Collaboration-Protocol Profile and Agreement Specification Version 0.93

ebXML Trading-Partners Team

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1 Status of this Document

This document specifies an ebXML WORK IN PROGRESS for the eBusiness community.

Distribution of this document is unlimited.

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4 Introduction

4.1 Summary of Contents of Document

As defined in the ebXML Business-Process Specification Schema specification[BPMSPEC], a *Business Partner* is an entity that engages in *Business Transactions* with another *Business Partner(s)*. Each *Partner's* capabilities (both commercial/business and technical) to engage in electronic *Message* exchanges with other *Partners* MAY be described by a document called a *Trading-Partner Profile* (*TPP*). The agreed interactions between two *Partners* MAY be documented in a document called a *Trading-Partner Agreement (TPA).* A *TPA* MAY be created by computing the intersection of the two *Partners*' *TPPs.*

The *Message*-exchange capabilities of a *Party* MAY be described by a *Collaboration-Protocol Profile (CPP)* within the *TPP*. The *Message*-exchange agreement between two *Parties* MAY be described by a *Collaboration-Protocol Agreement (CPA)* within the *TPA.* Included in the *CPP* and *CPA* are details of transport, messaging, security constraints, and bindings to a *Process-Specification* document that contains the definition of the interactions between the two *Parties* while engaging in a specified electronic *Business Process*.

This specification is a draft standard for trial implementation. This specification contains the detailed definitions of the *Collaboration-Protocol Profile (CPP)* and the *Collaboration-Protocol Agreement* (*CPA).*

This specification is a component of the suite of ebXML specifications. An overview of the ebXML specifications and their interrelations can be found in the ebXML Technical Architecture Specification[TECHARCH].

This specification is organized as follows:

- Section 5 defines the objectives of this specification.
- Section 6 provides a system overview.
- Section 7 contains the definition of the *CPP*, identifying the structure and all necessary fields.
- Section 8 contains the definition of the *CPA.*
- The appendices include examples of XML *CPP* and *CPA* documents (non-normative), the DTD (normative), an XML Schema document equivalent to the DTD (normative), formats of information in the *CPP* and *CPA* (normative), and composing a *CPA* from two *CPPs* (non-normative).

4.2 Document Conventions

Terms in *Italics* are defined in the ebXML Glossary of Terms[EBXMLGLOSS]. Terms listed in ***Bold Italics*** represent the element and/or attribute content of the XML *CPP or CPA* definitions.

In this specification, indented paragraphs beginning with "NOTE:" provide non-normative

explanations or suggestions that are not required by the specification.

References to external documents are represented with BLOCK text enclosed in brackets, e.g. [RFC2396]. The references are listed in Section 9, "References".

The keywords MUST, MUST NOT, REQUIRED, SHALL, SHALL NOT, SHOULD, SHOULD NOT, RECOMMENDED, MAY, and OPTIONAL, when they appear in this document, are to be interpreted as described in [RFC 2119].

> NOTE: Vendors should carefully consider support of elements with cardinalities (0 or 1) or (0 or more). Support of such an element means that the element is processed appropriately for its defined function and not just recognized and ignored. A given *Party* might use these elements in some *CPPs* or *CPAs* and not in others. Some of these elements define parameters or operating modes and should be implemented by all vendors. It might be appropriate to implement optional elements that represent major run-time functions, such as various alternative communication protocols or security functions, by means of plug-ins so that a given *Party* MAY acquire only the needed functions rather than having to install all of them.

4.3 Definitions

Technical terms in this specification are defined in the ebXML Glossary[EBXMLGLOSS].

4.4 Audience

One target audience for this specification is implementers of ebXML services and other designers and developers of middleware and application software that is to be used for conducting electronic business. Another target audience is the people in each enterprise who are responsible for creating *CPPs* and *CPAs*.

4.5 Assumptions

It is expected that the reader has an understanding of [XML] and is familiar with the concepts of electronic business (e-business).

4.6 Related Documents

Related documents include ebXML Specifications on the following topics:

- ebXML Technical Architecture Specification[TECHARCH]
- ebXML *Message* Service Specification[MSSPEC]
- ebXML Business Process Specification SchemaBPMSPEC]
- ebXML Glossary [EBXMLGLOSS]
- ebXML Core Components Specification[EBXMLCC]
- ebXML Registry and Repository Specification[REGREP]

See Section 9 for the complete list of references.

5 Design Objectives

The objective of this specification is to ensure interoperability between two *Parties* even though they MAY procure application software and run-time support software from different vendors. The *CPA* defines the way two *Parties* will interact in performing the chosen *Collaborative Process*. Both *Parties* SHALL use identical copies of the *CPA* to configure their run-time systems. This assures that they are compatibly configured to exchange *Messages* whether or not they have obtained their run-time systems from the same vendor. The configuration process MAY be automated by means of a suitable tool that reads the *CPA* and performs the configuration process.

In addition to supporting direct interaction between two *Parties*, this specification MAY also be used to support interaction between two *Parties* through an intermediary such as a portal or broker. In this initial version of this specification, this MAY be accomplished by creating a *CPA* between each *Party* and the intermediary in addition to the *CPA* between the two *Parties*. The functionality needed for the interaction between a *Party* and the intermediary is described in the *CPA* between the *Party* and the intermediary. The functionality needed for the interaction between the two *Parties* is described in the *CPA* between the two *Parties.*

It is an objective of this specification that a *CPA* SHALL be capable of being composed by intersecting the respective *CPPs* of the *Parties* involved. The resulting *CPA* SHALL contain only those elements that are in common, or compatible, between the two *parties*. Variable quantities, such as number of retries of errors, are then negotiated between the two *Parties*. The design of the *CPP* and *CPA* schemata facilitates this composition/negotiation process. However, the composition and negotatiation processes themselves are outside the scope of this specification. Appendix F contains a non-normative discussion of this subject.

It is a further objective of this specification to facilitate migration of both traditional EDI-based applications and other legacy applications to platforms based on the ebXML specifications. In particular, the *CPP* and *CPA* are components of the migration of applications based on the X12 838 Trading-Partner Profile to more automated means of setting up business relationships and doing business under them.

6 System Overview

6.1 What This Specification Does

The exchange of information between two *Parties* requires each *Party* to know the other *Party's* supported *Collaborative Processes*, the other *Party's* role in the *Collaborative Process*, and the technology details about how the other *Party* sends and receives *Messages*. In some cases, it is necessary for the two *Parties* to reach agreement on some of the details.

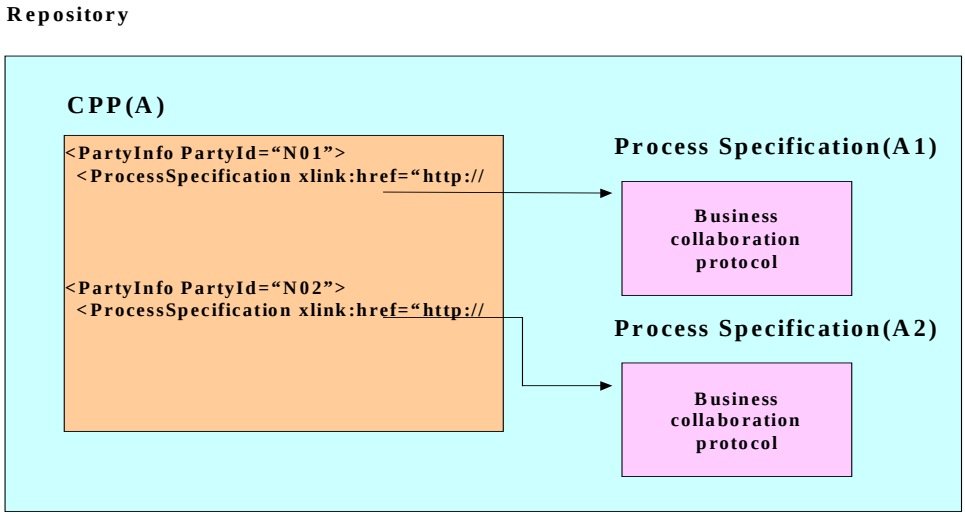
The way each *Party* can exchange information, in the context of a *Collaborative Process*, can be described by a *Collaboration-Protocol Profile (CPP).* The agreement between the *Parties* can be expressed as *a Collaboration-Protocol Agreement (CPA)*

To enable *Parties* wishing to do business to find other *Parties* that are suitable *Business Partners*, *CPP*s MAY be stored in a repository such as is provided by the ebXML Registry[REGREP]. Using a discovery process provided as part of the specifications of a repository, a *Party* MAY then use the facilities of the repository to find *Business Partners*.

The document that defines the interactions between two *Parties* is an [XML] document called a *Process-Specification* document that conforms to the ebXML Business Process Specification Schema specification[BPMSPEC]. The *CPP* and *CPA* include references to this *Process-Specification* document. The *Process-Specification* document MAY also be stored in a repository such as the ebXML Registry.

Figure 1 illustrates the relationships between a *CPP* and two *Process-Specification* documents,

Figure 1: Structure of CPP & Business Process Specification in an ebXML Registry



A1 and A2, in an ebXML Registry. On the left is a *CPP*, A, that includes information about two

parts of an enterprise that are represented as different *Parties*. On the right are shown two *Process-Specification* documents. Each of the ***PartyInfo*** elements in the *CPP* contains a reference to one of the *Process-Specification* documents. This identifies the *Business Process* that the *Party* can perform.

This specification defines the markup language vocabulary for creating electronic *CPPs* and *CPAs*. *CPPs* and *CPAs* are [XML] documents. In the appendices of this specification are a sample *CPP*, a sample *CPA*, the DTD, and the corresponding XML Schema document.

The *CPP* describes the capabilities of an individual *Party*. A *CPA* describes the capabilites that two *Parties* have agreed to use to perform a particular *Business Process*. These *CPAs* define the "information technology terms and conditions" that enable *Business* documents to be electronically interchanged between *Parties*. The information content of a *CPA* is similar to the information-technology specifications sometimes included in Electronic Data Interchange (EDI) trading-partner agreements (TPA). However, these *CPAs* are not paper documents. Rather, they are electronic documents that can be processed by computers at the *Parties'* sites in order to set up and then execute the desired business information exchanges. The "legal" terms and conditions of a business agreement are outside the scope of this specification and therefore are not included in the *CPP* and *CPA*.

An enterprise MAY choose to represent itself as multiple *Parties*. For example, it might represent a central office supply procurement organization and a manufacturing supplies procurement organization as separate *Parties*. The enterprise MAY then construct a *CPP* that includes all of its units that are represented as separate *Parties*. In the *CPP*, each of those units would be represented by a separate ***PartyInfo*** element.

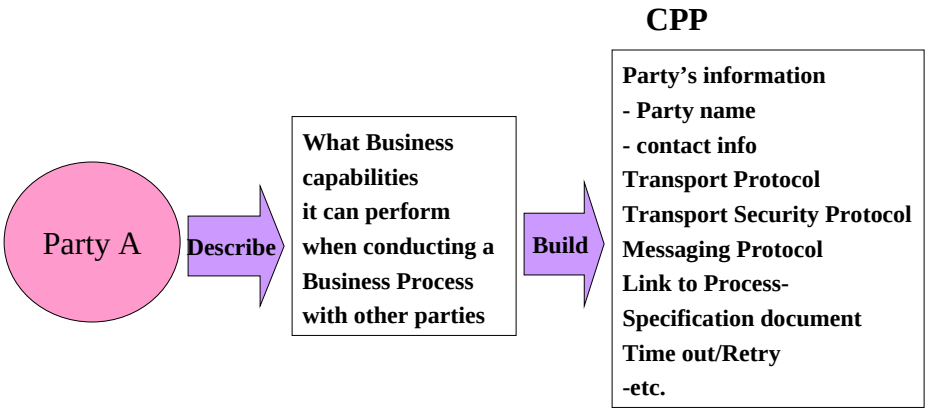
In general, the *Parties* to a *CPA* can have both client and server characteristics. A client requests services and a server provides services to the *Party* requesting services. In some applications, one *Party* only requests services and one *Party* only provides services. These applications have some resemblance to traditional client-server applications. In other applications, each *Party* MAY request services of the other. In that case, the relationship between the two *Parties* can be described as a peer-peer relationship rather than a client-server relationship.

6.2 Forming a *CPA* from Two *CPPs*

This section summarizes the process of discovering a *Party* to do business with and forming a *CPA* from the two *Parties' CPP*s. In general, this section is an overview of a possible procedure and is not to be considered a normative specification. See Appendix F "Composing a *CPA* from Two *CPPs* (Non-Normative)" for more information.

Figure 2 illustrates forming a *CPP*. *Party* A tabulates the information to be placed in a repository for the discovery process, constructs a *CPP* that contains this information, and enters it into an ebXML Registry or similar repository.

Figure 2: Overview of Collaboration-Protocol Profiles (CPP)



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184 In figure 3, *Party* A and *Party* B use their *CPP*s to jointly construct a single copy of a *CPA* by
185 calculating the intersection of the information in their *CPP*s. The resulting *CPA* defines how the
186 two *parties* will behave in performing their *Collaborative Process*.

Figure 3: Overview of Collaboration-Protocol Agreements (CPA)

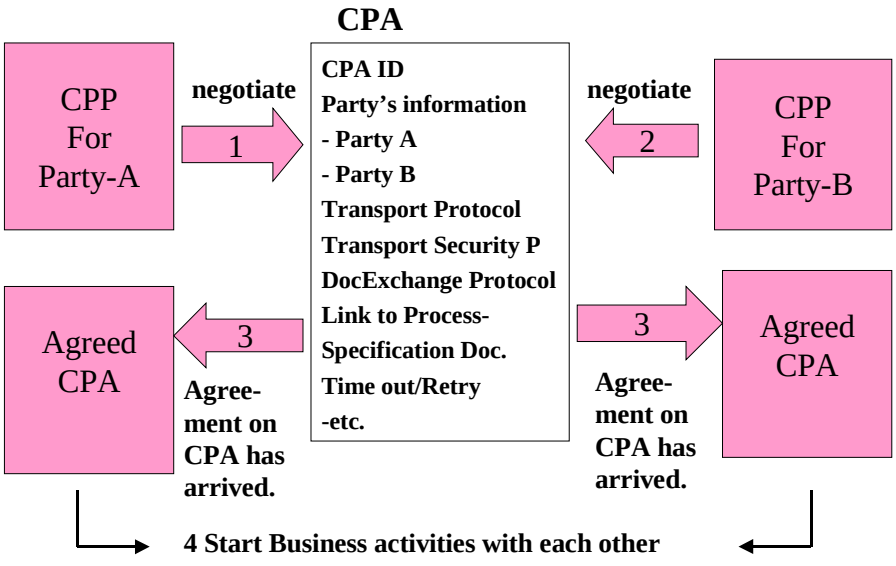

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Figure 4 illustrates the entire process. The steps are listed at the left. The end of the process is that the two *Parties* configure their systems from identical copies of the agreed *CPA* and they are then ready to do business.

Figure 4: Overview of Working Architecture of CPP/CPA with ebXML Registry

1. Any company may register its CPPs to an ebXML Registry.

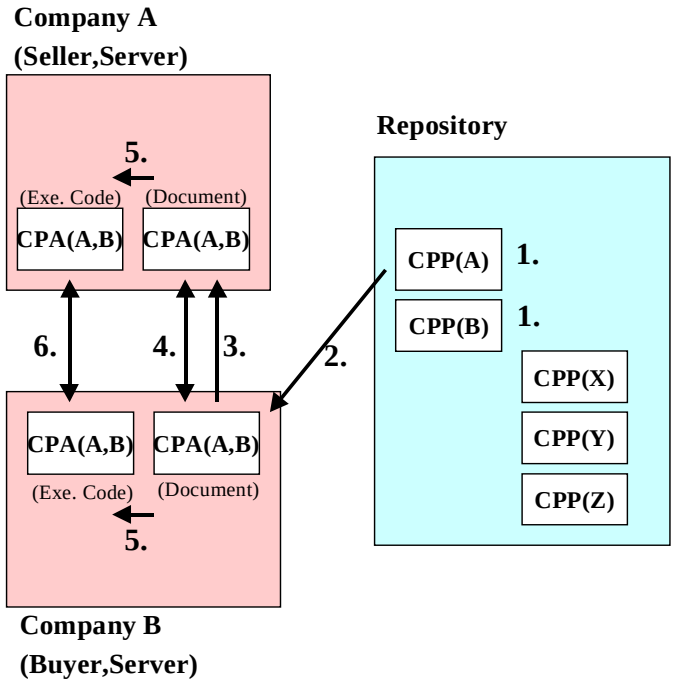
2. Company B discovers trading partner A (Seller) by searching CPPs in the Repository and downloads CPP(A) to Company-B's server.

3. Company B makes CPA(A,B) and sends CPA(A,B) to Company A.

4. Companies A and B negotiate and store identical copies of the completed CPA as a document in both servers. This process is done manually or automatically.

5. Companies A and B configure their runtime systems with the information in the CPA.

6. Do Business (e.g. submit purchase orders).



6.3 How the *CPA* Works

A *CPA* describes all the valid visible, and hence enforceable, interactions between the *Parties* and the way these interactions are carried out. It is independent of the internal processes executed at each *Party*. Each *Party* executes its own internal processes and interfaces them with the *Collaborative Process* described by the *CPA* and *Process-Specification* document. The *CPA* does not expose details of a *Party's* internal processes to the other *Party*. The intent of the *CPA* is to provide a high-level specification that can be easily comprehended by humans and yet is precise enough for enforcement by computers.

The information in the *CPA* is used to configure the *Parties'* systems to enable exchange of *Messages* in the course of performing the selected *Business Process.* Typically, the software that performs the *Messages* exchanges and otherwise supports the interactions between the *Parties* is middleware that can support any selected *Business Process.* One component of this middleware is the ebXML *Message* Service Handler[MSSPEC]. In this specification, the term "runtime system" or "runtime software" is used to denote such middleware.

The *CPA* and the *Process-Specification* document that it references define a conversation between the two *Parties*. The conversation represents a single unit of business as defined by the *Binary-Collaboration* component of the *Process-Specification* document. The conversation consists of one or more *Business Transactions*, each of which is a request *Message* from one *Party* and a response *Message* from the other *Party*. The *Process-Specification* document defines, among other things, the request and response *Message*s for each *Business Transaction* and the order in which the *Business Transactions* are REQUIRED to occur. See [BPMSPEC] for a detailed explanation.

The *CPA* MAY actually reference more than one *Process-Specification* document. When a *CPA* references more than one *Process-Specification* document, each *Process-Specification* document defines a distinct type of conversation. Any one conversation involves only a single *Process-Specification* document.

A new conversation is started each time a new unit of business is started. The *Business Process* also determines when the conversation ends. From the viewpoint of a *CPA* between *Party* A and *Party* B, the conversation starts at *Party* A when *Party* A sends the first request *Message* to *Party* B. At *Party* B, the conversation starts when it receives the first request of the unit of business from *Party* A. A conversation ends when the *Parties* have completed the unit of business.

> NOTE: The run-time system SHOULD provide an interface by which the business application can request initiation and ending of conversations.

6.4 Where the *CPA* May Be Implemented

Conceptually, the *CPA* and *Process-Specification* document are implemented by a business-to-business (B2B) server at each *Party's* site. The B2B server includes the runtime software, i.e. the middleware that supports communication with the other *Party*, execution of the functions specified in the *CPA*, interfacing to each *Party's* back-end processes, and logging the interactions between the *Parties* for purposes such as audit and recovery. The middleware might support the concept of a long-running conversation as the embodiment of a single unit of business between the *Parties*. To configure the two *Parties'* systems for business to business operations, the information in the copy of the *CPA* and *Process-Specification* documents at each *Party's* site is installed in the run-time system. The static information MAY be recorded in a local database and other information in the *CPA* and *Process-Specificationdocument* MAY be used in generating or customizing the necessary code to support the *CPA*.

> NOTE: It is possible to provide a graphic *CPP/CPA*-authoring tool that understands both the semantics of the *CPP/CPA* and the XML syntax. Equally important, the definitions in this specification make it feasible to automatically generate, at each *Party's* site, the code needed to execute the *CPA*, enforce its rules, and interface with the *Party's* back-end processes.

6.5 Definition and Scope

This specification defines and explains the contents of the *CPP* and *CPA* XML documents. Its scope is limited to these definitions. It does not define how to compose a *CPA* from two *CPPs* nor does it define anything related to run-time support for the *CPP* and *CPA*. It does include some non-normative suggestions and recommendations regarding runtime support where these notes serve to clarify the *CPP* and *CPA* definitions. See section 10 for a discussion of conformance to this specification.

NOTE: This specification is limited to defining the contents of the *CPP* and *CPA*, and it is possible to be conformant with it merely by producing a *CPP* or *CPA* document that conforms to the DTD and XML Schema documents defined herein. It is, however, important to understand that the value of this specification lies in its enabling a runtime system that supports electronic commerce between two *Parties* under the guidance of the information in the *CPA.*

7 *CPP* Definition

A *CPP* defines the capabilities of a *Party* to engage in electronic business with other *Parties*. These capabilities include both technology capabilities such as supported communication and messaging protocols, and business capabilities in terms of what *Business Processes* it supports.

