Service Component Architecture JCA Binding Specification Version 1.1

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- OASIS Committee Draft 02, “SCA Policy Framework Version 1.1”, February 2009
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Abstract:

This document presents bindings describing access and connectivity to the services provided by the Enterprise Information System (EIS).

This version of the document describes JCA Bindings thus narrowing connectivity down to the connectivity to the EIS system external to the SCA system, based on the Java EE Connector Architecture specification and implemented in Java.

Further specification is necessary to define EIS Bindings between different SCA runtimes within SCA system, for example J2EE and EIS based runtimes.

The binding specified in this document applies to the composite’s references and services.

The connection to exchange data with the EIS is characterized by two sets of configuration parameters, the connection and interaction parameters. The former set determines the location of the target system the latter determines characteristics that need to be specified to invoke one specific service available at the endpoint. JCA Binding model captures these parameters as separate sets to allow their reuse and reconfiguration.

Status:

This document was last revised or approved by the OASIS Service Component Architecture / Bindings (SCA-Bindings) TC on the above date. The level of approval is also listed above. Check the “Latest Version” or “Latest Approved Version” location noted above for possible later revisions of this document.

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1 Introduction

This document presents a binding describing access and connectivity to the services provided by Enterprise Information Systems (EIS). This document focuses on JCA Bindings thus narrowing connectivity down to the connectivity to the EIS system external to the SCA system, based on the J2EE Connector Architecture specification and implemented in Java.

Further specification is necessary to define EIS Bindings between different SCA runtimes within SCA system, for example J2EE and EIS based runtimes.

The JCA Bindings are applicable to the composite's references and services.

The connection to exchange data with the EIS is characterized by two sets of configuration parameters, the connection and interaction parameters. The former set determines the location of the target system the latter determines characteristics that need to be specified to invoke one specific service available at the endpoint. JCA Binding model captures these parameters as separate sets to allow their reuse and reconfiguration.

This binding places no requirement to support bidirectional interfaces, SCA runtimes can implement support for bidirectional interfaces via extensions.

1.1 Terminology

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

This specification uses predefined namespace prefixes throughout; they are given in the following list. Note that the choice of any namespace prefix is arbitrary and not semantically significant.

Table 1-1 Prefixes and Namespaces used in this specification

Prefix	***Namespace***	***Notes***
xs	"http://www.w3.org/2001/XMLSchema"	Defined by XML Schema 1.0 specification
sca	"http://docs.oasis-open.org/ns/opencsa/sca/200903"	Defined by the SCA specifications

1.2 Normative References

[RFC2119] S. Bradner, *Key words for use in RFCs to Indicate Requirement Levels*, http://www.ietf.org/rfc/rfc2119.txt, IETF RFC 2119, March 1997.

[JCA15] J2EE Connector Architecture Specification Version 1.5 http://java.sun.com/j2ee/connector/

[WSDL] E. Christensen et al, *Web Service Description Language (WSDL) 1.1*, http://www.w3.org/TR/2001/NOTE-wsdl-20010315, W3C Note, March 15 2001.

R. Chinnici et al, *Web Service Description Language (WSDL) Version 2.0 Part 1: Core Language*, http://www.w3.org/TR/2007/REC-wsdl20-20070626/, W3C Recommendation, June 26 2007.

[SCA-Assembly] OASIS Committee Draft 03, "Service Component Architecture Assembly Model Specification Version 1.1", March 2009 http://docs.oasis-open.org/opencsa/sca-assembly/sca-assembly-1.1-spec-cd03.pdf

[SCA-Policy] OASIS Committee Draft 02, "SCA Policy Framework Specification Version 1.1", February 2009 http://docs.oasis-open.org/opencsa/sca-policy/sca-policy-1.1-spec-cd02.pdf

1.3 Non-Normative References

TBD TBD

1.4 Naming Conventions

This specification follows some naming conventions for artifacts defined by the specification. In addition to the conventions defined by section 1.3 of the SCA Assembly Specification [SCA-Assembly], this specification adds three additional conventions:

- Where the names of elements and attributes consist partially or wholly of acronyms, the letters of the acronyms use the same case. When the acronym appears at the start of the name of an element or an attribute, or after a period, it is in lower case. If it appears elsewhere in the name of an element or an attribute, it is in upper case. For example, an attribute might be named "uri" or "jndiURL".
- Where the names of types consist partially or wholly of acronyms, the letters of the acronyms are in all upper case. For example, an XML Schema type might be named "JCABinding" or "MessageID".
- Values, including local parts of QName values, follow the rules for names of elements and attributes as stated above, with the exception that the letters of acronyms are in all upper case. For example, a value might be "JMSDefault" or "namespaceURI".

