*Technical Specifications*
2.		*2.1*		*RosettaNet Business Message Components*
3.			*2.1.2*	*XML Usage*
4.			**2.1.2.5**	**XML Namespace**
5.		**2.1.3**		**Header Structure and Format Specification**
6.			**2.1.3.1**	**Preamble Specification**
7.			**2.1.3.2**	**Delivery Header Specification**
8.			**2.1.3.3**	**Service Header**
9.			*2.1.4*	*Payload Components*
10.			**2.1.4.1**	**Service Content**
11.		*2.5*		*Business Signal Specifications & Process Control PIPs*
12.			*2.5.1*	*Business Signals*
13.			**2.5.1.1**	**Receipt Acknowledgement**
14.			**2.5.1.2**	**Exception**
15.			*2.5.2*	*Process Control PIPs*
16.			**2.5.2.1**	**PIP 0A1: Notification of Failure (NoF)**
17.	**Appendix A**			**Signals and Signal Fields**
18.	**Appendix F**			**Additional Examples**

3.6 Additional Sections in RNIF 1.1 Focusing on RosettaNet Business Message Components

	Section Number	Section Label
1.		*Preface*
2.		**Structure of this Document**
3.	*2*	*Partner Interface Process(PIP) Specifications*
4.	*2.1*	*PIP Business Message Structure*
5.	**2.1.1**	**Message Preamble**
6.	**2.1.2**	**Message Header**
7.	2.2	RosettaNet Message Guideline Format
8.	*3*	*RosettaNet Networked Application Protocols*
9.	*3.1*	*Message-Packing Example*
10.	**3.1.1**	**RosettaNet Service Protocol Message**
11.	**3.1.1.1**	**Preamble**
12.	**3.1.1.2**	**Service Header**
13.	**3.1.1.3**	**Service Content**
14.	**8**	**RosettaNet Protocol Message DTDs**
15.	**9**	**Complete Example of a Service Protocol Message**

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