This section defines and discusses the details in the *CPP* in terms of the individual XML elements. The discussion is illustrated with some XML fragments. See Appendix C and Appendix D for the DTD and XML Schema, respectively, and Appendix A for a sample *CPP* document.

The ***ProcessSpecification, DeliveryChannel***, ***DocExchange***, and ***Transport*** elements of the *CPP* describe the processing of a unit of business (conversation). These elements form a layered structure somewhat analogous to a layered communication model. The remainder of this section describes both the above-mentioned elements and the corresponding run-time processing.

Process-Specification layer - The Process-Specification layer defines the heart of the business agreement between the *Parties*: the services (*Business Transaction*s) which *Parties* to the *CPA* can request of each other and transition rules that determine the order of requests. This layer is defined by the separate *Process-Specification* document that is referenced by the *CPP* and *CPA*.

Delivery Channels - A delivery channel describes a *Party's Message*-receiving characteristics. It consists of one document-exchange definition and one transport definition. Several delivery channels MAY be defined in one *CPP*.

Document-Exchange layer - The document-exchange layer accepts a business from the *Process-Specification* layer at one *Party*, encrypts it if specified, adds a digital signature for nonrepudiation if specified, and passes it to the transport layer for transmission to the other *Party*. It performs the inverse steps for received *Message*s. The options selected for the document-exchange layer are complementary to those selected for the transport layer. For example, if *Message* security is desired and the selected transport protocol does not provide *Message* encryption, then it must be specified at the document-exchange layer. The protocol for exchanging *Message*s between two *Parties* is defined by the ebXML *Message* Service Specification MSSPEC] or other similar messaging service.

Transport layer - The transport layer is responsible for *Message* delivery using the selected transport protocol. The selected protocol affects the choices selected for the document-exchange layer. For example, some transport-layer protocols might provide encryption and authentication while others have no such facility.

It should be understood that the functional layers encompassed by the *CPP* have no understanding of the contents of the payload of the business documents.

7.1 *CPP* Structure

This section describes the overall structure of the *CPP*. Unless otherwise noted, *CPP* elements MUST be in the order shown here. Subsequent sections describe each of the elements in greater detail.

```
<CollaborationProtocolProfile
      xmlns="http://www.ebxml.org/namespaces/tradePartner"
      xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
      xmlns:xlink="http://www.w3.org/1999/xlink">
      <PartyInfo>  <!--one or more-->
       ...
      </PartyInfo>
      <ds:Signature>  <!--zero or one-->
      ...
      </ds:Signature>
      <Comment>text</Comment> <!--zero or more-->
      </CollaborationProtocolProfile>
```

7.2 CollaborationProtocolProfile element

The ***CollaborationProtocolProfile*** element is the root element of the *CPP* XML document. The REQUIRED [XML] Namespace[XMLNS] declarations for the basic document are as follows:

- The default namespace: xmlns="http://www.ebxml.org/namespaces/tradePartner",
- XML Digital Signature namespace: xmlns:ds="http://www.w3.org/2000/09/xmldsig#",
- and the XLINK namespace: xmlns:xlink="http://www.w3.org/1999/xlink".

The ***CollaborationProtocolProfile*** element SHALL consist of the following child elements:

- One or more REQUIRED ***PartyInfo*** elements that identify the organization (or parts of the organization) whose capabilities are described by the *CPP*.
- Zero or one ***ds:Signature*** elements that contain the digital signature that signs the *CPP* document.
- Zero or more ***Comment*** elements.

A *CPP* document MAY be digitally signed so as to provide for a means of ensuring that the document has not been altered (integrity) and to provide for a means of authenticating the author of the document. A digitally signed *CPP* SHALL be signed using technology that conforms to the joint W3C/IETF XML Digital Signature specification[XMLDSIG].

7.3 PartyInfo Element

The ***PartyInfo*** element identifies the organization whose capabilities are described in this *CPP* and includes all the details about this *Party*. More than one ***PartyInfo*** element MAY be provided in a *CPP* if the organization chooses to represent itself as subdivisions with different characteristics. Each of the subelements of ***PartyInfo*** is discussed later. The overall structure of the ***PartyInfo*** element is as follows:

```
<PartyInfo>
      <PartyId type="...">  <!--one or more-->
```

```
            ...
        </PartyId>
        <PartyRef xlink:type="...", xlink:href="..."/>
        <CollaborationRole>   <!--one or more-->
            ...
        </CollaborationRole>
        <Certificate>  <!--one or more-->
            ...
        </Certificate>
        <DeliveryChannel>  <!--one or more-->
        ...
        </DeliveryChannel>
        <Transport>  <!--one or more-->
        ...
        </Transport>
        <DocExchange>  <!--one or more-->
        ...
        </DocExchange>
</PartyInfo>
```

The ***PartyInfo*** element consists of the following child elements:

- One or more REQUIRED ***PartyId*** elements that provide a logical identifier for the organization.
- A REQUIRED ***PartyRef*** element that provides a pointer to more information about the *Party*.
- One or more REQUIRED ***CollaborationRole*** elements that identify the roles that this *Party* can play in the context of a *Process Specification*.
- One or more REQUIRED ***Certificate*** elements that identify the certificates used by this *Party* in security functions.
- One or more REQUIRED ***DeliveryChannel*** elements that define the characteristics of each delivery channel that the *Party* can use to receive *Messages*. It includes both the transport level (e.g. HTTP) and the messaging protocol (e.g. ebXML *Message* Service).
- One or more REQUIRED ***Transport*** elements that define the characteristics of the transport protocol(s) that the *Party* can support to receive *Messages*.
- One or more REQUIRED ***DocExchange*** elements that define the *Message*-exchange characteristics, such as the *Message*-exchange protocol, that the *Party* can support.

7.3.1 PartyId element

The REQUIRED ***PartyId*** element provides a logical identifier that MAY be used to logically identify the *Party*. Additional ***PartyId*** elements MAY be present so as to provide for alternative logical identifiers for the *Party*. This permits a large organization, for example, to have different identifiers for different purposes.

The value of the ***PartyId*** element is any string that provides a unique identifier. The identifier MAY be any identifier that is understood by both *Parties* to a *CPA*. Typically, the identifier would be listed in a well-known directory such as DUNS or in any naming system specified by [ISO6523].

The ***PartyId*** element has a single IMPLIED attribute: ***type*** that has a string value.

If the ***type*** attribute is present, then it provides a scope or namespace for the content of the ***PartyId*** element.

If the ***type*** attribute is not present, the content of the ***PartyId*** element MUST be a URI that conforms to [RFC2396]. It is RECOMMENDED that the value of the ***type*** attribute be a URN that defines a namespace for the value of the ***PartyId*** element. Typically, the URN would be registered as a well-known directory of organization identifiers.

The following example illustrates two URI references.

```
<PartyId type = "uriReference">urn:duns.com:duns:1234567890123</PartyId>
<PartyId type = "uriReference">urn:www.example.com</PartyId>
```

The first example is the URN for the *Party's* DUNS number, assuming that Dun and Bradstreet has registered a URN for DUNS numbers with the Internet Assigned Numbers Authority (IANA). The last field is the DUNS number of the organization.

The second example shows an arbitrary URN. This might be a URN that the *Party* has registered with IANA to identify itself directly.

7.3.2 PartyRef element

The ***PartyRef*** element provides a link, in the form of a URI, to additional information about the *Party*. Typically, this would be the URL from which the information can be obtained. The information might be at the *Party's* web site or in a publicly accessible repository such as an ebXML Registry, a UDDI repository, or an LDAP directory. Information available at that URI MAY include contact names, addresses, and phone numbers, and perhaps more information about the *Business Processes* that the *Party* supports. This information MAY be in the form of an ebXML Core Component[EBXMLCC]. It is not within the scope of this specification to define the content or format of the information at that URI.

The ***PartyRef*** element is an [XLINK] simple link. It has the following attributes:

- a REQUIRED ***xlink:type*** attribute,
- a REQUIRED ***xlink:href*** attribute.

7.3.2.1 xlink:type attribute

The ***xlink:type*** attribute SHALL have a FIXED value of "simple". This identifies the element as being an [XLINK] simple link.

7.3.2.2 xlink:href attribute

The REQUIRED ***xlink:href*** attribute SHALL have a value that is a URI that conforms to [RFC2396] and identifies the location of the external information about the *Party*.

An example of the ***PartyRef*** element is:

```
      <PartyRef xlink:type="simple"
            xlink:href="http://example2.com/ourInfo.html"/>
```

7.3.3 CollaborationRole element

```
<CollaborationRole id="N11" >
    <ProcessSpecification name="BuySell" version="1.0">
     ...
    </ProcessSpecification>
    <Role name="buyer" xlink:href="..."/>
    <CertificateRef certId = "N03"/>    <!-- primary binding with "preferred"
        DeliveryChannel -->
    <ServiceBinding name="some process" channelId="N02">
        <!-- override "default" deliveryChannel  for selected message(s)-->
        <Override action="OrderAck" channelId="N05"
            xlink:type="locator"
            xlink:href="..."/>
        <Packaging>
            ...
        </Packaging>  <!--one or more-->
    </ServiceBinding>
    <!-- the first alternate binding -->
    <ServiceBinding channelId="N04">
        <Override action="OrderAck" channelId="N05"
      xlink:type="locator"
            xlink:href="..."/>
        <Packaging>
        ...
        </Packaging>  <!--one or more-->
    </ServiceBinding>
</CollaborationRole>
```

The ***CollaborationRole*** element associates a *Party* with a specific role in the *Business Process* that is defined in the *Process-Specification* document[BPMSPEC]. Generally, the *Process Specification* is defined in terms of roles such as "buyer" and "seller". The association between a specific *Party* and the role(s) it is capable of fulfilling within the context of a *Process Specification* is defined in both the *CPP* and *CPA* documents. In a *CPP*, the ***CollaborationRole*** element identifies which role the *Party* is capable of playing in each *Process Specification* documents referenced by the *CPP*.

To indicate that the *Party* can play roles in more than one *Business Process* or more than one role in a given *Business Process*, the ***PartyInfo*** element SHALL contain more than one ***CollaborationRole*** element. Each ***CollaborationRole*** element SHALL contain the appropriate combination of ***ProcessSpecification*** element and ***Role*** element.

The ***CollaborationRole*** element SHALL consist of the following child elements: a REQUIRED ***ProcessSpecification*** element, a REQUIRED ***Role*** element, zero or one ***CertificateRef*** element, and one or more ***ServiceBinding*** elements. The ***ProcessSpecification*** element identifies the *Process-Specification* document that defines such role. The ***Role*** element identifies which role the *Party* is capable of supporting. The ***CertificateRef*** element identifies the certificate to be used. Each ***ServiceBinding*** element provides a binding of the role to a default ***DeliveryChannel.*** The default ***DeliveryChannel*** describes the receive properties of all *Message* traffic that is to be received by the *Party* within the context of the role in the identified *Process-Specification* document. Alternative ***DeliveryChannels*** MAY be specified for specific purposes, using ***Override*** elements as described below.

When there are more than one ***ServiceBinding*** child elements of a ***CollaborationRole***, then the order of the ***ServiceBinding*** elements SHALL be treated as signifying the *Party's* preference starting with highest and working towards lowest. The default delivery channel for a given *Process-Specification document* is the delivery channel identified by the highest-preference ***ServiceBinding*** element that references the particular *Process-Specification* document.

> NOTE: When a *CPA* is composed, the ***ServiceBinding*** preferences are applied in choosing the highest-preference delivery channels that are compatible between the two *Parties*.

When a *CPA* is composed, only ***ServiceBinding*** elements that are compatible between the two *Parties* SHALL be retained. Each *Party* SHALL have a default delivery channel for each *Process-Specification* document referenced in the *CPA*. For each *Process-Specification* document, the default delivery channel for each *Party* is the delivery channel that is indicated by the ***channelId*** attribute in the highest-preference ***ServiceBinding*** element that references that *Process-Specification* document.

> NOTE: An implementation MAY provide the capability of dynamically assigning delivery channels on a per *Message* basis during performance of the *Business Process.* The delivery channel selected would be chosen, based on present conditions, from those identified by ***ServiceBinding*** elements that refer to the *Business Process* that is sending the *Message*. If more than one delivery channel is applicable, the one referred to by the highest-preference ***ServiceBinding*** element is used.

The ***CollaborationRole*** element has the following attribute:

- a REQUIRED ***id*** attribute.

7.3.3.1 id attribute

The REQUIRED ***id*** attribute is an [XML] ID attribute by which this ***CollaborationRole*** element can be referenced from elsewhere in the *CPP* document.

7.3.3.2 CertificateRef element

The EMPTY ***CertificateRef*** element contains an IMPLIED attribute, ***certId*** that identifies the certificate to be used by referring to the ***Certificate*** element (under ***PartyInfo***) that has the matching ID attribute value.

7.3.3.3 certId attribute

The IMPLIED ***certId*** attribute is an [XML] IDREF that associates the ***CollaborationRole*** with a ***Certificate*** with a matching ID attribute**.**

> NOTE: This ***certID*** attribute relates to the authorizing role in the *Process Specification* while the certificates identified in the delivery-channel description relate to *Message* exchanges.

7.3.4 ProcessSpecification Element

The ***ProcessSpecification*** element provides the link to the *Process-Specification* document that defines the interactions between the two *Parties*. This document is prepared in accord with the ebXML Business Process Specification Schema specification[BPMSPEC]. The *Process-Specification* document MAY be kept in an ebXML Registry.

The syntax of the ***ProcessSpecification*** element is:

```
<ProcessSpecification
      name="BuySell"
      version="1.0"
      xlink:type="locator"
      xlink:href="http://www.ebxml.org/services/purchasing.xml"
      <ds:Reference ds:URI="http://www.ebxml.org/services/purchasing.xml">
            <ds:Transforms>
                  <ds:Transform
            ds:Algorithm="http://www.w3.org/TR/2000/CR-xml-c14n-20001026"/>
            </ds:Transforms>
            <ds:DigestMethod
                  ds:Algorithm="http://www.w3.org/2000/09/xmldsig#sha1">
                  String
            </ds:DigestMethod>
            <ds:DigestValue>j6lwx3rvEPO0vKtMup4NbeVu8nk=</ds:DigestValue>
      </ds:Reference>
</ProcessSpecification>
```

As an alternative to the string value of the ***ds:DigestMethod***, the child element, ***ds:HMACOutputLength***, with a string value, MAY be used. See the XML Digital Signature Specification[XMLDSIG] for more information.

The ***ProcessSpecification*** element has a single REQUIRED child element, ***ds:Reference,*** and the following attributes:

- a REQUIRED ***name*** attribute, with type ID,
- a REQUIRED ***version*** attribute,
- a FIXED ***xlink:type*** attribute,
- a REQUIRED ***xlink:href*** attribute.

The ***ds:Reference*** element relates to the ***xlink:type*** and ***xlink:href*** attributes as follows. Each ***ProcessSpecification*** element SHALL contain one ***xlink:href*** attribute and one ***xlink:type*** attribute with a value of "locator", and MAY contain one ***ds:Reference*** element formulated according to the XML Digital Signature specification[XMLDSIG]. In case the document is signed, it MUST use the ***ds:Reference*** element. When the ***ds:Reference*** element is present, it MUST include a ***ds:URI*** attribute whose value is identical to that of the ***xlink:href*** attribute in the enclosing ***ProcessSpecification*** element.

7.3.4.1 name attribute

The ***ProcessSpecification*** element MUST include a REQUIRED ***name*** attribute: an [XML] ID that MAY be used to refer to this element from elsewhere within the *CPP* document.

7.3.4.2 version attribute

The ***ProcessSpecification*** element includes a REQUIRED ***version*** attribute to identify the

version of the *Process-Specification* document identified by the ***xlink:href*** attribute (and also identified by the ***ds:Reference*** element, if any).

7.3.4.3 xlink:type attribute

The ***xlink:type*** attribute has a FIXED value of "locator". This identifies the element as being an [XLINK] locator.

7.3.4.4 xlink:href attribute

The REQUIRED ***xlink:href*** attribute SHALL have a value that identifies the *Process-Specification* document and is a URI that conforms to [RFC2396].

7.3.4.5 ds:Reference Element

The ***ds:Reference*** element identifies the same *Process-Specification* document as the enclosing ***ProcessSpecification*** element's **xlink:href** attribute and additionally provides for verification that the *Process-Specification* document has not changed since the *CPP* was created.

> NOTE: *Parties* MAY test the validity of the *CPP* or *CPA* at any time. The following validity tests MAY be of particular interest:
>
> - test of the validity of a *CPP* and the referenced *Process-Specification* documents at the time composition of a *CPA* begins in case they have changed since they were created,
> - test of the validity of a *CPA* and the referenced *Process-Specification* documents at the time a *CPA* is installed into a *Party's* system,
> - test of the validity of a *CPA* at intervals after the *CPA* has been installed into a *Party's* system. The *CPA* and the referenced *Process-Specification* documents MAY be processed by an installation tool into a form suited to the particular middleware. Therefore, alterations to the *CPA* and the referenced *Process-Specification* documents do not necessarily affect ongoing run-time operations. Such alterations might not be detected until it becomes necessary to reinstall the *CPA* and the referenced *Process-Specification* documents.

The syntax and semantics of the ***ds:Reference*** element and its child elements are defined in the XML Digital Signature specification[XMLDSIG], with the following additional requirements:

- Each ***ds:Reference*** element within a ***ProcessSpecification*** element MUST specify a ***ds:Transform*** to canonicalize the reference, and that transform MUST be Canonical XML[XMLC14N]. Note that implementation of Canonical XML is REQUIRED by the XML Digital Signature specification[XMLDSIG].

- A ***ds:Reference*** element within a ***ProcessSpecification*** element SHALL NOT specify a ***ds:Transform*** that would alter the canonical form of the reference as defined by Canonical XML[XMLC14N].

A ***ds:Reference*** element in a ***ProcessSpecification*** element has implications for *CPP* validity:

- A *CPP* MUST be considered invalid if any ***ds:Reference*** element within a ***ProcessSpecification*** element fails reference validation as defined by the XML Digital Signature specification[XMLDSIG].

- A *CPP* MUST be considered invalid if any ***ds:Reference*** within it cannot be dereferenced.

Other validity implications of such ***ds:Reference*** elements are specified in the description of the ***ds:Signature*** element**.**

NOTE: The XML Digital Signature specification[XMLDSIG] states "The signature application MAY rely upon the identification (URI) and Transforms provided by the signer in the Reference element, or it MAY obtain the content through other means such as a local cache" (emphases on MAY added). However, it is RECOMMENDED that ebXML *CPP*/*CPA* implementations not make use such cached results when signing or validating.

NOTE: It is recognized that the XML Digital Signature specification[XMLDSIG] provides for signing an XML document together with externally referenced documents. In cases where a *CPP* or *CPA* document is in fact suitably signed, that facility could also be used to ensure that the referenced *Process-Specification* documents are unchanged. However, this specification does not currently mandate that a *CPP* or *CPA* be signed.

NOTE: If the *Parties* to a *CPA* wish to customize a previously existing *Process-Specification* document, they MAY copy the existing document, modify it, and cause their *CPA* to reference the modified copy. It is recognized that for reasons of clarity, brevity, or historical record, the parties might prefer to reference a previously existing *Process-Specification* document in its original form and accompany that reference with a specification of the agreed modifications. Therefore, *CPP* usage of the ***ds:Reference*** element's ***ds:Transforms*** subelement within a ***ProcessSpecification*** element might be expanded in the future to allow other transforms as specified in the XML Digital Signature specification[XMLDSIG]. For example, modifications to the original document could then be expressed as XSLT transforms. After applying any transforms, it would be necessary to validate the transformed document against the ebXML Business Process Specification Schema specification[BPMSPEC].

7.3.5 Role element

The REQUIRED ***Role*** element identifies which role in the *Process Specification* the *Party* is capable of supporting via the ***ServiceBinding*** element(s) siblings within this ***CollaborationRole*** element.

The ***Role*** element has the following attributes:

- a REQUIRED ***name*** attribute,
- a FIXED ***xlink:type*** attribute,
- a REQUIRED ***xlink:href*** attribute.

7.3.5.1 name attribute

The REQUIRED ***name*** attribute is a string that gives a name to the ***Role***. Its value is taken from one of the following sources in the *Process Specification*[BPMSPEC] that is referenced by the ***ProcessSpecification*** element depending upon which element is the "root" (highest order) of the process referenced:

- ***initiator*** attribute of the ***binary-collaboration*** element,
- ***responder*** attribute of the ***binary-collaboration*** element,
- ***from*** attribute of the ***business-transaction-activity*** element,
- ***to*** attribute of the ***business-transaction-activity*** element,
- ***from*** attribute of the ***collaboration-activity*** element,
- ***to*** attribute of the ***collaboration-activity*** element,
- ***name*** attribute of the ***business-partner-role*** element.

7.3.5.2 xlink:type attribute

The ***xlink:type*** attribute has a FIXED value of "locator". This identifies the element as being an [XLINK] locator.