2 JCA Binding

The JCA binding element is defined by the following pseudo-schema:

```
<binding.jca connectionInfo="QName"?
             initialContextFactory="xs:anyURI"?
             jndiURL="xs:anyURI"?
             name="NCName"?
             requires="list of xs:QName"?
             policySets="list of xs:QName"?
             uri="xsd:anyURI"?>

   <outboundConnection managed="xs:boolean"?>
      <resourceAdapter name="NMTOKEN" type="NMTOKEN">
         <property name="NMTOKEN" type="NMTOKEN">*
      </resourceAdapter>?
      <connection name="NMTOKEN"? type="NMTOKEN" create="string"?>
         <property name="NMTOKEN" type="NMTOKEN">*
      </connection>
      <resAuth>container|application</resAuth>?
   </outboundConnection>?
   <inboundConnection>
      <resourceAdapter name="NMTOKEN"? type="NMTOKEN">
         <property name="NMTOKEN" type="NMTOKEN">*
      </resourceAdapter>
      <activationSpec name="NMTOKEN"? type="NMTOKEN" create="string"?>
         <property name="NMTOKEN" type="NMTOKEN">*
      </activationSpec>
   </inboundConnection>?

   <outboundInteraction>
      <connectionSpec type="NMTOKEN">
         <property name="NMTOKEN" type="NMTOKEN">*
      </connectionSpec>?
      <interactionSpec type="NMTOKEN">
         <property name="NMTOKEN" type="NMTOKEN">*
      </interactionSpec>?
      <operation name="NMTOKEN">
         <interactionSpec type="NMTOKEN"?>
            <property name="NMTOKEN" type="NMTOKEN">*
         </interactionSpec>?
      </operation>*
   </outboundInteraction>?
   <inboundInteraction>
      <listener type="NMTOKEN">?
      <inboundOperation name="NMTOKEN" nativeOperation="NMTOKEN">*
   </inboundInteraction>?
   <wireFormat ... />?
   <operationSelector ... />?
</binding.jca>
```

The ***binding.jca*** element has the following attributes:

- ***/binding.jca/@uri*** the binding's @uri attribute allows for the specification of the endpoint. For the reference, it defines the endpoint allowing connecting to the target EIS by providing JNDI name under which the ConnectionFactory is located. For the service, the @uri defines the endpoint to allow the EIS system to connect to the SCA system by defining the JNDI lookup name of the ActivationSpec, for example @uri="java:comp/env/eis/TRAN_EIS".

The ***@uri*** attribute, the ***@connectionInfo*** attribute and the ***inboundConnection*** or ***outboundConnection*** elements are mutually exclusive and the SCA runtime MUST raise an error if more than one is present [BJC20001].