7.3.5.3 xlink:href attribute

The REQUIRED ***xlink:href*** attribute SHALL have a value that is a URI that conforms to [RFC2396]. It identifies the location of the element or attribute within the *Process-Specification* document that defines the role in the context of the *Business Process.*

7.3.6 ServiceBinding element

The ***ServiceBinding*** element identifies a ***DeliveryChannel*** element for all of the *Message* traffic that is to be sent to the *Party* within the context of the identified *Process-Specification* document. An example of the ***ServiceBinding*** element is:

```
<ServiceBinding name="SomeProcess" channelId="X03">
      <Packaging>  <!--one or more-->
            ...
      </Packaging>
      <Override action="OrderAck"
            channelId="X04"
            xlink:type="locator"
            xlink"href="..."/>  <!--zero or more-->
</ServiceBinding>
```

The ***ServiceBinding*** element SHALL have one or more REQUIRED ***Packaging*** child elements and zero or more ***Override*** child elements.

The ***ServiceBinding*** element has the following attributes:

- a REQUIRED ***name*** attribute,
- a REQUIRED ***channelId*** attribute.

7.3.6.1 name attribute

The value of the REQUIRED ***name*** attribute is a string value that labels the ***ServiceBinding*** element. The value of the ***name*** attribute SHALL be used as the value of the ***Service*** element in

the ebXML *Message Header*[MSSSPEC].

7.3.6.2 channelId attribute

The REQUIRED ***channelId*** attribute is an [XML] IDREF that identifies the ***DeliveryChannel*** that SHALL provide a default technical binding for all of the *Message* traffic that is received for the *Process Specification* that is referenced by the ***ProcessSpecification*** element.

The ***ServiceBinding*** element has one or more ***Packaging*** child elements. The ***Packaging*** element MAY appear one or more times in a *CPP* as a child of each ***ServiceBinding*** element and SHALL appear once as a child of each ***ServiceBinding*** element in a *CPA.*

The packaging subtree provides specific information about how the *Message Header* and payload constituent(s) are packaged for transmittal over the transport, including the crucial information about what document-level security packaging is used and the way in which security features have been applied. Typically the subtree under the ***Packaging*** element indicates the specific way in which constituent parts of the *Message* are organized. MIME processing capabilities are typically the capabilities or agreements described in this subtree.

Following is an example of the ***Packaging*** element:

```
<Packaging>  <!--one or more-->
<!--The triplet  of child elements of Packaging MAY appear one
      or more times-->
      <ProcessingCapabilities parse="..."  generate="..."/>
      <SimplePart
            id="id" mimetype="type"/> <!--one or more-->
       <!--The child of CompositeList is an enumeration of either
       Composite or Encapsulation.  The enumeration MAY appear one
       or more time, with the two elements intermixed-->
       <CompositeList
            <Composite mimetype="type"
                  id="name"
                  mimeparameters="parameter">
                  <Constituent idref="name"/>
            </Composite>
            <Encapsulation mimetype="type" id="name">
                  <Constituent idref="name"/>
            </Encapsulation>
      </CompositeList>
</Packaging>
```

The child elements of the ***Packaging*** element are ***ProcessingCapabilities, SimplePart***, and ***CompositeList.*** This set of elements MAY appear one or more times as a child of each ***Packaging*** element in a *CPP* and SHALL appear once as a child of each ***Packaging*** element in a *CPA.*

The ***ProcessingCapabilities*** element has two attributes with REQUIRED Boolean values of either "true" or "false". The attributes are ***parse*** and ***generate***. Normally these attributes will both have values of "true" to indicate that the packaging constructs specified in the other child elements can be both produced as well as processed at the software *Message* service layer.

The ***SimplePart*** element provides a repeatable list of the constituent parts, primarily identified by

the MIME Content-Type value. The ***SimplePart*** element has two REQUIRED attributes: ***id*** and ***mimetype***. The ***id*** attribute, type ID, provides the value that will be used later to reference this *Message* part when specifying how the parts are packaged into composites, if composite packaging is present. The ***mimetype*** attribute provides the actual value of the Content-type for the simple *Message* part being specified.

The final child element of ***Packaging*** is ***CompositeList***, which is a container for the specific way in which the simple parts are combined into groups (MIME multiparts) or encapsulated within security-related MIME content-types. The ***CompositeList*** element MAY be omitted from ***Packaging*** when no security encapsulations or composite multiparts are used. When the ***CompositeList*** element is present, the content model for ***CompositeList*** is a repeatable sequence of choices of ***Composite*** or ***Encapsulation*** elements. The ***Composite*** and ***Encapsulation*** elements MAY appear intermixed as desired.

The sequence in which the choices are presented is important because, given the recursive character of MIME packaging, ***Composites*** or ***Encapsulations*** MAY include previously mentioned ***Composites*** (or rarely, ***Encapsulations***) in addition to the *Message* parts characterized within the ***SimplePart*** subtree. Therefore, the "top-level" packaging will be described last in the sequence.

The ***Composite*** element has the following attributes:

- a REQUIRED ***mimetype*** attribute,
- a REQUIRED ***id*** attribute,
- an IMPLIED ***mimeparameters*** attribute.

The ***mimetype*** attribute provides the value of the MIME content-type for this *Message* part, and this will be some MIME composite type, such as "Multipart/related" or "Multipart/signed". The ***id*** attribute, type ID, provides a way to refer to this composite if it needs to be mentioned as a constituent of some later element in the sequence. The ***mimeparameters*** attribute provides the values of any significant MIME parameter (such as "type=application/vnd.eb+xml") that is needed to understand the processing demands of the content-type.

The ***Composite*** element has one child element, ***Constituent.***

The ***Constituent*** element has one REQUIRED attribute, ***idref***, type IDREF, and has an EMPTY content model. The ***idref*** *attribute* has as its value the value of the ***id*** attribute of a previous ***Composite***, ***Encapsulation***, or ***SimplePart*** element. The purpose of this sequence of ***Constituents*** is to indicate both the contents and the order of what is packaged within the current ***Composite*** or ***Encapsulation***.

The ***Encapsulation*** element is typically used to indicate the use of MIME security mechanisms, such as [S/MIME] or Open-PGP[RFC2015]. A security body part can encapsulate a MIME part that has been previously characaterized. For convenience, we tag all such security structures under ***Encapsulation***, even when technically speaking the data is not "inside" the body part. (In other words, the so-called clear-signed or detached signature structures possible with MIME multipart/signed are for simplicity found under the ***Encapsulation*** element.)

The ***Encapsulation*** element has the following attributes:

- a REQUIRED ***mimetype*** attribute,
- a REQUIRED ***id*** attribute,
- an IMPLIED ***mimeparameters*** attribute.

The ***mimetype*** attribute provides the value of the MIME content-type for this *Message* part, such as "application/pkcs7-mime." The ***id*** attribute, type ID, provides a way to refer to this encapsulation if it needs to be mentioned as a constituent of some later element in the sequence. The ***mimeparameters*** attribute provides the values of any significant MIME parameter(s) needed to understand the processing demands of the content-type.

Both the ***Encapsulation*** attribute and the ***Composite*** element have child elements consisting of a ***Constituent*** element or of a repeatable sequence of ***Constituent*** elements, respectively.

7.3.7 Override element

The ***Override*** element provides a *Party* with the ability to map, or bind, a different ***DeliveryChannel*** to selected *Messages* that are to be received by the *Party* within the context of the parent ***ServiceBinding*** element.

Each ***Override*** element SHALL specify a different ***DeliveryChannel*** for selected *Messages* that are to be received by the *Party* in the context of the *Process Specification* that is associated with the parent ***ServiceBinding*** element.
The ***Override*** element has the following attributes:

- a REQUIRED ***action*** attribute,
- a REQUIRED ***channelId*** attribute,
- an IMPLIED ***xlink:href*** attribute,
- a FIXED ***xlink:type*** attribute.

Under a given ***ServiceBinding*** element, there SHALL be only one ***Override*** element whose ***action*** attribute has a given value.

> NOTE: It is possible that when a *CPA* is composed from two *CPPs*, a delivery channel in one *CPP* might have an ***Override*** element that will not be compatible with the other *Party*. This incompatibility MUST be resolved either by negotiation or by reverting to a compatible default delivery channel.

7.3.7.1 action attribute

The REQUIRED ***action*** attribute is a string that identifies the *Message* that is to be associated with the ***DeliveryChannel*** that is identified by the ***channelId*** attribute. The value of the ***action*** attribute MUST match the corresponding ***request*** or ***response*** element/attribute in the *Process-Specification* document that is referenced by the ***ProcessSpecification*** element.

7.3.7.2 channelId attribute

The REQUIRED ***channelId*** attribute is an [XML] IDREF that identifies the ***DeliveryChannel***

element that is to be associated with the *Message* that is identified by the ***action*** attribute.

7.3.7.3 xlink:href attribute

The IMPLIED ***xlink:href*** attribute MAY be present. If present, it SHALL provide an absolute [XPOINTER] URI expression that specifically identifies the ***BusinessTransaction*** element within the associated *Process-Specification* document[BPMSPEC] that is identified by the ***ProcessSpecification*** element.

7.3.7.4 xlink:type attribute

The IMPLIED ***xlink:type*** attribute has a FIXED value of "locator". This identifies the element as being an [XLINK] locator.

7.3.8 Certificate element

The ***Certificate*** element defines certificate information for use in this *CPP*. One or more ***Certificate*** elements MAY be provided for use in the various security functions in the *CPP*. An example of the ***Certificate*** element is:

```
<Certificate certId = "N03">
      <ds:KeyInfo>. . .</ds:KeyInfo>
</Certificate>
```

The ***Certificate*** element has a single REQUIRED attribute: ***certId***. The ***Certificate*** element has a single child element: ***ds:KeyInfo***.

7.3.8.1 certId attribute

The REQUIRED ***certId*** attribute is an ID attribute. Its is referred to in a ***CertificateRef*** element, using an IDREF attribute, where a certificate is specified elsewhere in the *CPP*. For example:

```
<CertificateRef certId = "N03"/>
```

7.3.8.2 ds:KeyInfo element

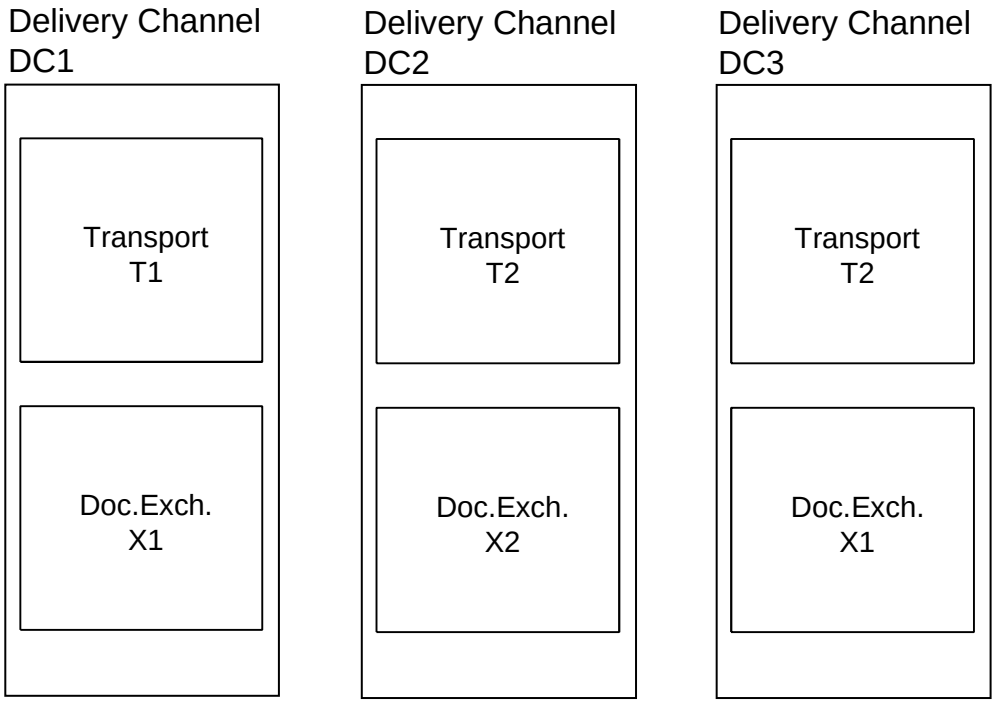
The ***ds:KeyInfo*** element defines the certificate information. The content of this element and any subelements are defined by the XML Digital Signature specification[XMLDSIG].

> NOTE: Software for creation of *CPPs* and *CPAs* MAY recognize the ***ds:KeyInfo*** element and insert the subelement structure necessary to define the certificate.

7.3.9 DeliveryChannel element

A delivery channel is a combination of a ***Transport*** element and a ***DocExchange*** element that describes the *Party's Message*-receiving characteristics. The *CPP* SHALL contain one or more ***DeliveryChannel*** elements, one or more ***Transport*** elements, and one or more ***DocExchange*** elements. Each delivery channel MAY refer to any combination of a ***DocExchange*** element and a ***Transport*** element. The same ***DocExchange*** element or the same ***Transport*** element MAY be referred to by more than one delivery channel. Two delivery channels MAY use the same transport protocol and the same document-exchange protocol and differ only in details such as communication addresses or security definitions. Figure 5 illustrates three delivery channels.

Figure 5: Three Delivery Channels



The delivery channels have ID attributes with values "DC1", "DC2", and "DC3". Each delivery channel contains one transport definition and one document-exchange definition. Each transport definition and each document-exchange definition also has a name as shown in the figure. Note that delivery-channel DC3 illustrates that a delivery channel MAY refer to the same transport definition and document-exchange definition used by other delivery channels but a different combination. In this case delivery-channel DC3 is a combination of transport definition T2 (also referred to by delivery-channel DC2) and document-exchange definition X1 (also referred to by delivery-channel DC1).

A specific delivery channel SHALL be associated with each ***ServiceBinding*** element or ***Override*** element (***action*** attribute). Following is the delivery-channel syntax.

```
<DeliveryChannel channelId="N04" transportId="N05" docExchangeId="N06">
      <Characteristics
            nonrepudiationOfOrigin = "true"
            nonrepudiationOfReceipt = "true"
            secureTransport = "true"
            confidentiality = "true"
            authenticated = "true"
            authorized = "true"/>
</DeliveryChannel>
```

Each ***DeliveryChannel*** element identifies one ***Transport*** element and one ***DocExchange*** element that make up a single delivery channel definition.

The ***DeliveryChannel*** element has the following attributes:

- a REQUIRED ***channelId*** attribute,
- a REQUIRED ***transportId*** attribute,
- a REQUIRED ***docExchangeId*** attribute.

The ***DeliveryChannel*** element has one REQUIRED child element, ***Characteristics.***

7.3.9.1 channelId attribute

The ***ChannelId*** element is an [XML] ID attribute that uniquely identifies the ***DeliveryChannel*** element for reference, using IDREF attributes, from other parts of the *CPP* or *CPA.*

7.3.9.2 transportId attribute

The ***transportId*** attribute is an [XML] IDREF that identifies the ***Transport*** element that defines the transport characteristics of the delivery channel. It MUST have a value that is equal to the value of a ***transportId*** attribute of a ***Transport*** element elsewhere within the *CPP* document.

7.3.9.3 docExchangeId attribute

The ***docExchangeId*** attribute is an [XML] IDREF that identifies the ***DocExchange*** element that defines the document-exchange characteristics of the delivery channel. It MUST have a value that is equal to the value of a ***docExchangeId*** attribute of a ***DocExchange*** element elsewhere within the *CPP* document.

7.3.10 Characteristics element

The ***Characteristics*** element describes the security characteristics provided by the delivery channel. The ***Characteristics*** element has the following attributes:

- an IMPLIED ***nonrepudiationOfOrigin*** attribute,
- an IMPLIED ***nonrepudiationOfReceipt*** attribute,
- an IMPLIED ***secureTransport*** attribute,
- an IMPLIED ***confidentiality*** attribute,
- an IMPLIED ***authenticated*** attribute,
- anIMPLIED ***authorized*** attribute.

7.3.10.1 nonrepudiationOfOrigin attribute

The ***nonrepudiationOfOrigin*** attribute is a Boolean with possible values of "true" and "false". If the value is "true" then the delivery channel REQUIRES the *Message* to be digitally signed by the certificate of the *Party* that sent the *Message*.

7.3.10.2 nonrepudiationOfReceipt attribute

The ***nonrepudiationOfReceipt*** attribute is a Boolean with possible values of "true" and "false". If the value is "true" then the delivery channel REQUIRES that the *Message* be acknowledged by a digitally signed *Message*, signed by the certificate of the *Party* that received the *Message*, that includes the digest of the *Message* being acknowledged.

7.3.10.3 secureTransport attribute

The ***secureTransport*** attribute is a Boolean with possible values of "true" and "false". If the value is "true" then it indicates that the delivery channel uses a secure transport protocol such as

[SSL] or [IPSEC].

7.3.10.4 confidentiality attribute

The ***confidentiality*** attribute is a Boolean with possible values of "true" and "false". If the value is "true" then it indicates that the delivery channel REQUIRES that the *Message* be encrypted in a persistent manner. It MUST be encrypted above the level of the transport and delivered, encrypted, to the application.

7.3.10.5 authenticated attribute

The ***authenticated*** attribute is a Boolean with possible values of "true" and "false". If the value is "true" then it indicates that the delivery channel REQUIRES that the sender of the *Message* be authenticated before delivery to the application.

7.3.10.6 authorized attribute

The ***authorized*** attribute is a Boolean with possible of values of "true" and "false". If the value is "true" then it indicates that the delivery channel REQUIRES that the sender of the *Message* be authorized before delivery to the application.

7.3.11 Transport element

The ***Transport*** element of the *CPP* defines the *Party's* capabilities with regard to communication protocol, encoding, and transport security information.

The overall structure of the ***Transport*** element is as follows:

```
<Transport transportId = "N05">
      <!--protocols are HTTP, SMTP, and FTP-->
      <SendingProtocol version = "1.1">HTTP</SendingProtocol>
            <!--one or more SendingProtocol elements-->
      <ReceivingProtocol version = "1.1">HTTP</ReceivingProtocol>
      <!--one or more endpoints-->
      <Endpoint uri="http://example.com/servlet/ebxmlhandler"
            type = "request"/>
      <TransportSecurity>  <!--0 or 1 times-->
            <Protocol version = "3.0">SSL</Protocol>
            <CertificateRef certId = "N03"/>
      </TransportSecurity>
</Transport>
```

7.3.11.1 TransportId attribute

The ***Transport*** element has a single REQUIRED ***transportId*** attribute, of type [XML] ID, that provides a unique identifier for each ***Transport*** element, which SHALL be referred to by the ***transportId*** IDREF attribute in a ***DeliveryChannel*** element elsewhere within the *CPP* or *CPA* document.

7.3.12 Transport Protocol

Supported communication protocols are HTTP, SMTP, and FTP. The *CPP* MAY specify as many protocols as the *Party* is capable of supporting.

NOTE: It is the aim of this specification to enable support for any transport capable of carrying MIME content using the vocabulary defined herein.

7.3.12.1 SendingProtocol element

The ***SendingProtocol*** element identifies the protocol that a *Party* can, or will, use to send business data to its intended collaborator. The IMPLIED ***version*** attribute identifies the specific version of the protocol. For example, suppose that within a *CPP*, a ***Transport*** element, containing ***SendingProtocol*** elements whose values are SMTP and HTTP, is referenced within a ***DeliveryChannel*** element. Suppose, further, that this ***DeliveryChannel*** element is referenced for the role of Seller within a purchase-ordering process. Then the party is asserting that it can send purchase orders by either SMTP or HTTP. In a *CPP*, the ***SendingProtocol*** element MAY appear one or more times under each ***Transport*** element. In a *CPA*, the ***SendingProtocol*** element shall appear once.

7.3.12.2 ReceivingProtocol element

The ***ReceivingProtocol*** element identifies the protocol by which a *Party* can receive its business data from the other *Party*. The IMPLIED ***version*** attribute identifies the specific version of the protocol. For example, within a *CPP*, if a ***Transport*** element is referenced within a ***DeliveryChannel*** element containing a ***ReceivingProtocol*** element whose value is HTTP, and this ***DeliveryChannel*** is referenced for the role of seller within a purchase ordering process, then the party is asserting that it can receive business responses to purchase orders over HTTP.

Within a *CPA*, the ***SendingProtocol*** and ***ReceivingProtocol*** elements serve to indicate the actual agreement upon what transports will be used for the complementary roles of the collaborators. For example, continuing the earlier examples, the seller in a purchase-order process collaboration could specify its receiving protocol to be SMTP and its sending protocol to be HTTP. These collaborator capabilities would match the buyer capabilities indicated in the *CPP*. These matches support an interoperable transport agreement where the buyer would send purchase orders by SMTP and where the responses to purchase orders (acknowledgements, cancellations, or change requests, for example) would be sent by the seller to the buyer using HTTP.

To fully describe receiving transport capabilities, the receiving-protocol information needs to be combined with URLs that provide the endpoints (see below).

NOTE: Though the URL scheme gives information about the protocol used, an explicit ***ReceivingProtocol*** element remains useful for future extensibility to protocols all of whose endpoints are identified by the same URL schemes, such as distinct transport protocols that all make use of HTTP endpoints. Likewise, both URL schemes of HTTP:// and HTTPS:// can be regarded as the same ***ReceivingProtocol***. Therefore, the ***ReceivingProtocol*** element is separated from the endpoints, which are, themselves, needed to provide essential information needed for connections.