- ***/binding.jca/@connectionInfo*** identifies the jca.binding element present in the definitions document and whose child or children (one or more of inboundConnection, outboundConnection, inboundInteraction, outboundInteraction) are used to define characteristics of connection and interaction characteristics for this binding.
- ***/binding.jca/@initialContextFactory*** – the name of the JNDI initial context factory.
  The ***@initialContextFactory*** attribute MUST NOT be specified if the ***@uri*** attribute is not present [BJC20002].
- ***/binding.jca/@jndiURL*** – the URL for the JNDI provider.
  The ***@jndiURL*** attribute MUST NOT be specified if the ***@uri*** attribute is not present [BJC20003].
- ***/binding.jca/@name*** - as defined in the SCA Assembly Specification [SCA-Assembly].
- ***/binding.jca/@requires*** - as defined in the SCA Assembly Specification [SCA-Assembly].
- ***/binding.jca/@policySets*** - as defined in the SCA Assembly Specification [SCA-Assembly].
- ***/binding.jca/outboundConnection*** defines the outbound connection characteristics.
  The ***outboundConnection*** element MUST NOT be specified for services [BJC20004].
- ***/binding.jca/outboundConnection/@managed*** attribute that determines whether the interaction with the EIS system is to be performed in the managed or non-managed mode. If the value is true (default), the JNDI name is used to obtain connection to the EIS and use adapter in the managed mode. If the value is false, the connection information is used to invoke adapter in the non-managed mode i.e. by creating instance of the ManagedConnectionFactory and using it to create Connection. For the full description of the managed and non-managed mode refer to section 6.9 of the JCA 1.5 specification [JCA15].
- ***/binding.jca/outboundConnection/resourceAdapter*** – specifies name, type and properties of the Resource Adapter Java bean.
  The SCA runtime MAY restrict valid properties of the outbound connection's Resource Adapter Java bean depending on the deployment platform [BJC20005].
  The ***outboundConnection/resourceAdapter*** element MUST NOT be specified when the ***@managed*** attribute value is ***"false"*** [BJC20006].
- ***/binding.jca/outboundConnection/resourceAdapter/@type*** – the fully qualified name of the class implementing the JCA ResourceAdapter interface
- ***/binding.jca/outboundConnection/resourceAdapter/@name*** – the optional name that uniquely identifies the existing instance of the resource adapter.
- ***/binding.jca/outboundConnection/resourceAdapter/property*** element contains the subset of the properties of the Resource Adapter Java Bean that need to be set in order to access specified EIS service. The full list of Resource Adapter properties can be obtained by introspecting the Java Bean.
- ***/binding.jca/outboundConnection/connection*** element specifies the properties of the connection factory used to create connections to the service endpoint.
- ***/binding.jca/outboundConnection/connection/@type*** – the fully qualified name of the class implementing the JCA ManagedConnectionFactory interface
- ***/binding.jca/outboundConnection/connection/@name*** – if the ***@create*** attribute is ***"never"***, the name uniquely identifies an existing instance of the managed connection factory.
  If the ***connection/@create*** attribute is ***"always"***, the ***@name*** value MUST be unique within the domain [BJC20007].
- ***/binding.jca/outboundConnection/connection/property*** element contains the subset of the properties of the Managed Connection Factory Java Bean that need to be set in order to access specified EIS service. The full list of Managed Connection Factory properties can be obtained by introspecting the Java Bean.

- ***/binding.jca/outboundConnection/connection/@create*** attribute indicates whether the element containing the attribute should be created when the containing composite is deployed. Valid values are "***always***", "***never***" and "***ifNotExist***". The default value is "***ifNotExist***".
  The SCA runtime SHOULD raise an error if the ***connection/@create*** attribute value is "***always***" and the element with the given name already exists [BJC20008].
- ***/binding.jca/outboundConnection/connection/resAuth*** element specifies the authentication mechanism used by the resource adapter in the managed environment
- ***/binding.jca/outboundInteraction*** defines characteristics of the outbound interaction.
  The ***outboundInteraction*** element MUST NOT be specified for services [BJC20009].
- ***/binding.jca/outboundInteraction/connectionSpec*** identifies the name of the class implementing javax.resource.cci.ConnectionSpec interface and the set of connectionSpec properties to be specified when creating a connection, a client level connection properties e.g. user name or password. The ConnectionSpec object is used in several patterns that justify its definition in the interaction binding.
- ***/binding.jca/outboundInteraction/interactionSpec*** type specifies the name of the class implementing javax.resource.cci.InteractionSpec interface. This ***interactionSpec*** applies to all operations that do not have one defined via an ***operation*** element.
- ***/binding.jca/outboundInteraction/operation*** element gathers characteristics of one operation of the service, the data bindings of the inbound and outbound arguments as well as interaction type and the properties.
- ***/binding.jca/inboundConnection*** defines the inbound connection characteristics.
  The ***inboundConnection*** element MUST NOT be specified for references [BJC20010].
- ***/binding.jca/inboundConnection/resourceAdapter*** – specifies name, type and properties of the Resource Adapter Java bean.
  The SCA runtime MAY restrict valid properties of the inbound connection's Resource Adapter Java bean depending on the deployment platform [BJC20011].
  The ***inboundConnection/resourceAdapter*** element MUST NOT be specified when the ***@managed*** attribute is ***"false"*** [BJC20012].
- ***/binding.jca/inboundConnection/resourceAdapter/@type*** – the fully qualified name of the class implementing the ResourceAdapter interface
- ***/binding.jca/inboundConnection/resourceAdapter/@name*** – the optional name that uniquely identifies the existing instance of the resource adapter.
- ***/binding.jca/inboundConnection/activationSpec*** element specifies the name of the class implementing javax.resource.spi.ActivationSpec interface and its properties.
- ***/binding.jca/inboundConnection/activationSpec/@type*** – the fully qualified name of the class implementing the ActivationSpec interface
- ***/binding.jca/inboundConnection/activationSpec/@name*** – if the @create attribute is ***"never"***, the name uniquely identifies an existing instance of the activation spec.
  If the ***activationSpec/@create*** attribute is ***"always"***, the ***@name*** value MUST be unique within domain [BJC20013].
- ***/binding.jca/inboundConnection/activationSpec/@create*** attribute indicates whether the element containing the attribute should be created when the containing composite is deployed. Valid values are "***always***", "***never***" and "***ifNotExist***". The default value is "***ifNotExist***".
  The SCA runtime SHOULD raise an error if the ***activationSpec/@create*** attribute value is "***always***" and the element with the given name already exists [BJC20014].
- ***/binding.jca/inboundInteraction*** defines characteristics of the inbound interaction.
  The ***inboundInteraction*** element MUST NOT be specified for references [BJC20015].
- ***/binding.jca/inboundInteraction/listener*** type specifies the listener interface supported by this group of interactions.
  If the ***inboundInteraction/listener*** element is not specified, the SCA runtime MUST interpret it as

a listener implementing javax.resource.cci.MessageListener interface from the JCA specification [BJC20016].

- ***/binding.jca/inboundInteraction/inboundOperation*** element that maps the name of the EIS event received by ResourceAdapter to the name of the operation of the Service.
- ***/binding.jca/wireFormat*** – identifies the wire format used by requests and responses sent or received by this binding as defined in the SCA Assembly Specification [SCA-Assembly].
- ***/binding.jca/operationSelector*** – identifies the operation selector used when receiving requests for a service as defined in the SCA Assembly Specification [SCA-Assembly].

The ***binding.jca*** element MUST conform to the XML schema defined in sca-binding-jca.xsd [BJC20017].

2.1 Extensibility

The JCA Binding allows further customization of the binding element and its subelements with vendor specific attributes or elements. This is done by providing extension points in the schema; refer to Appendix A, “JCA XML Binding Schema: sca-binding-jca.xsd” for the locations of these extension points.

3 Policy

This JCA Binding specification does not support intents such as mayProvide or alwaysProvides as JCA Specification does not define generic Resource Adapter characteristics that could be set using intents.

4 Operation Selectors and Wire Formats

In general JCA resource adapters deal with records. There is not usually a built-in concept of "operation" that corresponds to that defined in a WSDL [WSDL] portType. Records have a format which corresponds in some way to the schema of an input or output message of an operation in the interface of a service or reference, however additional Resource Adapter-specific information is required in order for an SCA runtime to know how to identify the operation and understand the format of records.

The process of identifying the operation to be invoked is ***operation selection***; the information that describes the contents of messages is a ***wire format***. The binding element as described in the SCA Assembly Specification [SCA-Assembly] provides the means to identify specific operation selection via the ***operationSelector*** element and the format of messages received and to be sent using the ***wireFormat*** element.

This specification does not define default behavior for the operation selection or wire format of a JCA binding. This choice had been made because the implementations of generic Record interfaces that define the data exchanged between JCA adapter and its client are specific to a particular adapter and, unlike JMS, cannot be used in a generic manner.

No standard means is provided for linking the ***wireFormat*** or ***operationSelector*** elements with the runtime components that implement their behaviour.

5 Binding Properties

The JCA Binding contains properties necessary to interact with the EIS system, properties that are, however, not related to the service location or type of services available. Such properties ought to be configurable but not require overwriting connection or interaction elements. Examples of such properties are user ID or password.

The binding.jca element contains connectionInfo attribute that specifies the name of the binding.jca element in the definition file.

```
<reference name="EISHelloWorldReference">
      <binding.jca connectionInfo="JCA_Services">
      </binding.jca>
</reference>
```

This element can contain the interaction properties, for example properties of the connectionSpec.

```
<definitions targetNamespace="http://acme.com"
             xmlns="http://docs.oasis-pen.org/ns/opencsa/sca/200903">
      <binding.jca name="JCA_Services">
            <outboundInteraction >
                  <connectionSpec name="FAConnectionSpec">
                        <property name="group">GROUP1</property>
                        <property name="userid">SYSAD</property>
                        <property name="password">SYSAD</property>
                  </connectionSpec>
                  …
            </outboundInteraction>
      </binding.jca>
</definitions>
```

In the example above, the connectionSpec element specifies all the properties it overwrites in place and needs to be updated when there is a need to modify any of the properties. This could be inefficient at times and the method of passing properties from the bindings is defined. To get the value from the bindings, the property specifies the source attribute as follows.

```
      <outboundInteraction >
            <connectionSpec
                   name="connector.file.outbound.FAConnectionSpec">
                  <property name="group">GROUP1</property>
                  <property name="userid">SYSAD</property>
                  <property name="password" source="$password"/>
            </connectionSpec>
      </outboundInteraction>
```