7.3.13 Endpoint Element

The REQUIRED ***uri*** attribute of the ***Endpoint*** element specifies the *Party's* communication addressing information associated with the ***ReceiveProtocol*** element. One or more ***Endpoint*** elements SHALL be provided for each ***Transport*** element in order to provide different addresses

for different purposes. The value of the ***uri*** attribute is a URI that contains the electronic address of the *Party* in the form REQUIRED for the selected protocol. The value of the ***uri*** attribute SHALL conform to the syntax for expressing URIs as defined in [RFC2396].

The ***type*** attribute identifies the purpose of this endpoint. The value of ***type*** is an enumeration; permissible values are "login", "request", "response", "error", and "allPurpose". There can be, at most, one of each. The ***type*** attribute MAY be omitted. If it is omitted, its value defaults to "allPurpose". The "login" endpoint MAY be used for the address for the initial *Message* between the two *Parties.* The "request" and "response" endpoints are used for request and response *Messages*, respectively. The "error" endpoint MAY be used as the address for error *Messages* issued by the messaging service. If no "error" endpoint is defined, these error *Messages* SHALL be sent to the "response" address, if defined, or to the "allPurpose" endpoint. To enable error *Messages* to be received, each ***Transport*** element SHALL contain at least one endpoint of type "error", "response", or "allPurpose".

7.3.14 Transport Protocols

In the following sections, we discuss the specific details of each supported transport protocol.

7.3.14.1 HTTP

HTTP is Hypertext Transfer Protocol[HTTP]. For HTTP, the address is a URI that SHALL conform to [RFC2396]. Depending on the application, there MAY be one or more endpoints, whose use is determined by the application.

Following is an example of an HTTP endpoint:

```
      <Endpoint uri="http://example.com/servlet/ebxmlhandler"
            type = "request"/>
```

The "request" and "response" endpoints MAY be dynamically overridden for a particular request or asynchronous response by application-specified URIs exchanged in business documents exchanged under the *CPA*.

For a synchronous response, the "response" endpoint is ignored if present. A synchronous response is always returned on the existing connection, i.e. to the URI that is identified as the source of the connection.

7.3.14.2 SMTP

SMTP is Simple Mail Transfer Protocol[SMTP]. For use with this standard, Multipurpose Internet Mail Extensions[MIME] MUST be supported. The MIME media type used by the SMTP transport layer is "Application" with a sub-type of "octet-stream".

For SMTP, the communication address is the fully qualified mail address of the destination *Party* as defined by [RFC822]. Following is an example of an SMTP endpoint:

```
      <Endpoint uri="mailto:ebxmlhandler@example.com"
            type = "request"/>
```

SMTP with MIME automatically encodes or decodes the document as required, on a link-by-link basis, and presents the decoded document to the destination document-exchange function. If the application design is such that the choices in the ***documentExchange*** element and the ***ProcessSpecification*** element are intended to be independent of the choice of transport protocol, it is permissible to specify a ***MessageEncoding*** element under the ***DocExchange*** element.

> NOTE: The SMTP mail transfer agent encodes binary data (i.e. data that are not 7-bit ASCII) unless it is aware that the upper level (mail user agent) has already encoded the data. If the data are encoded in the document-exchange level (***MessageEncoding***), the information that the data are already encoded SHOULD be passed to the mail user agent.
>
> NOTE: SMTP by itself (without any authentication or encryption) is subject to denial of service and masquerading by unknown *Parties*. It is strongly suggested that those *Parties* who choose SMTP as their transport layer also choose a suitable means of encryption and authentication either in the document-exchange layer or in the transport layer such as [S/MIME].
>
> NOTE: SMTP is an asynchronous protocol that does not guarantee a particular quality of service. A transport-layer acknowledgment (i.e. an SMTP acknowledgment) to the receipt of a mail *Message* constitutes an assertion on the part of the SMTP server that it knows how to deliver the mail *Message* and will attempt to do so at some point in the future. However, the *Message* is not hardened and might never be delivered to the recipient. Furthermore, the sender will see a transport-layer acknowledgment only from the nearest node. If the *Message* passes through intermediate nodes, SMTP does not provide an end-to-end acknowledgment. Therefore receipt of an SMTP acknowledgement does not guarantee that the *Message* will be delivered to the application and failure to receive an SMTP acknowledgment is not evidence that the *Message* was not delivered. It is recommended that the reliable- messaging protocol in the ebXML *Message* Service be used with SMTP.

7.3.14.3 FTP

FTP is File Transfer Protocol[RFC959].

Since a delivery channel specifies receive characteristics, each *Party* sends a *Message* using FTP PUT. The endpoint specifies the user id and input directory path (for PUTs to this *Party*). An example of an FTP endpoint is:

```
<Endpoint uri="ftp://userid@server.foo.com"
      type = "request"/>
```

Since FTP must be compatible across all implementations, the FTP for ebXML will use the minimum sets of commands and parameters available for FTP as specified in [RFC959], section 5.1, and modified in [RFC1123], section 4.1.2.13. The mode SHALL be stream only and the type MUST be either ASCII Non-print (AN), Image (I) (binary), or Local 8 (L 8) (binary between 8-bit machines and machines with 36 bit words – for an 8-bit machine Local 8 is the same as Image).

Stream mode closes the data connection upon end of file. The server side FTP MUST set control to "PASV" before each transfer command to obtain a unique port pair if there are multiple third party sessions.

NOTE: [RFC 959] states that User-FTP SHOULD send a PORT command to assign a non-default data port before each transfer command is issued to allow multiple transfers during a single FTP because of the long delay after a TCP connection is closed until its socket pair can be reused.

NOTE: The format of the 227 reply to a PASV command is not well-standardized and an FTP client may assume that the parentheses indicated in [RFC959] will be present when in some cases they are not. If the User-FTP program doesn't scan the reply for the first digit of host and port numbers, the result will be that the User-FTP might point at the wrong host. In the response, the h1, h2, h3, h4 is the IP address of the server host and the p1, p2 is a non-default data transfer port that PASV has assigned.

NOTE: As a recommendation for firewall transparency, [RFC1579] proposes that the client sends a PASV command, allowing the server to do a passive TCP open on some random port, and inform the client of the port number. The client can then do an active open to establish the connection.

NOTE: Since STREAM mode closes the data connection upon end of file, the receiving FTP may assume abnormal disconnect if a 226 or 250 control code hasn't been received from the sending machine.

NOTE: [RFC1579] also makes the observation that it might be worthwhile to enhance the FTP protocol to have the client send a new command APSV (all passive) at startup that would allow a server that implements this option to always perform a passive open. A new reply code 151 would be issued in response to all file transfer requests not preceded by a PORT or PASV command; this *Message* would contain the port number to use for that transfer. A PORT command could still be sent to a server that had previously received APSV; that would override the default behavior for the next transfer operation, thus permitting third-party transfers.

7.3.15 Transport Security

The ***TransportSecurity*** element provides the *Party's* security specifications, associated with the ***ReceivingProtocol*** element, for the transport layer of the *CPP*. It MAY be omitted if transport security will not be used for any *CPAs* composed from this *CPP*. Unless otherwise specified below, transport security applies to *Messages* in both directions.

Following is the syntax:

```
<TransportSecurity>
      <Protocol version = "3.0">SSL</Protocol>
      <CertificateRef certId = "N03"/> <!--zero or one-->
```

```
      </TransportSecurity>
```

The ***TransportSecurity*** element contains two REQUIRED child elements, ***Protocol*** and ***CertificateRef.***

7.3.15.1 Protocol element

The value of the ***Protocol*** element can identify any transport security protocol that the *Party* is prepared to support. The IMPLIED ***version*** attribute identifies the version of the specified protocol.

The specific security properties depend on the services provided by the identified protocol. For example, SSL performs certificate-based encryption and certificate-based authentication.

Whether authentication is bidirectional or just from *Message* sender to *Messag*e recipient depends on the selected transport-security protocol.

7.3.15.2 CertificateRef element

The EMPTY ***CertificateRef*** element contains an IMPLIED IDREF attribute, ***certId*** that identifies the certificate to be used by referring to the ***Certificate*** element (under ***PartyInfo***) that has the matching ID attribute value. The ***CertificateRef*** element MUST be present if the transport-security protocol uses certificates. It MAY be omitted otherwise (e.g. if authentication is by password).

7.3.15.3 Specifics for HTTP

For encryption with HTTP, the protocol is SSL[SSL] (Secure Socket Layer) Version 3.0, which uses public-key encryption.

7.4 DocExchange element

The ***DocExchange*** element provides information that the *Parties* must agree on regarding exchange of documents between them. This information includes the messaging service properties (e.g. ebXML *Message* Service[MSSPEC]).

Following is the structure of the ***DocExchange*** element of the *CPP*. Subsequent sections describe each child element in greater detail.

```
      <DocExchange docExchangeId = "N06">
            <ebXMLBinding version = "0.92">
                  <MessageEncoding> <!--cardinality 0 or 1-->
                  ...
                  </MessageEncoding>
                  <ReliableMessaging>  <!--cardinality 0 or 1-->
                  ...
                  </ReliableMessaging>
                  <NonRepudiation>  <!--cardinality 0 or 1-->
                        ...
                  </NonRepudiation>
                  <DigitalEnvelope>  <!--cardinality 0 or 1-->
                        ...
                  </DigitalEnvelope>
                  <NamespaceSupported> <!-- 1 or more -->
```

```
                    ...
                </NamespaceSupported>
            </ebXMLBinding>
        </DocExchange>
```

The ***DocExchange*** element of the *CPP* defines the properties of the messaging service to be used with *CPAs* composed from the *CPP*.

The ***DocExchange*** element is comprised of a single ***ebXMLBinding*** child element.

> NOTE: The document-exchange section can be extended to other messaging services by adding additional ***xxxBinding*** elements and their child elements that describe the other services, where ***xxx*** is replaced by the name of the additional binding. An example is ***XPBinding***, which might define support for the future XML Protocol specification.

7.4.1 docExchangeId attribute

The ***DocExchange*** element has a single IMPLIED ***docExchangeId*** attribute that is an [XML] ID that provides an unique identifier which MAY be referenced from elsewhere within the *CPP* document.

7.4.2 ebXMLBinding element

The ***ebXMLBinding*** element describes properties specific to the ebXML *Message* Service[MSSPEC] The ***ebXMLBinding*** element is comprised of the following child elements:

- zero or one ***MessageEncoding*** element which specifies how *Messages* are to be encoded by the document-exchange layer,
- zero or one ***ReliableMessaging*** element which specifies the characteristics of reliable messaging,
- zero or one ***NonRepudiation*** element which specifies the requirements for signing the *Message*,
- zero or one ***DigitalEnvelope*** element which specifies the requirements for encryption by the digital-envelope[DIGENV] method,
- zero or more ***NamespaceSupported*** elementswhich identify any namespace extensions supported by the messaging service implementation.

7.4.3 version attribute

The ***ebXMLBinding*** element has a single REQUIRED ***version*** attribute that identifies the version of the ebXML *Message* Service specification being used.

7.4.4 MessageEncoding element

The ***MessageEncoding*** element specifies how the *Messages* are to be encoded by the document-exchange layer for transmission. Encoding choices depend on the properties of the *Message*-exchange protocol specified by the ***ebXMLBinding*** element. An example for BASE64[MIME] is:

```
<MessageEncoding>BASE64</MessageEncoding>
```

If the ***MessageEncoding*** element is omitted, there is no document-exchange encoding.

7.4.5 ReliableMessaging element

The ***ReliableMessaging*** element specifies the properties of reliable ebXML *Message* exchange. The default that applies if the ***ReliableMessaging*** element is omitted is "BestEffort". See Section 7.4.5.1. The following is the element structure:

```
<ReliableMessaging deliverySemantics="OnceAndOnlyOnce"
            idempotency="false"
            persistDuration="30S">
    <!--The pair of elements Retries, RetryInterval
        has cardinality 0 or 1-->
      <Retries>5</Retries>
      <RetryInterval>60</RetryInterval> <!--time in seconds-->
</ReliableMessaging>
```

The ***ReliableMessaging*** element is comprised of the following child elements. The pair of elements has cardinality 0 or 1. Both must be either present or absent.

- a ***Retries*** element,
- a ***RetryInterval*** element.

The ***ReliableMessaging*** element has attributes as follows:

- a REQUIRED ***deliverySemantics*** attribute,
- a REQUIRED ***idempotency*** attribute,
- a REQUIRED ***persistDuration*** element.

7.4.5.1 deliverySemantics attribute

The ***deliverySemantics*** attribute of the ***ReliableMessaging*** element specifies the degree of reliability of *Message* delivery. This attribute is an enumeration of possible values that include the following:

- "OnceAndOnlyOnce",
- "BestEffort".

A value of "OnceAndOnlyOnce" specifies that a *Message* must be delivered exactly once. "BestEffort" specifies that reliable-messaging semantics are not to be used.

7.4.5.2 idempotency attribute

The ***idempotency*** attribute of the ***ReliableMessaging*** element specifies whether the *Party* requires that all *Messages* exchanged be subject to an idempotency test (detection and discard of duplicate *Messages*) in the document-exchange layer. The attribute is a Boolean with possible values of "true" and "false". If the value of the attribute is "true", all *Messages* are subject to the test. If the value is "false", *Messages* are not subject to an idempotency test in the document-exchange layer. Testing for duplicates is based on the *Message* identifier; other information that is carried in the *Message Header* MAY also be tested, depending on the context.

NOTE: Additional testing for duplicates MAY take place in the business application based on application information in the *Messages* (e.g. purchase order number).

The idempotency test checks whether a *Message* duplicates a prior *Message* between the same client and server. If the idempotency test is requested, the receiving messaging service passes a duplicate *Message* to the recipient *Business Process* with a "duplicate" indication. The receiving messaging service also returns a "duplicate" indication to the sender of the duplicate.

> NOTE: One of the main purposes of this test is to aid in retry following timeouts and in recovery following node failures. In these cases, the sending *Party* might have sent request *Messages* and not received responses. The sending *Party* MAY re-send such a *Message*. If the original *Message* had been received, the receiving server discards the duplicate *Message* and re-sends the original results to the requester.

If a communication protocol always checks for duplicate *Messages*, the check in the communication protocol overrides any idempotency specifications in the *CPA*.

7.4.5.3 persistDuration attribute

The value of the ***persistDuration*** attribute is the minimum length of time, expressed as a [XMLSchema] timeDuration, that data from a *Message* that is sent reliably is kept in *Persistent Storage* by an ebXML *Message*-Service implementation that receives that *Message*.

7.4.5.4 Retries and RetryInterval elements

The ***Retries*** and ***RetryInterval*** elements specify the permitted number of retries and interval between retries (in seconds) of a request following a timeout. The purpose of the ***RetryInterval*** element is to improve the likelihood of success on retry be deferring the retry until any temporary conditions that caused the error might be corrected.

The ***Retries*** and ***RetryInterval*** elements MUST be included together or MAY be omitted together. If they are omitted, the values of the corresponding quantities (number of retries and retry interval) are a local matter at each *Party*.

7.4.6 NonRepudiation element

Non-repudiation both proves who sent a *Message* and prevents later repudiation of the contents of the *Message*. Non-repudiation is based on signing the *Message* using XML Digital Signature[XMLDSIG]. The element structure is as follows:

```
<NonRepudiation>
      <Protocol version = "1.0">XMLDSIG</Protocol>
      <HashFunction>sha1</HashFunction>
      <SignatureAlgorithm>rsa</SignatureAlgorithm>
      <CertificateRef certId = "N03"/>
</NonRepudiation>
```

If the ***NonRepudiation*** element is omitted, the *Messages* are not digitally signed.

Security at the document-exchange level applies to all *Messages* in both directions for *Business Transaction*s for which security is enabled.

The ***NonRepudiation*** element is comprised of the following child elements:

- a REQUIRED ***Protocol*** element,
- a REQUIRED ***HashFunction*** (e.g. SHA1, MD5) element,
- a REQUIRED ***SignatureAlgorithm*** element,
- a REQUIRED ***Certificate*** element.

7.4.6.1 Protocol element

The REQUIRED ***Protocol*** element identifies the technology that will be used to digitally sign a *Message*. It has a single IMPLIED ***version*** attribute whose value is is a string that identifies the version of the specified technology. An example of the ***Protocol*** element follows:

```
<Protocol version="2000/10/31">http://www.w3.org/2000/09/xmldsig#
</Protocol>
```

7.4.6.2 HashFunction element

The REQUIRED ***HashFunction*** element identifies the algorithm that is used to compute the digest of the *Message* being signed.

7.4.6.3 SignatureAlgorithm element

The REQUIRED ***SignatureAlgorithm*** element identifies the algorithm that is used to compute the value of the digital signature.

7.4.6.4 CertificateRef element

The REQUIRED ***CertificateRef*** element refers to one of the ***Certificate*** elements elsewhere within the *CPP* document, using the IMPLIED ***certId*** IDREF attribute.

7.4.7 DigitalEnvelope element

The ***DigitalEnvelope*** element[DIGENV] is an encryption procedure in which the *Message* is encrypted by symmetric encryption (shared secret key) and the secret key is sent to the *Message* recipient encrypted with the recipient's public key. The element structure is:

```
<DigitalEnvelope>
      <Protocol version = "2.0">S/MIME</Protocol>
      <EncryptionAlgorithm>rsa</EncryptionAlgorithm>
      <CertificateRef certId = "N03"/>
</DigitalEnvelope>
```

Security at the document-exchange level applies to all *Messages* in both directions for *Business Transaction*s for which security is enabled.

7.4.7.1 Protocol element

The REQUIRED ***Protocol*** element identifies the security protocol to be used. The FIXED ***version*** attribute identifies the version of the protocol.

7.4.7.2 EncryptionAlgorithm element

The REQUIRED ***EncryptionAlgorithm*** element identifies the encryption algorithm to be used.

7.4.7.3 CertificateRef element

The REQUIRED ***CertificateRef*** element identifies the certificate to be used by means of its

certId attribute. The IMPLIED ***certId*** attribute is an attribute of type [XML] IDREF, which refers to a matching ID attribute in a ***Certificate*** element elsewhere in the *CPP* or *CPA*.

7.4.8 NamespaceSupported element

The ***NamespaceSupported*** element identifies any namespace extensions supported by the messaging service implementation. Examples are Security Services Markup Language[S2ML] and Transaction Authority Markup Language[XAML]. For example, support for the S2ML namespace would be defined as follows:

```
<NamespaceSupported schemaLocation = "http://www.s2ml.org/s2ml.xsd"
version = "0.8">http://www.s2ml.org/s2ml</NamespaceSupported>
```

7.5 *ds:Signature* element

The *CPP* MAY be digitally signed using technology that conforms with the XML Digital Signature specification[XMLDSIG]. The ***ds:Signature*** element is the root of a subtree of elements that MAY be used for signing the *CPP*. The syntax is:

```
<ds:Signature>...</ds:Signature>
```

The content of this element and any subelements are defined by the XML Digital Signature specification. See Section 8.8 for a detailed discussion. The following additional constraints on ***ds:Signature*** are imposed:

- A *CPP* MUST be considered invalid if any ***ds:Signature*** element fails core validation as defined by the XML Digital Signature specification[XMLDSIG].

- Whenever a *CPP* is signed, each ***ds:Reference*** element within a ***ProcessSpecification*** element MUST pass reference validation and each ***ds:Signature*** element MUST pass core validation.

NOTE: In case a *CPP* is unsigned, software MAY nonetheless validate the ***ds:Reference*** elements within ***ProcessSpecification*** elements and report any exceptions.

NOTE: Software for creation of *CPPs* and *CPAs* MAY recognize ***ds:Signature*** and automatically insert the element structure necessary to define signing of the *CPP* and *CPA*. Signature creation itself is a cryptographic process that is outside the scope of this specification.

NOTE: see non-normative note in Section 7.3.4.5 for a discussion of times at which validity tests MAY be made.

7.6 Comment element

The ***CollaborationProtocolProfile*** element MAY contain zero or more ***Comment*** elements. The ***Comment*** element is a textual note that MAY be added to serve any purpose the author desires. The language of the ***Comment*** is identified by a REQUIRED ***xml:lang*** attribute. The ***xml:lang***

attribute MUST comply with the rules for identifying languages specified in [XML]. If multiple ***Comment*** elements are present, each SHOULD have a unique ***xml:lang*** attribute value. An example of a ***Comment*** element follows:

```
<Comment xml:lang="en-gb">yadda yadda, blah blah</Comment>
```

When a *CPA* is composed from two *CPPs*, all ***Comment*** elements from both *CPPs* SHALL be included in the *CPA* unless the two *Parties* agree otherwise.

8 *CPA* Definition

A *Collaboration-Protocol Agreement (CPA)* defines the capabilities that two *Parties* must agree to enable them to engage in electronic business for the purposes of the particular *CPA*. This section defines and discusses the details of the *CPA*. The discussion is illustrated with some XML fragments.

Most of the XML elements in this section are described in detail in section 7, "*CPP* Definition". In general, this section does not repeat that information. The discussions in this section are limited to those elements that are not in the *CPP* or for which additional discussion is required in the *CPA* context. See also Appendix C and Appendix D for the DTD and XML Schema, respectively, and Appendix B for an example of a *CPA* document.