The property value is the specified in the binding element that refers to the element in the definitions file.

```
<reference name="JCAHelloWorldReference">
      <binding.jca connectionInfo="JCA_Services">
            <property name=”password”>SYSAD</property>
      </binding.jca>
</reference>
```

The properties can also be specified by the composite, in that case the reference or service would contain the source attribute pointing to the property of the composite:

```
<composite xmlns="http://docs.oasis-pen.org/ns/opencsa/sca/200903
           name="EISHelloworld">

   <reference name="EISHelloWorldReference">
<binding.jca connectionInfo="JCA_Services">
            <property name=”userid” source=”$UID”/>
```

```
   </binding.jca>
   </reference>


   <property name="UID">SYSAD</property>
</composite>
```

The indirection level of the binding, required even if the property value is specified in the composite prevents introducing hidden dependencies between the composite and definitions file.

6 Examples

6.1 Minimal JCA Binding

The minimal JCA Binding only contains the binding's uri attribute with JNDI name of the connection factory. It allows to obtain the Connection to execute request against EIS using adapter. Since no interaction properties are specified, it is assumed that Resource Adapter accepts the null values for the invocation methods.

```
<!-- JCA reference, connection is configured in JNDI context -->
<reference name="EISHelloWorldReference">
      <binding.jca uri="java:comp/env/eis/EISMCF"/>
</reference>
```

6.2 Existing resources

The sample reference with the JCA Binding, the binding's uri attribute specifies the existing resource - the JNDI name under which the connection factory object is located. The interaction properties are specified explicitly in the inlined ***outboundInteraction*** element.

```
<reference name="EISHelloWorldReference">
      <binding.jca uri="java:comp/env/eis/EISMCF">
            <outboundInteraction>

                  <connectionSpec name="FAConnectionSpec">
                        <property name="userid">SYSAD</property>
                  </connectionSpec>
                  <interactionSpec name="FAInteractionSpec">
                  </interactionSpec>

                  <operation name="hello">
                        <interactionSpec>
                              <property name="dir">temp</property>
                              <property name="fileMode">read</property>
                        </interactionSpec>
                  </operation>

            </outboundInteraction>
      </binding.jca>
</reference>
```

6.3 Resource Creation

The following sample presents the reference with JCA bindings where the connection resources do not exist and need to be created.

```
<reference name="JCAHelloWorldReference">
      <binding.jca>
            <outboundConnection managed="true">
                  <resourceAdapter
                        name="connector.file.FAResourceAdapter">
                        <property name="logDrive">D</property>
                  </resourceAdapter>
                  <connection name="FAManagedConnectionFactory"
                        create="always">
                        <property name="host">localhost</property>
                        <property name="drive">C</property>
                  </connection>
            </outboundConnection>
```

```
        </binding.jca>
    </reference>
```

6.4 Existing Resources specified in the definition file

This sample shows the resources specified in the definitions file and referred to by the binding elements. The definitions file contains the following

```
<definitions targetNamespace="http://acme.com"
             xmlns="http://docs.oasis-pen.org/ns/opencsa/sca/200903">

   <binding.jca name="JCA_Inbound">
         <inboundConnection>
               <resourceAdapter name="FAResourceAdapter">
                     <property name="logDrive">D</property>
               </resourceAdapter>
               <activationSpec     name="FAActivationSpec">
                     <property name="directory_type">temp</property>
                     <property name="drive">C</property>
               </activationSpec>
         </inboundConnection>
   </binding.jca>
</definitions>
```

The service with the JCA Bindings uses the connectionInfo attribute to identify the resources in the definition file

```
<service name="JCAHelloWorldService">
   <binding.jca connectionInfo=" JCA_Inbound ">
         <inboundInteraction>
               <listener>MyInboundListener</listener>
               <inboundOperation name="hello" nativeOperation="TXPN"/>
                     <inboundOperation name="bye" nativeOperation="ETXPRN"/>
         </inboundInteraction>
   </binding.jca>
</service>
```

7 Conformance

The XML schema pointed to by the RDDL document at the namespace URI, defined by this specification, are considered to be authoritative and take precedence over the XML schema defined in the appendix of this document.There are two categories of artifacts for which this specification defines conformance:

a) SCA JCA Binding XML Document

b) SCA Runtime

7.1 SCA JCA Binding XML Document

An SCA JCA Binding XML document is an SCA Composite Document, an SCA Definitions Document or an SCA ComponentType Document, as defined by the SCA Assembly specification Section 13.1 [SCA-Assembly], that uses the ***binding.jca*** element.