8.1 *CPA* Structure

```
<CollaborationProtocolAgreement id = "N01"
      xmlns="http://www.ebxml.org/namespaces/tradePartner"
      xmlns:bpm="http://www.ebxml.org/namespaces/businessProcess"
      xmlns:ds = "http://www.w3.org/2000/09/xmldsig#"
      xmlns:xlink = "http://www.w3.org/1999/xlink">
      <CPAType> <!--MAY appear 0 or 1 times-->
            …
      </CPAType>
      <Status value = "proposed"/>
      <Start>1988-04-07T18:39:09</Start>
      <End>1990-04-07T18:40:00</End>
      <!--ConversationConstraints MAY appear 0 or 1 times-->
      <ConversationConstraints invocationLimit = "100"
            concurrentConversations = "4"/>
      <PartyInfo>
            …
      </PartyInfo>
      <PartyInfo>
            …
      </PartyInfo>
      <!--ds:signature MAY appear 0 or more times-->
      <ds:Signature>any combination of text and elements
      </ds:Signature>
      <Comment xml:lang=”en-gb">any text</Comment> <!--zero or more-->
</CollaborationProtocolAgreement>
```

8.2 CollaborationProtocol Agreement element

The ***CollaborationProtocolAgreement*** element is the root element of a *CPA*. It has a REQUIRED ***id*** attribute of type [XML] CDATA that supplies a unique idenfier for the document. The value of the ***id*** attribute SHALL be assigned by one *Party* and used by both. It is RECOMMENDED that the value of the ***id*** attribute be a URI. The value of the ***id*** attribute MAY be used as the value of the ***CPAId*** element in the ebXML *Message Header*[MSSPEC].

NOTE: Each *Party* MAY associate a local identifier with the ***id*** attribute.

The ***CollaborationProtocolAgreement*** element has REQUIRED [XML] Namespace[XMLNS] declarations that are defined in Section 7, "CPP Definition".

The ***CollaborationProtocolAgreement*** element is comprised of the following child elements, each of which is described in greater detail in subsequent sections:

- zero or one ***CPAType*** element that provides information about the general nature of the *CPA*,
- a REQUIRED ***Status*** element that identifies the state of the process that creates the *CPA*,
- a REQUIRED ***Start*** element that records the date and time that the *CPA* goes into effect,
- a REQUIRED ***End*** element that records the date and time after which the *CPA* must be renegotiated by the *Parties*,
- zero or one ***ConversationConstraints*** element that documents certain agreements about conversation processing,
- two REQUIRED ***PartyInfo*** elements, one for each *Party* to the *CPA*,
- one or more ***ds:Signature*** elements that provide signing of the *CPA* using the XML Digital Signature[XMLDSIG] standard.

8.3 CPAType element

The ***CPAType*** element MAY be present in a *CPA* document. It provides information about the general nature of the *CPA*. An example of this element follows:

```
<CPAType>
      <Protocol version = "1.1">PIP3A4</Protocol>
      <Type>RNIF</Type>
</CPAType>
```

The ***CPAType*** element is comprised of the following child elements:

- a REQUIRED ***Protocol*** element identifies the business-level protocol. An example is `PIP3A4`, a RosettaNet™ Partner Interface Process.
- a REQUIRED ***Type*** element provides additional information about the *Business Protocol*. Specific values depend on the particular protocol and its optional features. An example is RNIF (RosettaNet Implementation Framework).

The ***Protocol*** element has a REQUIRED attribute, ***version***, whose value specifies the version of the protocol that is to be used.

NOTE: An implementation MAY use the ***CPAType*** element to determine whether it already has the code to support this particular protocol.

8.4 Status element

The ***Status*** element records the state of the composition/negotiation process that creates the *CPA*. An example of the ***Status*** element follows:

```
<Status value = "proposed"/>
```

The Status element has a REQUIRED ***value*** attribute that records the current state of composition of the *CPA*. The value of this attribute is an enumeration of the following possible values:

- "proposed", meaning that the *CPA* is still being negotiated by the *Parties*,
- "agreed", meaning that the contents of the *CPA* have been agreed to by both *Parties*,
- "signed", meaning that the *CPA* has been "signed" by the *Parties*. This "signing" MAY take the form of a digital signature that is described in section 8.8 below.

NOTE: The ***Status*** element MAY be used by a *CPA* composition and negotiation tool to assist in the process of building a *CPA*.

8.5 *CPA* Lifetime

The lifetime of the *CPA* is given by the ***Start*** and ***End*** elements. The syntax is:

```
<Start>1988-04-07T18:39:09</Start>
<End>1990-04-07T18:40:00</End>
```

8.5.1 Start element

The ***Start*** element specifies the starting date and time of the *CPA*. The ***Start*** element SHALL be a string value that conforms to the content model of a canonical timeInstant as defined in the XML Schema Datatypes Specification[XMLSCHEMA-2]. For example, to indicate 1:20 pm UTC (Coordinated Universal Time) on May 31, 1999, a ***Start*** element would have the following value:

```
1999-05-31T13:20:00Z
```

The ***Start*** element SHALL be represented as Coordinated Universal Time (UTC).

8.5.2 End element

The ***End*** element specifies the ending date and time of the *CPA*. The ***End*** element SHALL be a string value that conforms to the content model of a canonical timeInstant as defined in the XML Schema Datatypes Specification[XMLSCHEMA-2]. For example, to indicate 1:20 pm UTC (Coordinated Universal Time) on May 31, 1999, an ***End*** element would have the following value:

```
1999-05-31T13:20:00Z
```

The ***End*** element SHALL be represented as Coordinated Universal Time (UTC).

When the end of the *CPA's* lifetime is reached, any *Business Transaction*s that are still in progress SHALL be allowed to complete and no new *Business Transactions* SHALL be started. When all in-progress *Business Transactions* on each conversation are completed, the *Conversation* shall be terminated whether or not it was completed.

> NOTE: It should be understood that if a business application defines a conversation as consisting of multiple *Business Transactions*, such a conversation MAY be terminated with no error indication when the end of the lifetime is reached. The run-time system could provide an error indication to the application.
>
> NOTE: It should be understood that it MAY not be feasible to wait for outstanding conversations to terminate before ending the *CPA* since there is no limit on how long a conversation MAY last.
>
> NOTE: The runtime system SHOULD return an error indication to both *Parties* when a new *Business Transaction* is started under this *CPA* after the date and time specified in the ***End*** element.

8.6 ConversationConstraints element

The ***ConversationConstraints*** element places limits on the number of conversations under the *CPA*. An example of this element follows:

```
<ConversationConstraints invocationLimit = "100"
                         concurrentConversations = "4"/>
```

The ***ConversationConstraints*** element has the following attributes:

- an IMPLIED ***invocationLimit*** attribute,
- an IMPLIED ***concurrentConversations*** attribute.

8.6.1 invocationLimit attribute

The ***invocationLimit*** attribute defines the maximum number of conversations that can be processed under the *CPA*. When this number has been reached, the *CPA* is terminated and must be renegotiated. If no value is specified, there is no upper limit on the number of conversations and the lifetime of the *CPA* is controlled solely by the ***End*** element.

> NOTE: The ***invocationLimit*** attribute sets a limit on the number of units of *Business* that can be performed under the *CPA*. It is a business parameter, not a performace parameter.

8.6.2 concurrentConversations attribute

The ***concurrentConversations*** attribute defines the maximum number of conversations that can be in process under this *CPA* at the same time. If no value is specified, processing of concurrent

conversations is strictly a local matter.

NOTE: The ***concurrentConversations*** attribute provides a parameter for the *Parties* to use when it is necessary to limit the number of conversations that can be concurrently processed under a particular *CPA*. For example, the back-end process might only support a limited number of concurrent conversations. If a request for a new conversation is received when the maximum number of conversations allowed under this *CPA* is already in process, an implementation MAY reject the new conversation or MAY enqueue the request until an existing conversation ends. If no value is given for ***concurrentConversations***, how to handle a request for a new conversation for which there is no capacity is a local implementation matter.

8.7 PartyInfo element

The general characteristics of the ***PartyInfo*** element are discussed in sections 7.3 and 7.3.1 .

The *CPA* SHALL have one ***PartyInfo*** element for each *Party* to the *CPA*. The ***PartyInfo*** element specifies the *Parties'* agreed terms for engaging in a *the Business Processes* defined by the *Process-Specification* documents *referenced by the CPA*. If a *CPP* has more than one ***PartyInfo*** element, the appropriate ***PartyInfo*** element SHALL be selected from each *CPP* when composing a *CPA*.

In the *CPA*, there SHALL be one ***PartyId*** element under each ***PartyInfo*** element. The value of this element is the same as the value of the ***PartyId*** element in the ebXML *Message* Service specification[MSSPEC]. One ***PartyId*** element SHALL be used within a ***To*** or ***From*** *Header* element of an ebXML *Message*.

8.7.1 ProcessSpecification element

The ***ProcessSpecification*** element identifies the *Business Process* that the two *Parties* have agreed to perform. There MAY be one or more ***ProcessSpecification*** elements in a *CPA*. Each SHALL be a child element of a separate ***CollaborationRole*** element. See the discussion in Section 7.3.3.

8.8 ds:Signature element

A *CPA* document MAY be digitally signed by one or more of the *Parties* as a means of ensuring its integrity as well as a means of expressing the agreement just as a corporate officer's signature would do for a paper document. If signatures are being used to digitally sign an ebXML *CPA* or *CPP* document, then it is strongly RECOMMENDED that [XMLDSIG] be used to digitally sign the document. The ***ds:Signature*** element is the root of a subtree of elements that MAY be used for signing the *CPP*. The syntax is:

```
<ds:Signature>...</ds:Signature>
```

The content of this element and any subelements are defined by the XML Digital Signature specification[XMLDSIG]. The following additional constraints on ***ds:Signature*** are imposed:

- A *CPA* MUST be considered invalid if any ***ds:Signature*** fails core validation as defined by the XML Digital Signature specification.

- Whenever a *CPA* is signed, each ***ds:Reference*** within a ***ProcessSpecification*** MUST pass reference validation and each ***ds:Signature*** MUST pass core validation.

NOTE: In case a *CPA* is unsigned, software MAY nonetheless validate the ***ds:Reference*** elements within ***ProcessSpecification*** elements and report any exceptions.

NOTE: Software for creation of *CPPs* and *CPAs* MAY recognize ***ds:Signature*** and automatically insert the element structure necessary to define signing of the *CPP* and *CPA*. Signature creation itself is a cryptographic process that is outside the scope of this specification.

NOTE: See non-normative note in section 7.3.4.5 for a discussion of times at which a *CPA* MAY be validated.

8.8.1 Persistent Digital Signature

If [XMLDSIG] is used to sign an ebXML *CPP* or *CPA*, the process defined in this section of the specification SHALL be used.

8.8.1.1 Signature Generation

1)Create a ***SignedInfo*** element, a child element of ***ds:signature. SignedInfo*** SHALL have child elements ***SignatureMethod***, ***CanonicalizationMethod***, and ***Reference*** as prescribed by [XMLDSIG].

2)Canonicalize and then calculate the **SignatureValue** over ***SignedInfo*** based on algorithms specified in ***SignedInfo*** as specified in [XMLDSIG].

3)Construct the ***Signature*** element that includes the ***SignedInfo***, ***KeyInfo*** (RECOMMENDED), and ***SignatureValue*** elements as specified in [XMLDSIG].

4)Include the namespace qualified ***Signature*** element in the document just signed, following the last ***PartyInfo*** element.

8.8.1.2 ds:SignedInfo element

The ***ds:SignedInfo*** element SHALL be comprised of zero or one ***ds:CanonicalizationMethod*** element, the ***ds:SignatureMethod*** element, and one or more ***ds:Reference*** elements.

8.8.1.3 ds:CanonicalizationMethod element

The ***ds:CanonicalizationMethod*** element is defined as OPTIONAL in [XMLDSIG], meaning that the element need not appear in an instance of a ***ds:SignedInfo*** element. The default canonicalization method that is applied to the data to be signed is [XMLC14N] in the absence of a ***ds:CanonicalizationMethod*** element that specifies otherwise. This default SHALL also serve as the default canonicalization method for the ebXML *CPP* and *CPA* documents.

8.8.1.4 ds:SignatureMethod element

The ***ds:SignatureMethod*** element SHALL be present and SHALL have an ***Algorithm*** attribute. The RECOMMENDED value for the ***Algorithm*** attribute is:

http://www.w3.org/2000/02/xmldsig#sha1

This RECOMMENDED value SHALL be supported by all compliant ebXML *CPP* or *CPA* software implementations.

8.8.1.5 ds:Reference element

The ***ds:Reference*** element for the *CPP* or *CPA* document SHALL have a REQUIRED URI attribute value of "" to provide for the signature to be applied to the document that contains the ***ds:Signature*** element (the *CPA* or *CPP* document). The ***ds:Reference*** element for the *CPP* or *CPA* document MAY include an IMPLIED ***type*** attribute that has a value of:

"http://www.w3.org/2000/02/xmldsig#Object"

in accordance with [XMLDSIG]. This attribute is purely informative. It MAY be omitted. Implementations of software designed to author or process an ebXML *CPA* or *CPP* document SHALL be prepared to handle either case. The ***ds:Reference*** element MAY include the ***id*** attribute, type ID, by which this ***ds:Reference*** element MAY be referenced from a ***ds:Signature*** element.

8.8.1.6 ds:Transform element

The ***ds:Reference*** element for the *CPA* or *CPP* document SHALL include a child ***ds:Transform*** element that excludes the containing ***ds:Signature*** element and all its descendants.

8.8.1.7 ds:Xpath element

The ***ds:Transform*** element SHALL include a child ***ds:XPath*** element that has a value of:

/descendant-or-self::node()[not(ancestor-or-self::ds:Signature[@id='S1'])]

NOTE: When digitally signing a *CPA*, it is RECOMMENDED that each *Party* sign the document in accordance with the process described above. The first *Party* that signs the *CPA* will sign only the *CPA* contents, excluding their own signature. The second *party* signs over the contents of the *CPA* as well as the ***ds:Signature*** element that contains the first *Party's* signature. It MAY be necessary that a notary sign over both signatures so as to provide for cryptographic closure.

8.9 Comment element

The ***CollaborationProtocolAgreement*** element MAY contain zero or more ***Comment*** elements. See section 7.6 for details of the syntax of the ***Comment*** element.

8.10 Composing a *CPA* from Two *CPPs*

This section discusses normative issues in composing a *CPA* from two *CPPs*. See also Appendix F , "Composing a *CPA* from Two *CPPs* (Non-Normative)".

8.10.1 ID Attribute Duplication

In composing a *CPA* from two *CPPs*, there is a hazard that ID attributes from the two *CPPs* might have duplicate values. When a *CPA* is composed from two *CPPs*, duplicate ID attribute values SHALL be tested for. If a duplicate ID attribute value is present, one of the duplicates shall be given a new value and the corresponding IDREF attribute values from the corresponding *CPP* SHALL be corrected.

8.11 Modifying Parameters of the Process-Specification Document Based on Information in the *CPA*

A *Process-Specification* document contains a number of parameters, expressed as XML attributes. An example is the security attributes that are counterparts of the attributes of the *CPA* ***Characteristics*** element. The values of these attributes can be considered to be default values or recommendations. When a *CPA* is created, the *Parties* MAY decide to accept the recommendations in the *Process-Specification* or they MAY agree on values of these parameters that better reflect their needs.

When a *CPA* is used to configure a run-time system, choices specified in the *CPA* MUST always assume precedence over choices specified in the referenced *Process-Specification* document. In particular, all choices expressed in a *CPA's* ***Characteristics*** and ***Packaging*** elements MUST be implemented as agreed to by the *Parties*. These choices SHALL override the default values expressed in the *Process-Specification* document. The process of installing the information from the *CPA* and *Process-Specification* document MUST verify that all of the resulting choices are mutually consistent and MUST signal an error if they are not.

> NOTE: There are several ways of overriding the information in the *Process-Specification* document by information from the *CPA*. For example:
>
> - A separate copy of the *Process-Specification* document can be created by the *CPA* composition tool. The tool can then directly modify the *Process-Specification* document with information from the *CPA*. One advantage of this method is that the override process is performed entirely by the *CPA* composition tool. A second advantage is that with a separate copy of the *Process-Specification* document associated with the particular *CPA*, there is no exposure to modifications of the *Process-Specification* document between the time that the *CPA* is created and the time it is installed in the *Parties'* systems.
> - A *CPA* installation tool can dynamically override parameters in the *Process-Specification* document with information from the corresponding parameters from the *CPA* at the time the *CPA* and *Process-Specification* document are installed in the *Parties'* systems. This eliminates the need to create a separate copy of the *Process-Specification* document.

1883 • Other possible methods might be based on XSLT transformations of the parameter
1884 information in the *CPA* and/or the *Process-Specification* document.
1885

9 References

Some references listed below specify functions for which specific XML definitions are provided in the *CPP* and *CPA*. Other specifications are referred to in this specification in the sense that they are represented by keywords for which the *Parties* to the *CPA* MAY obtain plug-ins or write custom support software but do not require specific XML element sets in the *CPP* and *CPA*.

In a few cases, the only available specification for a function is a proprietary specification. These are indicated by notes within the citations below.

[BPMSPEC] ebXML Business Process Specification Schema specification, http://www.ebxml.org.

[DIGENV] Digital Envelope, RSA Laboratories, http://www.rsasecurity.com/rsalabs/. NOTE: At this time, the only available specification for digital envelope appears to be the RSA Laboratories specification.

[EBXMLCC] ebXML Core Components and Business Process Document Overview, http://www.ebxml.org.

[EBXMLGLOSS] ebXML Glossary, http://www.ebxml.org.

[HTMLENC] HTML ver. 4.0 specification, World Wide WebConsortium, http://www.w3.org/TR/html4/. See section 5.3, Character References.

[HTTP] Hypertext Transfer Protocol, Internet Engineering Task Force RFC2616.

[IPSEC] IP Security Document Roadmap, Internet Engineering Task Force RFC 2411.

[ISO6523] Structure for the Identification of Organizations and Organization Parts, International Standards Organization ISO-6523.

[MIME] MIME (Multipurpose Internet Mail Extensions) Part One: Mechanisms for Specifying and Describing the Format of Internet *Message* Bodies. Internet Engineering Task Force RFC 1521.

[MSSPEC] ebXML Message Service Specification, http://www.ebxml.org

[REGREP] ebXML Registry and Repository Specification, http://www.ebxml.org

[RFC822] Standard for the Format of ARPA Internet Text Messages, Internet Engineering Task Force RFC 822.

[RFC959] File Transfer Protocol (FTP), Internet Engineering Task Force RFC 959.

[RFC1123] Requirements for Internet Hosts -- Application and Support, R. Braden, Internet Engineering Task Force, October, 1989.

[RFC1579] Firewall-Friendly FTP, S. Bellovin, Internet Engineering Task Force, February, 1994.

[RFC2015] MIME Security with Pretty Good Privacy, M. Elkins, Internet Engineering Task Force, RFC 2015.

[RFC2119] Key Words for use in RFCs to Indicate Requirement Levels, Internet Engineering Task Force RFC 2119.

[RFC2396] Uniform Resource Identifiers (URI): Generic Syntax; T. Berners-Lee, R. Fielding, L. Masinter - August 1998

[S/MIME] S/MIME Version 3 Message Specification, Internet Engineering Task Force RFC 2633.

[S2ML] Security Services Markup Language, http://s2ml.org/

[SMTP] Simple Mail Transfer Protocol, Internet Engineering Task Force RFC 821.

[SSL] Secure Sockets Layer, Netscape Communications Corp. http://developer.netscape.com. NOTE: At this time, it appears that the Netscape specification is the only available specification of SSL. Work is in progress in IETF on "Transport Layer Security", which is intended as a replacement for SSL.

[TECHARCH] ebXML Technical Architecture Specification, http://www.ebxml.org.

[XAML] Transaction Authority Markup Language, http://xaml.org/

[XLINK] XML Linking Language, http://www.w3.org/TR/xlink/

[XML] Extensible Markup Language (XML), World Wide Web Consortium, http://www.w3.org.

[XMLC14N] Canonical XML, Ver. 1.0, http://www.w3.org/TR/XML-C14N/

[XMLDSIG] XML Signature Syntax and Processing, Worldwide Web Consortium, http://www.w3.org/TR/xmldsig-core/

[XMLNS] Namespaces in XML, T. Bray, D. Hollander, and A. Layman, Jan. 1999, http://www.w3.org/TR/REC-xml-names/.

[XMLSCHEMA-1] XML Schema Part 1: Structures, http://www/w3/org/TR/xmlschema-1/

[XMLSCHEMA-2] XML Schema Part 2: Datatypes,
http://www.w3.org/TR/xmlschema-2/

[XPOINTER] XML Pointer Language, ver. 1.0, http://www.w3.org/TR/xptr

10 Conformance

In order to conform to this specification, an implementation:

a) SHALL support all the functional and interface requirements defined in this specification,
b) SHALL NOT specify any requirements that would contradict or cause non-conformance to this specification.

A conforming implementation SHALL satisfy the conformance requirements of the applicable parts of this specification,

An implementation of a tool or service that creates or maintains ebXML *CPP* or *CPA* instance documents SHALL be determined to be conformant by validation of the *CPP* or *CPA* instance documents, created or modified by said tool or service, against the [XMLSCHEMA] defintion of the *CPP* or *CPA* in Appendix D and available from

```
http://www.ebxml.org/schemas/cpp-cpa-v1_0.xsd
```

by using two or more validating XML Schema parsers that conform to the W3C XML Schema specifications[XMLSCHEMA-1,XMLSCHEMA-2].

The objective of conformance testing is to determine whether an implementation being tested conforms to the requirements stated in this specification. Conformance testing enables vendors to implement compatible and interoperable systems. Implementations and applications SHALL be tested using available test suites to verify their conformance to this specification.

Publicly available test suites from vendor neutral organizations such as OASIS and the U.S.A. National Institute of Science and Technology (NIST) SHOULD be used to verify the conformance of implementations, applications, and components claiming conformance to this specification. Open-source reference implementations MAY be available to allow vendors to test their products for interface compatibility, conformance, and interoperability.

11 Disclaimer

The views and specification expressed in this document are those of the authors and are not necessarily those of their employers. The authors and their employers specifically disclaim responsibility for any problems arising from correct or incorrect implementation or use of this design.

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Copyright Statement

Appendix A Example of *CPP* Document (Non-Normative)

This example is out of date and will be replaced along with the response to the next round of public-review comments.

```
<?xml version = "1.0"?>
<!DOCTYPE CollaborationProtocolProfile SYSTEM "cppml%2cv0.23.dtd">
<!--Generated by XML Authority.-->
<CollaborationProtocolProfile id = "id"
       xmlns="http://www.ebxml.org/namespaces/tradePartner"
       xmlns:bpm = "http://www /namespaces/businessProcess"
       xmlns:ds = "http://www.w3.org/2000/09/xmldsig#"
       xmlns:xlink = "http://www.w3.org/1999/xlink">
       <!--(Party , (CollaborationProtocol | bpm:ProcessSpecification |
bpm:BinaryCollaboration | bpm:BusinessTransactionActivity)+ , ds:Signature?)-->
       <Party partyId = "N01">
              <!--(PartyId+ , PartyDetails , Role+ , Certificate+ , DeliveryChannel+ ,
Transport+ , DocExchange+)-->
              <PartyId type = "uriReference">urn:duns.com:duns:1234567890123</PartyId>
              <PartyId type = "uriReference">urn:www.example.com</PartyId>
              <PartyDetails xlink:type="simple"
xlink:href="http://example2.com/example.com"/>
               <CollaborationRole roleId="N07" certId="N03">
                  <CollaborationProtocol name = "Buy Sell" version = "1.0"
                       xlink:type = "locator"
                       xlink:href = "http://www.example.com/services/purchasing.xml"/>
                   <Role name = "buyer" certId = "N03"
xlink:href="http://www.example.com/services/purchasing.xml"/>
                      <!--(+)-->
  <ServiceBinding name="MyShopper" channelId="N04"/>
              </CollaborationRole>
              <CollaborationRole roleId="N12" certId="N03">
                      <!--(+)-->
              </CollaborationRole>
              <Certificate certId = "N03">
                      <!--(ds:KeyInfo)-->
                      <ds:KeyInfo>REFERENCE [XMLDSIG]</ds:KeyInfo>
              </Certificate>
              <DeliveryChannel channelId = "N04"
                      transportId = "N05" docExchangeId = "N06">
                      <!--(Characteristics , ServiceBinding+)-->
                      <Characteristics nonrepudiationOfOrigin = "true"
nonrepudiationOfReceipt = "true" secureTransport = "true" confidentiality = "true"
authenticated = "true" authorized = "true"/>

              </DeliveryChannel>
              <Transport transportId = "N05">
                      <!--(Protocol , Endpoint+ , TransportTimeout? ,
TransportSecurity?)-->
                      <Protocol version = "1.1">HTTP</Protocol>
                      <Endpoint uri = "http://example.com/servlet/ebxmlhandler" type =
"request"/>
```

```
                    <TransportSecurity>
                        <!--(Protocol , CertificateRef?)-->
                        <Protocol version = "3.0">SSL</Protocol>
                        <CertificateRef certId = "N03"/>
                    </TransportSecurity>
                </Transport>
                <DocExchange docExchangeId = "N06">
                    <!--(ebXMLBinding)-->
                    <ebXMLBinding version = "0.9">
                        <!--(MessageEncoding? , ReliableMessaging , NonRepudiation?
, DigitalEnvelope? , NamespaceSupported+)-->
                        <MessageEncoding version = "base64" packagingType = "need to
discuss">only text</MessageEncoding>
                        <ReliableMessaging deliverySemantics = "BestEffort"
idempotency = "false">
                            <!--(Timeout , Retries , RetryInterval)?-->
                            <Timeout>30</Timeout>
                            <Retries>5</Retries>
                            <RetryInterval>60</RetryInterval>
                        </ReliableMessaging>
                        <NonRepudiation>
                            <!--(Protocol , HashFunction , EncryptionAlgorithm ,
SignatureAlgorithm , CertificateRef)-->
                            <Protocol version = "2.0">S/MIME</Protocol>
                            <HashFunction>sha1</HashFunction>
                            <SignatureAlgorithm>rsa</SignatureAlgorithm>
                            <CertificateRef certId = "N03"/>
                        </NonRepudiation>
                        <DigitalEnvelope>
                            <!--(Protocol , EncryptionAlgorithm ,
CertificateRef)-->
                            <Protocol version = "2.0">S/MIME</Protocol>
                            <EncryptionAlgorithm>rsa</EncryptionAlgorithm>
                            <CertificateRef certId = "N03"/>
                        </DigitalEnvelope>
                        <NamespaceSupported schemaLocation =
"http://www.s2ml.org/s2ml.xsd" version =
"0.7a">http://www.s2ml.org/s2ml/</NamespaceSupported>
                    </ebXMLBinding>
                </DocExchange>
        </Party>
        <ds:Signature>any combination of text and elements</ds:Signature>
</CollaborationProtocolProfile>
```

Appendix B Example of *CPA* Document (Non-normative)

This example is out of date and will be replaced along with the response to the next round of public review comments.

```
<?xml version = "1.0"?>
<!DOCTYPE CollaborationProtocolAgreement SYSTEM "cppml%2cv0.23.dtd">
<!--Generated by XML Authority.-->
<CollaborationProtocolAgreement id = "N01"
       xmlns="http://www.ebxml.org/namespaces/tradePartner"
       xmlns:bpm = "http://www.ebxml.org/namespaces/businessProcess"
       xmlns:ds = "http://www.w3.org/2000/09/xmldsig#"
       xmlns:xlink = "http://www.w3.org/1999/xlink">
       <!--(CPAType? , Status , Start , Duration , ConversationConstraints? , Party+ ,
(CollaborationProtocol | bpm:BinaryCollaboration | bpm:BusinessTransactionActivity |
bpm:ProcessSpecification)+ , ds:Signature?)-->
       <CPAType>
              <!--(Protocol , Type)-->
              <Protocol version = "1.1">PIP3A4</Protocol>
              <Type>RNIF</Type>
       </CPAType>
       <Status value = "proposed"/>
       <Start>1988-04-07T18:39:09</Start>
       <Duration>124</Duration>
       <ConversationConstraints invocationLimit = "100" concurrentConversations = "4"/>
       <Party partyId = "N01">
              <!--(PartyId+ , PartyDetails , Role+ , Certificate+ , DeliveryChannel+ ,
Transport+ , DocExchange+)-->
              <PartyId type = "uriReference">urn:duns.com:duns:1234567890123</PartyId>
              <PartyId type = "uriReference">urn:www.example.com</PartyId>
              <PartyDetails xlink:type="simple"
xlink:href="http://example.com/example2.com"/>
              <CollaborationRole roleId="N07" certId="N03">
                  <CollaborationProtocol name = "Buy Sell" version = "1.0"
                      xlink:type = "locator"
                      xlink:href = "http://www.example.com/services/purchasing.xml"/>
                   <Role name = "buyer" certId = "N03"
xlink:href="http://www.example.com/services/purchasing.xml"/>
                      <!--(+)-->
                  <ServiceBinding name="MyShopper" channelId="N04"/>
              </CollaborationRole>
              <Certificate certId = "N03">
                     <!--(ds:KeyInfo)-->
                     <ds:KeyInfo>REFERENCE [XMLDSIG]</ds:KeyInfo>
              </Certificate>
              <DeliveryChannel channelId = "N04" transportId = "N05" docExchangeId =
"N06">
                     <!--(Characteristics , ServiceBinding+)-->
                     <Characteristics nonrepudiationOfOrigin = "true"
nonrepudiationOfReceipt = "true" secureTransport = "true" confidentiality = "true"
authenticated = "true" authorized = "true"/>
```

```
2223                </DeliveryChannel>
2224                <Transport transportId = "N05">
2225                      <!--(Protocol , Endpoint+ , TransportTimeout? ,
2226    TransportSecurity?)-->
2227                      <Protocol version = "1.1">HTTP</Protocol>
2228                      <Endpoint uri = "http://example2.com/servlet/ebxmlhandler" type =
2229    "request"/>
2230
2231                      <TransportSecurity>
2232                            <!--(Protocol , CertificateRef?)-->
2233                            <Protocol version = "3.0">SSL</Protocol>
2234                            <CertificateRef certId = "N03"/>
2235                      </TransportSecurity>
2236                </Transport>
2237                <DocExchange docExchangeId = "N06">
2238                      <!--(ebXMLBinding)-->
2239                      <ebXMLBinding version = "0.9">
2240                            <!--(MessageEncoding? , ReliableMessaging , NonRepudiation?
2241    , DigitalEnvelope? , NamespaceSupported+)-->
2242                            <MessageEncoding version = "base64" packagingType = "need to
2243    discuss">only text</MessageEncoding>
2244                            <ReliableMessaging deliverySemantics = "BestEffort"
2245    idempotency = "false">
2246                                  <!--(Timeout , Retries , RetryInterval)?-->
2247                                  <Timeout>30</Timeout>
2248                                  <Retries>5</Retries>
2249                                  <RetryInterval>60</RetryInterval>
2250                            </ReliableMessaging>
2251                            <NonRepudiation>
2252                                  <!--(Protocol , HashFunction , EncryptionAlgorithm ,
2253    SignatureAlgorithm , CertificateRef)-->
2254                                  <Protocol version = "2.0">S/MIME</Protocol>
2255                                  <HashFunction>sha1</HashFunction>
2256                                  <SignatureAlgorithm>rsa</SignatureAlgorithm>
2257                                  <CertificateRef certId = "N03"/>
2258                            </NonRepudiation>
2259                            <DigitalEnvelope>
2260                                  <!--(Protocol , EncryptionAlgorithm ,
2261    CertificateRef)-->
2262                                  <Protocol version = "2.0">S/MIME</Protocol>
2263                                  <EncryptionAlgorithm>rsa</EncryptionAlgorithm>
2264                                  <CertificateRef certId = "N03"/>
2265                            </DigitalEnvelope>
2266                            <NamespaceSupported schemaLocation =
2267    "http://www.s2ml.org/s2ml.xsd" version =
2268    "0.7a">http://www.s2ml.org/s2ml/</NamespaceSupported>
2269                      </ebXMLBinding>
2270                </DocExchange>
2271          </Party>
2272          <Party partyId = "N01">
2273                <!--(PartyId+ , Role+ , Certificate+ , DeliveryChannel+ , Transport+ ,
2274    DocExchange+)-->
2275                <PartyId type = "uriReference">urn:duns.com:duns:1234567890123</PartyId>
2276                <PartyId type = "uriReference">urn:www.example.com</PartyId>
```

```
2277                <PartyDetails xlink:type="simple"
2278    xlink:href="http://example2.com/example.com"/>
2279                <Role certId = "N03" roleId = "N08" name = "seller">
2280                      <!--(ServiceBinding+)-->
2281                      <ServiceBinding collaborationId="N09" channelId="N04"/>
2282
2283                </Role>
2284                <CollaborationRole roleId="N07" certId="N03">
2285                    <CollaborationProtocol name = "Buy Sell" version = "1.0"
2286                         xlink:type = "locator"
2287                         xlink:href = "http://www.example.com/services/purchasing.xml"/>
2288                         <Role name = "buyer"
2289                            xlink:href="http://www.example.com/services/purchasing.xml"/>
2290                      <!--(+)-->
2291                <ServiceBinding name="MyShopper" channelId="N04"/>
2292               </CollaborationRole>
2293                <Certificate certId = "N03">
2294                      <!--(ds:KeyInfo)-->
2295                      <ds:KeyInfo>REFERENCE [XMLDSIG]</ds:KeyInfo>
2296                </Certificate>
2297                <DeliveryChannel channelId = "N04" transportId = "N05" docExchangeId =
2298    "N06">
2299                      <!--(Characteristics , ServiceBinding+)-->
2300                      <Characteristics nonrepudiationOfOrigin = "true"
2301    nonrepudiationOfReceipt = "true" secureTransport = "true" confidentiality = "true"
2302    authenticated = "true" authorized = "true"/>
2303
2304                </DeliveryChannel>
2305                <Transport transportId = "N05">
2306                      <!--(Protocol , Endpoint+ , TransportTimeout? ,
2307    TransportSecurity?)-->
2308                      <Protocol version = "1.1">HTTP</Protocol>
2309                      <Endpoint uri = "http://example.com/servlet/ebxmlhandler" type =
2310    "request"/>
2311
2312                      <TransportSecurity>
2313                            <!--(Protocol , CertificateRef?)-->
2314                            <Protocol version = "3.0">SSL</Protocol>
2315                            <CertificateRef certId = "N03"/>
2316                      </TransportSecurity>
2317                </Transport>
2318                <DocExchange docExchangeId = "N06">
2319                      <!--(ebXMLBinding)-->
2320                      <ebXMLBinding version = "0.9">
2321                            <!--(MessageEncoding? , ReliableMessaging , NonRepudiation?
2322    , DigitalEnvelope? , NamespaceSupported+)-->
2323                            <MessageEncoding version = "base64" packagingType = "need to
2324    discuss">only text</MessageEncoding>
2325                            <ReliableMessaging deliverySemantics = "BestEffort"
2326    idempotency = "false">
2327                                  <!--(Timeout , Retries , RetryInterval)?-->
2328                                  <Timeout>30</Timeout>
2329                                  <Retries>5</Retries>
2330                                  <RetryInterval>60</RetryInterval>
```

```
                        </ReliableMessaging>
                        <NonRepudiation>
                              <!--(Protocol , HashFunction , EncryptionAlgorithm ,
SignatureAlgorithm , CertificateRef)-->
                              <Protocol version = "2.0">S/MIME</Protocol>
                              <HashFunction>sha1</HashFunction>
                              <SignatureAlgorithm>rsa</SignatureAlgorithm>
                              <CertificateRef certId = "N03"/>
                        </NonRepudiation>
                        <DigitalEnvelope>
                              <!--(Protocol , EncryptionAlgorithm ,
CertificateRef)-->
                              <Protocol version = "2.0">S/MIME</Protocol>
                              <EncryptionAlgorithm>rsa</EncryptionAlgorithm>
                              <CertificateRef certId = "N03"/>
                        </DigitalEnvelope>
                        <NamespaceSupported schemaLocation =
"http://www.s2ml.org/s2ml.xsd" version =
"0.7a">http://www.s2ml.org/s2ml/</NamespaceSupported>
                  </ebXMLBinding>
            </DocExchange>
      </Party>
      <CollaborationProtocol version = "1.0" id = "N07" xlink:type = "locator"
xlink:href = "http://www.example.com/services/purchasing.xml">Buy and Sell
      </CollaborationProtocol>
      <ds:Signature>any combination of text and elements</ds:Signature>
</CollaborationProtocolAgreement>
```

Appendix C DTD Corresponding to Complete *CPP/CPA* Definition (Normative)

This DTD is out of date and will be replaced along with the response the next round of public review comments.

```
<?xml version='1.0' encoding='UTF-8' ?>

<!--Generated by XML Authority-->

<!ELEMENT CollaborationProtocolAgreement (CPAType? , Status , Start , End ,
ConversationConstraints? , PartyInfo* , ds:Signature+ , Comment*)>
<!ATTLIST CollaborationProtocolAgreement  id CDATA  #IMPLIED >
<!ELEMENT CollaborationProtocolProfile (PartyInfo+ , ds:Signature? , Comment*)>
<!ELEMENT ReceivingProtocol (#PCDATA)>
<!ATTLIST ReceivingProtocol  version CDATA    #IMPLIED
                             e-dtype NMTOKEN  #FIXED 'string' >
<!ELEMENT SendingProtocol (#PCDATA)>
<!ATTLIST SendingProtocol  version CDATA    #IMPLIED
                           e-dtype NMTOKEN  #FIXED 'string' >
<!ELEMENT Protocol (#PCDATA)>
<!ATTLIST Protocol    version CDATA    #IMPLIED
                      e-dtype NMTOKEN  #FIXED 'string' >
<!ELEMENT CollaborationRole (ProcessSpecification , Role , CertificateRef? , ServiceBinding+)>
<!ATTLIST CollaborationRole  id ID  #REQUIRED >
<!ELEMENT PartyInfo (PartyId+ , PartyRef , CollaborationRole+ , Certificate+ , DeliveryChannel+ ,
Transport+ , DocExchange+)>
<!ELEMENT PartyId (#PCDATA)>
<!ATTLIST PartyId  type    CDATA    #IMPLIED
                   e-dtype NMTOKEN  #FIXED 'string' >
<!ELEMENT PartyRef EMPTY>
<!ATTLIST PartyRef  xlink:type  (simple )  #FIXED 'simple'
                    xlink:href CDATA  #REQUIRED >
<!ELEMENT DeliveryChannel (Characteristics)>
<!ATTLIST DeliveryChannel  channelId     ID     #REQUIRED
                           transportId   IDREF  #REQUIRED
                           docExchangeId IDREF  #REEQUIRED >
<!ELEMENT Transport (SendingProtocol+ , ReceivingProtocol , Endpoint+ , TransportSecurity?)>
<!ATTLIST Transport  transportId ID  #REQUIRED >
<!ELEMENT Endpoint EMPTY>
<!ATTLIST Endpoint  uri     CDATA     #REQUIRED
                    type     (login | request | response | error | allPurpose )  'allPurpose'
                    a-dtype NMTOKENS  'uri uri' >
<!ELEMENT Retries (#PCDATA)>
<!ATTLIST Retries  e-dtype NMTOKEN  #FIXED 'string' >
<!ELEMENT RetryInterval (#PCDATA)>
<!ATTLIST RetryInterval  e-dtype NMTOKEN  #FIXED 'string' >
<!ELEMENT TransportSecurity (Protocol , CertificateRef)>
<!ELEMENT Certificate (ds:KeyInfo)>
<!ATTLIST Certificate  certId ID  #REQUIRED >
<!ELEMENT DocExchange (ebXMLBinding)>
<!ATTLIST DocExchange  docExchangeId ID  #IMPLIED >
<!ELEMENT ReliableMessaging (Retries , RetryInterval)?>
<!ATTLIST ReliableMessaging  deliverySemantics  (OnceAndOnlyOnce | BestEffort )  #REQUIRED
                             idempotency       CDATA     #REQUIRED
                             persistDuration   CDATA     #REQUIRED
                             a-dtype           NMTOKENS  'idempotency boolean'
                              e-dtype NMTOKEN  #FIXED     'timeDuration' >
<!ELEMENT NonRepudiation (Protocol , HashFunction , SignatureAlgorithm , CertificateRef)>
<!ELEMENT HashFunction (#PCDATA)>
<!ATTLIST HashFunction  e-dtype NMTOKEN  #FIXED 'string' >
<!ELEMENT EncryptionAlgorithm (#PCDATA)>
<!ATTLIST EncryptionAlgorithm  e-dtype NMTOKEN  #FIXED 'string' >
<!ELEMENT SignatureAlgorithm (#PCDATA)>
<!ATTLIST SignatureAlgorithm  e-dtype NMTOKEN  #FIXED 'string' >
<!ELEMENT DigitalEnvelope (Protocol , EncryptionAlgorithm , CertificateRef)>
```

```
<!ELEMENT ProcessSpecification (ds:Reference)>
<!ATTLIST ProcessSpecification
              name     ID      #REQUIRED
              version  CDATA   #REQUIRED >
              xlink:type (simple ) #FIXED 'simple'
              xlink:href CDATA     #REQUIRED >
<!ELEMENT ds:Reference (ds:DigestMethod, ds:DigestValue)>
<!ATTLIST ds:Reference  ds:URI CDATA   #REQUIRED
                        type CDATA #IMPLIED >
<!ELEMENT ds:DigestMethod ( #PCDATA | ds:HMACOutputLength )*>
<!ATTLIST ds:DigestMethod
          ds:Algorithm  CDATA   #REQUIRED>
<!ELEMENT ds:HMACOutputLength (#PCDATA)>
<!ELEMENT ds:DigestValue (#PCDATA)>
<!ELEMENT CertificateRef EMPTY>
<!ATTLIST CertificateRef  certId  IDREF    #IMPLIED
                          e-dtype NMTOKEN  #FIXED 'string' >
<!ELEMENT MessageEncoding (#PCDATA)>
<!ATTLIST MessageEncoding  version       CDATA    #REQUIRED
                           packagingType CDATA    #IMPLIED
                           e-dtype       NMTOKEN  #FIXED 'string' >
<!ELEMENT ebXMLBinding (MessageEncoding? , ReliableMessaging? , NonRepudiation? ,
DigitalEnvelope? , NamespaceSupported+)>
<!ATTLIST ebXMLBinding  version CDATA  #REQUIRED >
<!ELEMENT ds:KeyInfo EMPTY>
<!ELEMENT ds:Signature EMPTY>
<!ELEMENT NamespaceSupported (#PCDATA)>
<!ATTLIST NamespaceSupported  schemaLocation CDATA     #IMPLIED
                              version        CDATA     #REQUIRED
                              e-dtype        NMTOKEN   #FIXED 'uri'
                              a-dtype        NMTOKENS  'schemaLocation uri' >
<!ELEMENT EMPTY>
<!ATTLIST Characteristics  nonrepudiationOfOrigin  CDATA     #IMPLIED
                           nonrepudiationOfReceipt CDATA     #IMPLIED
                           secureTransport         CDATA     #IMPLIED
                           confidentiality         CDATA     #IMPLIED
                           authenticated           CDATA     #IMPLIED
                           authorized              CDATA     #IMPLIED
                           a-dtype                 NMTOKENS  'nonrepudiationOfOrigin  boolean
                                                              nonrepudiationOfReceipt boolean
                                                              secureTransport         boolean
                                                              confidentiality         boolean
                                                              authenticated           boolean
                                                              authorized              boolean' >
<!ELEMENT ServiceBinding (Packaging+ , Override*)>
<!ATTLIST ServiceBinding  channelId ID  REF   #REQUIRED
                          name      CDATA  #IMPLIED >
<!ELEMENT CPAType (Protocol , Type)>
<!ELEMENT Status EMPTY>
<!ATTLIST Status  value  (signed |agreed | proposed )  #REQUIRED >
<!ELEMENT Start (#PCDATA)>
<!ATTLIST Start  e-dtype NMTOKEN  #FIXED 'timeInstant' >
<!ELEMENT End (#PCDATA)>
<!ATTLIST End e-dtype NMTOKEN  #FIXED 'timeInstant' >
<!ELEMENT Type (#PCDATA)>
<!ATTLIST Type  e-dtype NMTOKEN  #FIXED 'string' >
<!ELEMENT ConversationConstraints EMPTY>
<!ATTLIST ConversationConstraints  invocationLimit         CDATA     #IMPLIED
                                   concurrentConversations CDATA     #IMPLIED
                                   a-dtype                 NMTOKENS
                                                          'invocationLimit         i4
                                                           concurrentConversations i4' >
<!ELEMENT Override EMPTY>
<!ATTLIST Override  action     CDATA  #REQUIRED
                    channelId  ID     #REQUIRED
                    xlink:href CDATA  #IMPLIED
                    xlink:type  (simple )  #FIXED 'simple' >
<!ELEMENT Role (#PCDATA)>
<!ATTLIST Role  name       CDATA  #IMPLIED
                xlink:href CDATA  #IMPLIED
                xlink:type  (simple )  #FIXED 'simple' >
<!ELEMENT Packaging (ProcessingCapabilities , SimplePart+ , CompositeList?)+>
```

```
<!ELEMENT Comment ANY>
<!ELEMENT Composite (Constituent+)>
<!ATTLIST Composite  mimetype       CDATA  #REQUIRED
                     id             ID  #REQUIRED
                     mimeparameters CDATA  #IMPLIED >
<!ELEMENT Constituent EMPTY>
<!ATTLIST Constituent  idref IDREF  #REQUIRED >
<!ELEMENT Encapsulation (Constituent)>
<!ATTLIST Encapsulation  mimetype       CDATA  #REQUIRED
                         id             ID  #REQUIRED
                         mimeparameters CDATA  #IMPLIED >
<!ELEMENT CompositeList (Encapsulation | Composite)+>
<!ELEMENT XMLMetaDataInformation EMPTY>
<!ATTLIST XMLMetaDataInformation  URI                     CDATA  #IMPLIED
                                  MetaDataDescriptionType  (dtd | xsd )  #REQUIRED >
<!ELEMENT MimeHeader EMPTY>
<!ATTLIST MimeHeader  HeaderName CDATA  #REQUIRED >
<!ELEMENT MimeParameter EMPTY>
<!ATTLIST MimeParameter  parameterAttribute CDATA  #REQUIRED
                         parameterValue     CDATA  #IMPLIED >
<!ELEMENT SimplePart EMPTY>
<!ATTLIST SimplePart  id       ID  #REQUIRED
                      mimetype CDATA  #REQUIRED >
<!ELEMENT ProcessingCapabilities EMPTY>
<!ATTLIST ProcessingCapabilities  parse    CDATA  #REQUIRED
                                  generate CDATA  #REQUIRED >
<!ELEMENT ds:Reference EMPTY>
```