An SCA JCA Binding XML document MUST be a conformant SCA Composite Document, SCA Definitions Document or a SCA ComponentType Document, as defined by the SCA Assembly Specification [SCA-Assembly], and MUST comply with all statements in Appendix B: “Conformance Items”related to elements and attributes in an SCA JCA Binding XML document, notably all "MUST" statements have to be implemented.

7.2 SCA Runtime

An implementation that claims to conform to the requirements of an SCA Runtime defined in this specification has to meet the following conditions:

1. The implementation MUST comply with all statements in Appendix B: “Conformance Items” related to an SCA Runtime, notably all "MUST" statements have to be implemented
2. The implementation MUST conform to the SCA Assembly Model Specification Version 1.1 [SCA-Assembly], and to the SCA Policy Framework Version 1.1 [SCA-Policy]
3. The implementation MUST reject an SCA JCA Binding XML Document that is not conformant per Section 7.1

A. JCA XML Binding Schema: sca-binding-jca.xsd

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Copyright(C) OASIS(R) 2005,2009. All Rights Reserved.
      OASIS trademark, IPR and other policies apply.  -->
<schema xmlns="http://www.w3.org/2001/XMLSchema"
   targetNamespace=" http://docs.oasis-open.org/ns/opencsa/sca/200903"
   xmlns:sca=" http://docs.oasis-open.org/ns/opencsa/sca/200903"
   elementFormDefault="qualified">

   <include schemaLocation="sca-core-1.1-cd03.xsd" />

   <complexType name="JCABinding">
      <complexContent>
         <extension base="sca:Binding">
            <sequence>
               <element name="outboundConnection"
                        type="sca:JCAOutboundConnection" minOccurs="0" />
               <element name="inboundConnection"
                        type="sca:JCAInboundConnection" minOccurs="0" />
               <element name="outboundInteraction"
                        type="sca:JCAOutboundInteraction" minOccurs="0" />
               <element name="inboundInteraction"
                        type="sca:JCAInboundInteraction" minOccurs="0" />
               <element name="property" type="sca:Property" minOccurs="0"
                        maxOccurs="unbounded" />
               <any namespace="##other" processContents="lax" minOccurs="0"
                    maxOccurs="unbounded" />
            </sequence>
            <attribute name="connectionInfo" type="anyURI" use="optional" />
            <attribute name="initialContextFactory" type="anyURI"
                       use="optional"/>
             <attribute name="jndiURL" type="anyURI" use="optional"/>
         </extension>
      </complexContent>
   </complexType>

   <simpleType name="JCACreateResource">
      <restriction base="string">
         <enumeration value="always" />
         <enumeration value="never" />
         <enumeration value="ifNotExist" />
       </restriction>
   </simpleType>
   <simpleType name="ResAuth">
      <restriction base="string">
         <enumeration value="container" />
         <enumeration value="application" />
      </restriction>
   </simpleType>
   <complexType name="JCAOutboundConnection">
      <sequence>
         <element name="resourceAdapter" type="sca:ResourceAdapter"
                  minOccurs="0" />
         <element name="connection" type="sca:Connection" />
         <element name="resAuth" type="sca:ResAuth" minOccurs="0" />
         <any namespace="##other" processContents="lax" minOccurs="0"
              maxOccurs="unbounded" />
      </sequence>
      <attribute name="managed" type="boolean" use="optional"
                 default="true" />
```

```
      <anyAttribute namespace="##other" processContents="lax" />
   </complexType>
   <complexType name="JCAInboundConnection">
      <sequence>
         <element name="resourceAdapter" type="sca:ResourceAdapter" />
         <element name="activationSpec" type="sca:ActivationSpec" />
         <any namespace="##other" processContents="lax" minOccurs="0"
              maxOccurs="unbounded" />
      </sequence>
      <anyAttribute namespace="##other" processContents="lax" />
   </complexType>
   <complexType name="JCAOutboundInteraction">
      <sequence>
         <element name="connectionSpec" type="sca:ConnectionSpec"
                  minOccurs="0" />
         <element name="interactionSpec" type="sca:InteractionSpec"
                  minOccurs="0" />
         <element name="operation" type="sca:Operation" minOccurs="0" />
         <any namespace="##other" processContents="lax" minOccurs="0"
              maxOccurs="unbounded" />
      </sequence>
      <anyAttribute namespace="##other" processContents="lax" />
   </complexType>
   <complexType name="JCAInboundInteraction">
      <sequence>
         <element name="listener" type="string" minOccurs="0" />
         <element name="inboundOperation" type="sca:InboundOperation"
                  minOccurs="0" maxOccurs="unbounded" />
         <any namespace="##other" processContents="lax" minOccurs="0"
              maxOccurs="unbounded" />
      </sequence>
      <anyAttribute namespace="##other" processContents="lax" />
   </complexType>
   <complexType name="ResourceAdapter">
      <sequence>
         <element name="property" type="sca:Property" minOccurs="0"
                  maxOccurs="unbounded" />
         <any namespace="##other" processContents="lax" minOccurs="0"
              maxOccurs="unbounded" />
      </sequence>
      <attribute name="name" type="NMTOKEN" use="optional" />
      <attribute name="type" type="NMTOKEN" use="required" />
      <anyAttribute namespace="##other" processContents="lax" />
   </complexType>
   <complexType name="Connection">
      <sequence>
         <element name="property" type="sca:Property" minOccurs="0"
                  maxOccurs="unbounded" />
         <any namespace="##other" processContents="lax" minOccurs="0"
              maxOccurs="unbounded" />
      </sequence>
      <attribute name="name" type="NMTOKEN" use="optional" />
      <attribute name="type" type="NMTOKEN" use="required" />
      <attribute name="create" type="sca:JCACreateResource" use="optional"
                 default="ifNotExist" />
      <anyAttribute namespace="##other" processContents="lax" />
   </complexType>
   <complexType name="ActivationSpec">
      <sequence>
         <element name="property" type="sca:Property" minOccurs="0"
                  maxOccurs="unbounded" />
         <any namespace="##other" processContents="lax" minOccurs="0"
              maxOccurs="unbounded" />
      </sequence>
```

```
      <attribute name="name" type="NMTOKEN" use="optional" />
      <attribute name="type" type="NMTOKEN" use="required" />
      <attribute name="create" type="sca:JCACreateResource" use="optional"
                 default="ifNotExist"/>
      <anyAttribute namespace="##other" processContents="lax" />
   </complexType>
   <complexType name="Operation">
      <sequence>
         <element name="interactionSpec" type="sca:InteractionSpec"
                  minOccurs="0" />
         <any namespace="##other" processContents="lax" minOccurs="0"
              maxOccurs="unbounded" />
      </sequence>
      <attribute name="name" type="NMTOKEN" use="required" />
      <anyAttribute namespace="##other" processContents="lax" />
   </complexType>
   <complexType name="InboundOperation">
      <sequence>
         <any namespace="##other" processContents="lax" minOccurs="0"
              maxOccurs="unbounded" />
         </sequence>
         <attribute name="name" type="NMTOKEN" use="required" />
         <attribute name="nativeOperation" type="string" use="required" />
         <anyAttribute namespace="##other" processContents="lax" />
   </complexType>
   <complexType name="ConnectionSpec">
      <sequence>
         <element name="property" type="sca:Property" minOccurs="0"
                  maxOccurs="unbounded" />
         <any namespace="##other" processContents="lax" minOccurs="0"
              maxOccurs="unbounded" />
      </sequence>
      <attribute name="type" type="NMTOKEN" use="required" />
      <anyAttribute namespace="##other" processContents="lax" />
   </complexType>
   <complexType name="InteractionSpec">
      <sequence>
         <element name="property" type="sca:Property" minOccurs="0"
                  maxOccurs="unbounded" />
         <any namespace="##other" processContents="lax" minOccurs="0"
              maxOccurs="unbounded" />
      </sequence>
      <attribute name="type" type="NMTOKEN" use="required" />
      <anyAttribute namespace="##other" processContents="lax" />
   </complexType>