Appendix D XML Schema Document Corresponding to Complete *CPA* Definition (Normative)

This schema is out of date and will be replaced along with the response to the next round of public review comments.

```
<?xml version = "1.0" encoding = "UTF-8"?>
<!--Generated by XML Authority. Conforms to w3c http://www.w3.org/2000/10/XMLSchema-->
<xsd:schema xmlns:xlink = "http://www.w3.org/1999/xlink"
        xmlns:ds = "http://www.w3.org/2000/09/xmldsig#"
        xmlns:xsd = "http://www.w3.org/2000/10/XMLSchema">
       <xsd:import namespace = "http://www.w3.org/1999/xlink" schemaLocation =
"http://www.w3.org/1999/xlink"/>
       <xsd:import namespace = "http://www.w3.org/2000/09/xmldsig#" schemaLocation =
"file:///C:/My%20Documents/ebXML/xmldsig-core-schema.xsd"/>
       <xsd:element name = "CollaborationProtocolAgreement">
              <xsd:complexType>
                     <xsd:sequence>
                            <xsd:element ref = "CPAType" minOccurs = "0"/>
                            <xsd:element ref = "Status"/>
                            <xsd:element ref = "Start"/>
                            <xsd:element ref = "Duration"/>
                            <xsd:element ref = "ConversationConstraints" minOccurs = "0"/>
                            <xsd:element ref = "PartyInfo" minOccurs = "0" maxOccurs =
"unbounded"/>
                            <xsd:element ref = "ds:Signature" minOccurs = "0"/>
                            <xsd:element ref = "Comment" minOccurs = "0" maxOccurs =
"unbounded"/>
                     </xsd:sequence>
                     <xsd:attribute name = "id" type = "xsd:string"/>
              </xsd:complexType>
       </xsd:element>
       <xsd:element name = "CollaborationProtocolProfile">
              <xsd:complexType>
                     <xsd:sequence>
                            <xsd:element ref = "PartyInfo" maxOccurs = "unbounded"/>
                            <xsd:element ref = "ds:Signature" minOccurs = "0"/>
                            <xsd:element ref = "Comment" minOccurs = "0" maxOccurs =
"unbounded"/>
                     </xsd:sequence>
              </xsd:complexType>
       </xsd:element>
       <xsd:element name = "ReceivingProtocol">
              <xsd:complexType>
                     <xsd:simpleContent>
                            <xsd:extension base = "xsd:string">
                                   <xsd:attribute name = "version" type = "xsd:string"/>
                            </xsd:extension>
                     </xsd:simpleContent>
              </xsd:complexType>
       </xsd:element>
       <xsd:element name = "SendingProtocol">
              <xsd:complexType>
                     <xsd:simpleContent>
                            <xsd:extension base = "xsd:string">
                                   <xsd:attribute name = "version" type = "xsd:string"/>
                            </xsd:extension>
                     </xsd:simpleContent>
              </xsd:complexType>
       </xsd:element>
       <xsd:element name = "Protocol" type = "xsd:string"/>
       <xsd:element name = "CollaborationRole">
              <xsd:complexType>
                     <xsd:sequence>
```

```
                        <xsd:element ref = "ProcessSpecification"/>
                        <xsd:element ref = "Role"/>
                        <xsd:element ref = "CertificateRef" minOccurs = "0"/>
                        <xsd:element ref = "ServiceBinding" maxOccurs = "unbounded"/>
                </xsd:sequence>
                <xsd:attribute name = "roleId" use = "required" type = "xsd:ID"/>
        </xsd:complexType>
</xsd:element>
<xsd:element name = "PartyInfo">
        <xsd:complexType>
                <xsd:sequence>
                        <xsd:element ref = "PartyId" maxOccurs = "unbounded"/>
                        <xsd:element ref = "PartyRef"/>
                        <xsd:element ref = "CollaborationRole" maxOccurs = "unbounded"/>
                        <xsd:element ref = "Certificate" maxOccurs = "unbounded"/>
                        <xsd:element ref = "DeliveryChannel" maxOccurs = "unbounded"/>
                        <xsd:element ref = "Transport" maxOccurs = "unbounded"/>
                        <xsd:element ref = "DocExchange" maxOccurs = "unbounded"/>
                </xsd:sequence>
        </xsd:complexType>
</xsd:element>
<xsd:element name = "PartyId">
        <xsd:complexType>
                <xsd:simpleContent>
                        <xsd:extension base = "xsd:string">
                                <xsd:attribute name = "type" type = "xsd:string"/>
                        </xsd:extension>
                </xsd:simpleContent>
        </xsd:complexType>
</xsd:element>
<xsd:element name = "PartyRef">
        <xsd:complexType>
                <xsd:sequence/>
                <xsd:attribute name = "xlink:type" use = "fixed" value = "simple">
                        <xsd:simpleType>
                                <xsd:restriction base = "xsd:NMTOKEN">
                                        <xsd:enumeration value = "simple"/>
                                </xsd:restriction>
                        </xsd:simpleType>
                </xsd:attribute>
                <xsd:attribute name = "xlink:href" use = "required" type = "xsd:string"/>
        </xsd:complexType>
</xsd:element>
<xsd:element name = "DeliveryChannel">
        <xsd:complexType>
                <xsd:sequence>
                        <xsd:element ref = "Characteristics"/>
                </xsd:sequence>
                <xsd:attribute name = "channelId" use = "required" type = "xsd:ID"/>
                <xsd:attribute name = "transportId" use = "required" type = "xsd:IDREF"/>
                <xsd:attribute name = "docExchangeId" type = "xsd:IDREF"/>
        </xsd:complexType>
</xsd:element>
<xsd:element name = "Transport">
        <xsd:complexType>
                <xsd:sequence>
                        <xsd:element ref = "SendingProtocol"/>
                        <xsd:element ref = "ReceivingProtocol"/>
                        <xsd:element ref = "Endpoint" maxOccurs = "unbounded"/>
                        <xsd:element ref = "TransportSecurity" minOccurs = "0"/>
                </xsd:sequence>
                <xsd:attribute name = "transportId" use = "required" type = "xsd:ID"/>
        </xsd:complexType>
</xsd:element>
<xsd:element name = "Endpoint">
        <xsd:complexType>
                <xsd:sequence/>
                <xsd:attribute name = "uri" use = "required" type = "xsd:uriReference"/>
                <xsd:attribute name = "type" use = "default" value = "allPurpose">
                        <xsd:simpleType>
                                <xsd:restriction base = "xsd:NMTOKEN">
```

```
                                        <xsd:enumeration value = "login"/>
                                        <xsd:enumeration value = "request"/>
                                        <xsd:enumeration value = "response"/>
                                        <xsd:enumeration value = "error"/>
                                        <xsd:enumeration value = "allPurpose"/>
                                </xsd:restriction>
                        </xsd:simpleType>
                </xsd:attribute>
        </xsd:complexType>
</xsd:element>
<xsd:element name = "TransportEncoding" type = "xsd:string"/>
<xsd:element name = "Retries" type = "xsd:string"/>
<xsd:element name = "RetryInterval" type = "xsd:timePeriod"/>
<xsd:element name = "TransportSecurity">
        <xsd:complexType>
                <xsd:sequence>
                        <xsd:element ref = "Protocol"/>
                        <xsd:element ref = "CertificateRef" minOccurs = "0"/>
                </xsd:sequence>
        </xsd:complexType>
</xsd:element>
<xsd:element name = "Certificate">
        <xsd:complexType>
                <xsd:sequence>
                        <xsd:element ref = "ds:KeyInfo"/>
                </xsd:sequence>
                <xsd:attribute name = "certId" use = "required" type = "xsd:ID"/>
        </xsd:complexType>
</xsd:element>
<xsd:element name = "DocExchange">
        <xsd:complexType>
                <xsd:sequence>
                        <xsd:element ref = "ebXMLBinding"/>
                </xsd:sequence>
                <xsd:attribute name = "docExchangeId" type = "xsd:ID"/>
        </xsd:complexType>
</xsd:element>
<xsd:element name = "ReliableMessaging">
        <xsd:complexType>
                <xsd:sequence minOccurs = "0">
                        <xsd:element ref = "Retries"/>
                        <xsd:element ref = "RetryInterval"/>
                </xsd:sequence>
                <xsd:attribute name = "deliverySemantics" use = "required">
                        <xsd:simpleType>
                                <xsd:restriction base = "xsd:NMTOKEN">
                                        <xsd:enumeration value = "OnceAndOnlyOnce"/>
                                        <xsd:enumeration value = "BestEffort"/>
                                </xsd:restriction>
                        </xsd:simpleType>
                </xsd:attribute>
                <xsd:attribute name = "idempotency" use = "required" type =
"xsd:boolean"/>
        </xsd:complexType>
</xsd:element>
<xsd:element name = "NonRepudiation">
        <xsd:complexType>
                <xsd:sequence>
                        <xsd:element ref = "Protocol"/>
                        <xsd:element ref = "HashFunction"/>
                        <xsd:element ref = "SignatureAlgorithm"/>
                        <xsd:element ref = "CertificateRef"/>
                </xsd:sequence>
        </xsd:complexType>
</xsd:element>
<xsd:element name = "HashFunction" type = "xsd:string"/>
<xsd:element name = "EncryptionAlgorithm" type = "xsd:string"/>
<xsd:element name = "SignatureAlgorithm" type = "xsd:string"/>
<xsd:element name = "DigitalEnvelope">
        <xsd:complexType>
                <xsd:sequence>
```

```
                                <xsd:element ref = "Protocol"/>
                                <xsd:element ref = "EncryptionAlgorithm"/>
                                <xsd:element ref = "CertificateRef"/>
                        </xsd:sequence>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "ProcessSpecification">
                <xsd:complexType>
                        <xsd:sequence>
                                <xsd:element ref = "ds:Reference"/>
                        </xsd:sequence>
                        <xsd:attribute name = "version" use = "required" type = "xsd:string"/>
                        <xsd:attribute name = "name" use = "required" type = "xsd:string"/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "CertificateRef">
                <xsd:complexType>
                        <xsd:simpleContent>
                                <xsd:extension base = "xsd:string">
                                        <xsd:attribute name = "certId" type = "xsd:IDREF"/>
                                </xsd:extension>
                        </xsd:simpleContent>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "MessageEncoding">
                <xsd:complexType>
                        <xsd:simpleContent>
                                <xsd:extension base = "xsd:string">
                                        <xsd:attribute name = "version" use = "required" type =
"xsd:string"/>
                                        <xsd:attribute name = "packagingType" type = "xsd:string"/>
                                </xsd:extension>
                        </xsd:simpleContent>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "ebXMLBinding">
                <xsd:complexType>
                        <xsd:sequence>
                                <xsd:element ref = "MessageEncoding" minOccurs = "0"/>
                                <xsd:element ref = "ReliableMessaging" minOccurs = "0"/>
                                <xsd:element ref = "NonRepudiation" minOccurs = "0"/>
                                <xsd:element ref = "DigitalEnvelope" minOccurs = "0"/>
                                <xsd:element ref = "NamespaceSupported" maxOccurs = "unbounded"/>
                        </xsd:sequence>
                        <xsd:attribute name = "version" use = "required" type = "xsd:string"/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "ds:KeyInfo">
                <xsd:complexType>
                        <xsd:sequence/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "ds:Signature">
                <xsd:complexType>
                        <xsd:sequence/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "NamespaceSupported">
                <xsd:complexType>
                        <xsd:simpleContent>
                                <xsd:extension base = "xsd:uriReference">
                                        <xsd:attribute name = "schemaLocation" type =
"xsd:uriReference"/>
                                        <xsd:attribute name = "version" use = "required" type =
"xsd:string"/>
                                </xsd:extension>
                        </xsd:simpleContent>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "Characteristics">
                <xsd:complexType>
```

```
                        <xsd:sequence/>
                        <xsd:attribute name = "nonrepudiationOfOrigin" type = "xsd:boolean"/>
                        <xsd:attribute name = "nonrepudiationOfReceipt" type = "xsd:boolean"/>
                        <xsd:attribute name = "secureTransport" type = "xsd:boolean"/>
                        <xsd:attribute name = "confidentiality" type = "xsd:boolean"/>
                        <xsd:attribute name = "authenticated" type = "xsd:boolean"/>
                        <xsd:attribute name = "authorized" type = "xsd:boolean"/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "ServiceBinding">
                <xsd:complexType>
                        <xsd:sequence>
                                <xsd:element ref = "Packaging" maxOccurs = "unbounded"/>
                                <xsd:element ref = "Override" minOccurs = "0"/>
                        </xsd:sequence>
                        <xsd:attribute name = "channelId" use = "required" type = "xsd:ID"/>
                        <xsd:attribute name = "name" type = "xsd:string"/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "CPAType">
                <xsd:complexType>
                        <xsd:sequence>
                                <xsd:element ref = "Protocol"/>
                                <xsd:element ref = "Type"/>
                        </xsd:sequence>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "Status">
                <xsd:complexType>
                        <xsd:sequence/>
                        <xsd:attribute name = "value" use = "required">
                                <xsd:simpleType>
                                        <xsd:restriction base = "xsd:NMTOKEN">
                                                <xsd:enumeration value = "signed"/>
                                                <xsd:enumeration value = "proposed"/>
                                        </xsd:restriction>
                                </xsd:simpleType>
                        </xsd:attribute>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "Start" type = "xsd:timeInstant"/>
        <xsd:element name = "Duration" type = "xsd:timePeriod"/>
        <xsd:element name = "Type" type = "xsd:string"/>
        <xsd:element name = "ConversationConstraints">
                <xsd:complexType>
                        <xsd:sequence/>
                        <xsd:attribute name = "invocationLimit" type = "xsd:int"/>
                        <xsd:attribute name = "concurrentConversations" type = "xsd:int"/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "Override">
                <xsd:complexType>
                        <xsd:sequence/>
                        <xsd:attribute name = "action" type = "xsd:string"/>
                        <xsd:attribute name = "channelId" use = "required" type = "xsd:ID"/>
                        <xsd:attribute name = "xlink:href" type = "xsd:string"/>
                        <xsd:attribute name = "xlink:type" use = "fixed" value = "simple">
                                <xsd:simpleType>
                                        <xsd:restriction base = "xsd:NMTOKEN">
                                                <xsd:enumeration value = "simple"/>
                                        </xsd:restriction>
                                </xsd:simpleType>
                        </xsd:attribute>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "Role">
                <xsd:complexType>
                        <xsd:simpleContent>
                                <xsd:extension base = "xsd:string">
                                        <xsd:attribute name = "name" type = "xsd:string"/>
                                        <xsd:attribute name = "xlink:href" type = "xsd:string"/>
```

```
                                        <xsd:attribute name = "xlink:type" use = "fixed" value =
"simple">
                                                <xsd:simpleType>
                                                        <xsd:restriction base = "xsd:NMTOKEN">
                                                                <xsd:enumeration value = "simple"/>
                                                        </xsd:restriction>
                                                </xsd:simpleType>
                                        </xsd:attribute>
                                </xsd:extension>
                        </xsd:simpleContent>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "SecurityRisks" type = "xsd:string"/>
        <xsd:element name = "SecurityBenefits" type = "xsd:string"/>
        <xsd:element name = "Packaging">
                <xsd:complexType>
                        <xsd:sequence maxOccurs = "unbounded">
                                <xsd:element ref = "ProcessingCapabilities"/>
                                <xsd:element ref = "SimplePart" maxOccurs = "unbounded"/>
                                <xsd:element ref = "CompositeList" minOccurs = "0"/>
                        </xsd:sequence>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "Comment">
                <xsd:complexType>
                        <xsd:sequence/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "Composite">
                <xsd:complexType>
                        <xsd:sequence>
                                <xsd:element ref = "Constituent" maxOccurs = "unbounded"/>
                        </xsd:sequence>
                        <xsd:attribute name = "mimetype" use = "required" type = "xsd:string"/>
                        <xsd:attribute name = "id" use = "required" type = "xsd:string"/>
                        <xsd:attribute name = "mimeparameters" type = "xsd:string"/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "Constituent">
                <xsd:complexType>
                        <xsd:sequence/>
                        <xsd:attribute name = "idref" use = "required" type = "xsd:string"/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "Encapsulation">
                <xsd:complexType>
                        <xsd:sequence>
                                <xsd:element ref = "Constituent"/>
                        </xsd:sequence>
                        <xsd:attribute name = "mimetype" use = "required" type = "xsd:string"/>
                        <xsd:attribute name = "id" use = "required" type = "xsd:string"/>
                        <xsd:attribute name = "mimeparameters" type = "xsd:string"/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "CompositeList">
                <xsd:complexType>
                        <xsd:choice maxOccurs = "unbounded">
                                <xsd:element ref = "Encapsulation"/>
                                <xsd:element ref = "Composite"/>
                        </xsd:choice>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "XMLMetaDataInformation">
                <xsd:complexType>
                        <xsd:sequence/>
                        <xsd:attribute name = "URI" type = "xsd:string"/>
                        <xsd:attribute name = "MetaDataDescriptionType" use = "required">
                                <xsd:simpleType>
                                        <xsd:restriction base = "xsd:NMTOKEN">
                                                <xsd:enumeration value = "dtd"/>
                                                <xsd:enumeration value = "xsd"/>
```

```
                                    </xsd:restriction>
                                </xsd:simpleType>
                        </xsd:attribute>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "MimeHeader">
                <xsd:complexType>
                        <xsd:sequence/>
                        <xsd:attribute name = "HeaderName" use = "required" type = "xsd:string"/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "MimeParameter">
                <xsd:complexType>
                        <xsd:sequence/>
                        <xsd:attribute name = "parameterAttribute" use = "required" type =
"xsd:string"/>
                        <xsd:attribute name = "parameterValue" type = "xsd:string"/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "SimplePart">
                <xsd:complexType>
                        <xsd:sequence/>
                        <xsd:attribute name = "id" use = "required" type = "xsd:string"/>
                        <xsd:attribute name = "mimetype" use = "required" type = "xsd:string"/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "ProcessingCapabilities">
                <xsd:complexType>
                        <xsd:sequence/>
                        <xsd:attribute name = "parse" use = "required" type = "xsd:string"/>
                        <xsd:attribute name = "generate" use = "required" type = "xsd:string"/>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name = "ds:Reference">
                <xsd:complexType>
                        <xsd:sequence/>
                </xsd:complexType>
        </xsd:element>
</xsd:schema>
```

Appendix E Formats of Information in the *CPP* and *CPA* (Normative)

This section defines format information that is not defined by the [XML] specification and is not defined in the descriptions of specific elements.

Formats of Character Strings

Protocol and Version Elements

Values of ***Protocol***, ***Version***, and similar elements are flexible. In general, any protocol and version for which the support software is available to both *Parties* to a *CPA* MAY be selected as long as the choice does not require changes to the DTD or schema and therefore a change to this specification.

> NOTE: A possible implementation MAY be based on the use of plug-ins or exits to support the values of these elements.

Alphanumeric Strings

Alphanumeric strings not further defined in this section follow these rules unless otherwise stated in the description of an individual element:

- Values of elements are case insensitive unless otherwise stated.
- Strings which represent file or directory names are case sensitive to ensure that they are acceptable to both UNIX and Windows systems.

Numeric Strings

A numeric string is a signed or unsigned decimal integer in the range imposed by a 32-bit binary number, i.e. -2,147,483,648 to +2,417,483,647. Negative numbers MAY or MAY not be permitted in particular elements.

Appendix F Composing a *CPA* from Two *CPPs* (Non-Normative)

Overview and Limitations

In this appendix, we discuss the tasks involved in *CPA* formation from *CPPs*. The detailed procedures for *CPA* formation are currently left for implementers. Therefore, no normative specification is provided for algorithms for *CPA* formation. In this initial section, we provide some background on *CPA* formation tasks.

There are three basic reasons why we prefer to provide information about the component tasks involved in *CPA* formation rather than attempt to provide an algorithm for *CPA* formation:

1. The precise informational inputs to the *CPA* formation procedure vary.
2. There exist at least two distinct approaches to *CPA* formation. One useful approach for certain situations involves basing *CPA* formation from a *CPA* template; the other approach involves composition from *CPPs*.
3. The conditions for output of a given *CPA* given two *CPPs* can involve different levels and extents of interoperability. In other words, when an optimal solution that satisfies every level of requirement and every other additional constraint does not exist, a *Party* MAY propose a *CPA* that satisfies enough of the requirements for "a good enough" implementation. User input MAY be solicited to determine what is a good enough implementation, and so MAY be as varied as there are user configuration options to express preferences. In practice, compromises MAY be made on security, reliable messaging, levels of signals and acknowledgements, and other matters in order to find some acceptable means of doing business.

Each of these reasons is elaborated in greater detail in the following sections.

Variability in Inputs

User preferences provide one source of variability in the inputs to the *CPA* formation process. Let us suppose in this section that each of the *Parties* has made its *CPP* available to potential collaborators. Normally one *Party* will have a desired *Collaboration Protocol* (defined in a *Process-Specification* document*)* to implement with its intended collaborator. So the information inputs will normally involve a user preference about intended *Collaboration Protocols* in addition to just the *CPPs.*

A *CPA* formation tool MAY have access to local user information not advertised in the *CPP* that MAY contribute to the *CPA* that is formed. A user MAY have chosen to only advertise those system capabilities that reflect nondeprecated capabilities. For example, a user MAY only advertize HTTP and omit FTP, even when capable of using FTP, because of concerns about the scalability of managing user accounts, directories, and passwords for FTP sessions. Despite not

advertising a FTP capability, configuration software MAY use tacit knowledge about its own FTP capability to form a *CPA* with an intended collaborator who happens to have only an FTP capability for implementing a desired business collaboration. In other words, business interests MAY, in this case, override the deprecation policy. Both tacit knowledge as well as detailed preference information account for variability in inputs into the *CPA* formation process.

Different Approaches

When a *CPA* is formed from a *CPA* template, it is typically because the capabilities of one of the *Parties* are limited, and already tacitly known. For example, if a *CPA* template were implicitly presented to a Web browser for use in an implementation using browser based forms capabilities, then the template maker can assume that the other *Party* has suitable web capabilities (or is about to download them). Therefore, all that really needs to be done is to supply ***PartyRef, Certificate***, and similar items for substitution into a *CPA* template. The *CPA* template will already have all the capabilities of both *Parties* specified at the various levels, and will have placeholders for values to be supplied by one of the *Partners*. A simple form might be adequate to gather the needed information and produce a *CPA*.

Variable Output “Satisficing” Policies

A *CPA* can support a fully interoperable configuration in which agreement has been reached on all technical levels needed for business collaboration. In such a case, matches in capabilities will have been found in all relevant technical levels.

However, there can be interoperable configurations agreed to in a *CPA* in which not all aspects of a business collaboration match. Gaps MAY exist in packaging, security, signaling, reliable messaging and other areas and yet the systems can still transport the business data, and special means can be employed to handle the exceptions. In such situations, a *CPA* MAY reflect configured policies or expressly solicited user permission to ignore some shortcomings in configurations. A system might not be capable of responding in a business collaboration so as to support a recommended ability to supply nonrepudiation of receipt, but might still be acceptable for business reasons. A system might not be able to handle all the processing required to support "multipart/related" processing with a type value of "application/vnd.eb+xml," and yet still be able to treat the multipart according to "multipart/mixed" handling and allow business collaboration to take place. In fact, short of a failure to be able to transport data and a failure to be able to provide data relevant to the *Business Process*, there are few features that might not be temporarily or indefinitely compromised about, given overriding business interests. This situation of "partial interoperability" is to be expected to persist for some time, and so interferes with formulating a “clean” algorithm for deciding on what is sufficient for interoperability.

In summary, the previous considerations indicate that at the present it is at best premature to seek a simple algorithm for *CPA* formation from *CPPs*. It is to be expected that as capability characterization and exchange becomes a more refined subject, that advances will be made in characterizing *CPA* formation and negotiation.

Despite it being too soon to propose a simple algorithm for *CPA* formation that covers all the above variations, it is currently possible to enumerate the basic tasks involved in matching capabilities within *CPPs.* This information might assist the software implementer in designing a partially automated and partially interactive software system useful for configuring business collaboration so as to arrive at satisfactorily complete levels of interoperability. To understand the context for characterizing the constituent tasks, the general perspective on *CPPs* and *CPAs* needs to be briefly recalled.

CPA Formation Component Tasks

Technically viewed, a *CPA* provides "bindings" between *Business- Process* (BP) specifications (as defined in the *Process-Specification* document) and those services and protocols that are used to implement these BP specifications. The implementation takes place at several levels and involves varied services at these levels. A *CPA* that arrives at a fully interoperable binding of a BP to its implementing services and protocols can be thought of as arriving at interoperable, application-to-application integration. *CPAs* MAY fall short of this goal and still be useful and acceptable to the collaborating *Parties*. Certainly, if no matching data-transport capabilities can be discovered, a *CPA* would not provide much in the way of interoperable business-to-business integration. Likewise, partial *CPAs* will leave significant system work to be done before a completely satisfactory application-to-application integration is realized. Even so, partial integration MAY be sufficient to allow collaboration, and to enjoy payoffs from increased levels of automation.

In practice, the *CPA* formation process MAY produce a complete *CPA,* a failure result, a gap list that drives a dialog with the user, or perhaps even a *CPA* that implements partial interoperability "good enough" for the business collaborators. Because both matching capabilities and interoperability can be matters of degree, the constituent tasks are finding the matches in capabilities at different levels and for different services. We next proceed to characterize many of these constituent tasks.

CPA Formation from *CPPs*: Enumeration of Tasks

To simplify discussion, assume in the following that we are viewing the tasks faced by a software agent when:

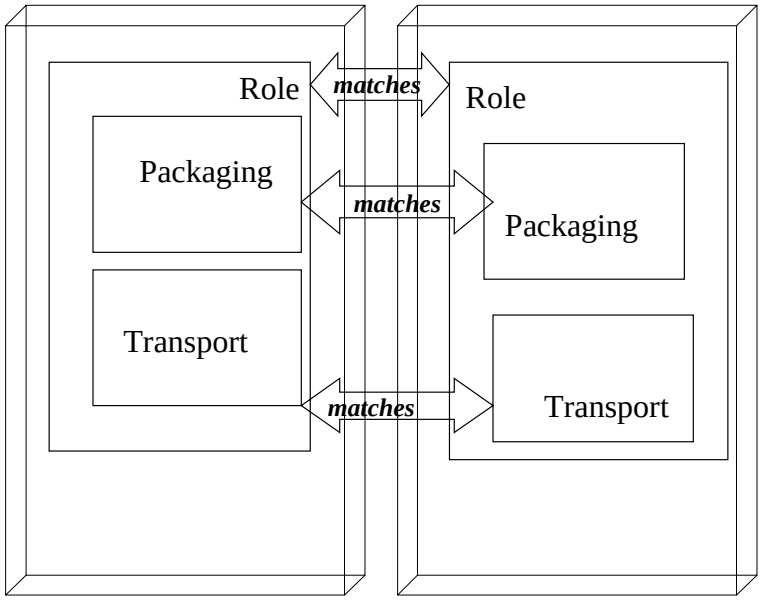
1. an intended collaborator is known and the collaborator's *CPP* has been retrieved,
2. the *Business Process* between us and our intended collaborator has been selected,
3. the specific role that our software agent is to play in the BP is known, and
4. the capabilities that are to be advertised in our *CPP* are known.

For vividness, we will suppose that our example agent wishes to play the role of supplier and seeks to find one of its current customers to begin a Purchase Order *Business Process* in which the intended player plays a complementary role. For simplicity, we assume that the information about capabilities is restricted to what is available in our agent's *CPP* and in the *CPP* of its intended collaborator.

In general, the constituent tasks consist of finding "matches" between our capabilities and our intended collaborator's at the various levels of the protocol stacks and with respect to the services supplied at these various levels.

Figure 6 illustrates the basic tasks informing a *CPA* from two *CPPs*: matching roles, matching packaging, and matching transport.

Figure 6: Basic Tasks in Forming a CPA



The first task to be considered is certainly the most basic: finding that our intended collaborator and ourselves have complementary role capabilities.

Matching Roles

Our agent has its role already selected in the BP. So it now begins to check the ***Role elements*** in its collaborator's *CPP*. The first element to examine is the ***PartyInfo*** element that contains a subtree of elements called ***CollaborationRole***. This set is searched to discover a role that complements the role of our agent within the BP that we have chosen. For simple binary collaboration cases, it is typically sufficient to find that our intended collaborator's ***CollaborationRole*** set contains ***ProcessSpecification*** elements that we intend to implement and where the role is not identical to our role. For more general collaborations, we would need to know the list of roles available within the process, and keep track that for each of the

collaborators, the roles chosen instantiate those that have been specified within the *Process-Specification* document. Collaborations involving more than two roles are not discussed further.

Matching Transport

We now have available a list of candidate ***CollaborationRole*** elements with the desired ***ProcessSpecification*** element (Purchase Ordering) and where our intended collaborator plays the buyer role. For simplicity, we shall suppose just one ***CollaborationRole*** element meets these conditions within each of the relevant *CPPs* and not discuss iterating over lists. (Within these remarks, where repetition is possible, we will frame the discussion by assuming that just one element is present.)

Matching transport first means matching the ***SendingProtocol*** capabilities of our intended collaborator with the ***ReceivingProtocol*** capabilities found on our side. Perusal of the *CPP* DTD or Schema will reveal that the ***ServiceBinding*** element provides the doorway to the relevant information from each side's ***CollaborationRole*** element with the ***channelId*** attribute. This ***channelId*** attribute's value allows us to find ***DeliveryChannels*** within each *CPP*. The ***DeliveryChannel*** has a ***transportId*** attribute that allows us to find the relevant ***Transport*** subtrees.

For example, suppose that our intended buyer has a ***Tranport*** entry:

```
<Transport transportId = "buyerid001">
      <SendingProtocol>HTTP</SendingProtocol>
      <ReceivingProtocol>
      HTTP
      </ReceivingProtocol>
      <Endpoint uri = "https://www.buyername.com/po-response"
                  type = "allPurpose"/>
      <TransportSecurity>
            <Protocol version = "1.0">TLS</Protocol>
            <CertificateRef certId =  certid001">BuyerName</CertificateRef>
      </TransportSecurity>
</Transport>
```

and our seller has a Transport entry:

```
<Transport transportId = "sellid001">
      <SendingProtocol>HTTP</SendingProtocol>
      <ReceivingProtocol>
      HTTP
      </ReceivingProtocol>
      <Endpoint uri = "https://www.sellername.com/pos_here"
                  type = "allPurpose"/>
      <TransportSecurity>
            <Protocol version = "1.0">TLS</Protocol>
            <CertificateRef certId =”certid002">Sellername</CertificateRef>
      </TransportSecurity>
</Transport>
```

A transport match for requests involves finding the initiator role or buyer has a ***SendingProtocol*** that matches one of our ***ReceivingProtocol***s. So here, "HTTP" provides a match. A transport match for responses involves finding the responder role or seller has a ***SendingProtocol*** that matches one of the buyer's ***ReceivingProtocol***s. So in the above example, "HTTP" again provides a match. When such matches exist, we then have discovered an interoperable solution at the transport level. If not, no *CPA* will be available, and a high-priority gap has been identified that will need to be remedied by whatever exception handling procedures are in place.

Matching Transport Security

Matches in transport security, such as in the above, will reflect agreement in versions and values of protocols. Software can supply some knowledge here so that if one side has SSL-3 and the other TLS-1, it can guess that security is available by means of a fallback of TLS to SSL.

Matching Document Packaging

Probably one of the most complex matching problems arises when it comes to finding whether there are matches in document-packaging capabilities. Here both security and other MIME handling capabilities can combine to create complexity for appraising whether full interoperability can be attained.

Access to the information needed for undertaking this task is found under the ***ServiceBinding*** elements, and again we suppose that each side has just one ***ServiceBinding*** element. However, we will initially suppose that two ***Packaging*** elements are available to consider under each role. Several quite different ways of thinking about the matching task are available, and several methods for the tasks MAY be performed when assessing whether a good enough match exists.

To continue our previous purchase-ordering example, we recall that the packaging is the particular combination of body parts, XML instances (*Header*s and payloads), and security encapsulations used in assembling the *Message* from its data sources. Both requests and responses will have packaging. The most complete specification of packaging, which MAY not always be needed, would consist of:

1. the buyer asserting what packaging it can generate for its purchase order, and what packaging it can parse for its purchase order response *Messages*.
2. the seller asserting what packaging it can generate for its purchase order responses and what packaging it can parse for received purchase orders.

Matching by structural comparison would then involve comparing the packaging details of the purchase orders generated by the seller with the purchase orders parsable by the buyer. The comparison would seek to establish that the MIME types of the ***SimplePart***s of corresponding subtrees match and would then proceed to check that the ***CompositeList*** matched in MIME types and in sequence of composition.

For example, if each *CPP* contained the packaging subtrees below, and under the appropriate

ServiceBindings, then there would be a straightforward match by structural comparison:

```
<Packaging>
      <ProcessingCapabilities parse = "true" generate = "true"/>
      <SimplePart id = "P1" mimetype = "application/vnd.eb+xml"/>
      <SimplePart id = "P2" mimetype = "application/po+xml"/>
      <CompositeList>
            <Composite mimetype = "multipart/related" id = "P3"
                  mimeparameters = "type=application/eb+xml">
                  <Constituent idref = "P1"/>
                  <Constituent idref = "P2"/>
            </Composite>
      </CompositeList>
</Packaging>
<Packaging>
      <ProcessingCapabilities parse = "true" generate = "true"/>
      <SimplePart id = "P11" mimetype = "application/vnd.eb+xml"/>
      <SimplePart id = "P12" mimetype = "application/po-ack+xml"/>
      <CompositeList>
            <Composite mimetype = "multipart/related" id = "P13"
                  mimeparameters = "type=application/eb+xml">
                  <Constituent idref = "P11"/>
                  <Constituent idref = "P12"/>
            </Composite>
      </CompositeList>
</Packaging>
```

However, it is to be expected that over time it might become possible to only assert what packaging is *generated* within each ***ServiceBinding*** for the requester and responder roles. This simplification assumes that each side has knowledge of what MIME types it handles correctly, what encapsulations it handles correctly, and what composition modes it handles correctly. By scanning the packaging specifications against its lists of internal capabilities, it can then look up whether other side's generated packaging scheme is one it can process and accept it under those conditions. Knowing what generated packaging style was produced by the other side could enable the software agent to propose a packaging scheme using only the MIME types and packaging styles used in the incoming *Message*. Such a packaging scheme would be likely to be acceptable to the other side when included within a proposed *CPA*. Over time, and as proposal and negotiation conventions get established, it is to be expected that the methods used for determining a match in packaging capabilities will move away from structural comparison to simpler methods, using more economical representations.

In the near term, however, more explicit specifications and the more elaborate structural comparisons will be most likely to give trustworthy matching assessments.

Matching Document-Level Security

Although the matching task for document-level security is a subtask of the Packaging-matching task, it is useful to discuss some specifics tied to the three major document-level security approaches found in [S/MIME], OpenPGP[RFC2015], and XMLDsig[XMLDSIG].

XMLDsig matching capability can be inferred from document-matching capabilities when the use of ebXML *Message* Service[MSSPEC] packaging is present. However, there are other sources that should be checked to confirm this match. The ***DeliveryChannel*** element has a subtree under the ***DocExchange*** element that, for the ***ebXMLBinding*** element**,** has a ***NameSpacesSupported*** element. XMLDsig capability should be found there. Likewise, a detailed check on this match should examine the information under the ***NonRepudiation*** element to check for compatibility in hash functions and algorithms.

The existence of several radically different approaches to document-level security, together with the fact that it is unusual at present for a given *Party* to commit to more than one form of such security, means that there can be basic failures to match security frameworks. Therefore, there might be no match in capabilities that supports full interoperability at all levels. For the moment, we assume that document-level security matches will require both sides able to handle the same security composites (multipart/signed using S/MIME, for example.)

However, suppose that there are matches at the transport and transport layer security levels, but that the two sides have failures at the document-security layer because one side makes use of PGP signatures while the other uses S/MIME. Does this mean that no *CPA* can be proposed? That is not necessarily the case.

Both S/MIME and OpenPGP permit signatures to be packaged within “multipart/signed” composites. In such a case, it MAY be possible to extract the data and arrive at a partial implementation that falls short with respect to nonrepudiation. While neither side could check the other's signatures, it might still be possible to have confidential document transmission and transport-level authentication for the business data. Eventually *CPA*-formation software MAY be created that is able to identify these exceptional situations and “salvage” a proposed *CPA* with downgraded security features. Whether the other side would accept such a proposed *CPA* would, naturally, involve what their preferences are with respect to initiating a business collaboration and sacrificing some security features. *CPA*-formation software MAY eventually be capable of these adaptations, but it is to be expected that human assistance will be required for such situations in the near term.

Of course, an implementation MAY simply decide to terminate looking for a *CPA* when a match fails in any crucial factor for an interoperable implementation. At the very least, the users should be warned that the only *CPAs* that can be proposed will be missing security or other normally desirable features or features recommended by the BP’s *Process Specification*.

Other Considerations

Handling Preferences among multiple matching capabilities involves

1. Preferences: tiebreaker needed.
2. Ranking: one might convert ranks to numerical order, add values, and decide that lowest value wins; in case of a tie, the choice is the lowest value that reflects the BP responder values.