   <element name="binding.jca" type="sca:JCABinding"
            substitutionGroup="sca:binding" />
</schema>
```

B. Conformance Items

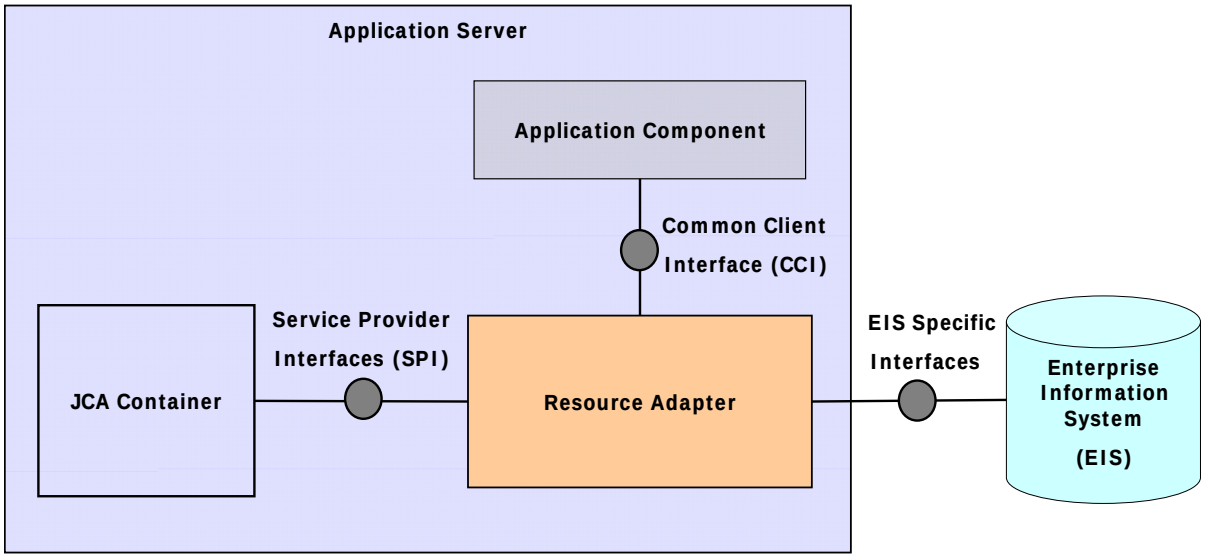
This section contains a list of conformance items for the SCA JCA Binding specification.

Conformance ID	Description
[BJC20001]	The ***@uri*** attribute, the ***@connectionInfo*** attribute and the ***inboundConnection*** or ***outboundConnection*** elements are mutually exclusive and the SCA runtime MUST raise an error if more than one is present
[BJC20002]	The ***@initialContextFactory*** attribute MUST NOT be specified if the ***@uri*** attribute is not present
[BJC20003]	The ***@jndiURL*** attribute MUST NOT be specified if the ***@uri*** attribute is not present
[BJC20004]	The ***outboundConnection*** element MUST NOT be specified for services
[BJC20005]	The SCA runtime MAY restrict valid properties of the outbound connection's Resource Adapter Java bean depending on the deployment platform
[BJC20006]	The ***outboundConnection/resourceAdapter*** element MUST NOT be specified when the ***@managed*** attribute value is ***"false"***
[BJC20007]	If the ***connection/@create*** attribute is ***"always"***, the ***@name*** value MUST be unique within the domain
[BJC20008]	The SCA runtime SHOULD raise an error if the ***connection/@create*** attribute value is "***always***" and the element with the given name already exists
[BJC20009]	The ***outboundInteraction*** element MUST NOT be specified for services
[BJC20010]	The ***inboundConnection*** element MUST NOT be specified for references
[BJC20011]	The SCA runtime MAY restrict valid properties of the inbound connection's Resource Adapter Java bean depending on the deployment platform
[BJC20012]	The ***inboundConnection/resourceAdapter*** element MUST NOT be specified when the ***@managed*** attribute is ***"false"***
[BJC20013]	If the ***activationSpec/@create*** attribute is ***"always"***, the ***@name*** value MUST be unique within domain
[BJC20014]	The SCA runtime SHOULD raise an error if the ***activationSpec/@create*** attribute value is "***always***" and the element with the given name already exists
[BJC20015]	The ***inboundInteraction*** element MUST NOT be specified for references
[BJC20016]	If the ***inboundInteraction/listener*** element is not specified, the SCA runtime MUST interpret it as a listener implementing javax.resource.cci.MessageListener interface from the JCA specification
[BJC20017]	The ***binding.jca*** element MUST conform to the XML schema defined in sca-binding-jca.xsd

C. Java EE Connector Architecture

C.1 Introduction

The connector architecture specification defines set of contracts that allow interoperability of the resource adapters and application server environments. The specification also defines set of client interfaces that can be optionally supported by the adapter and allow the use of adapter functionality by the application clients. The following figure illustrates the relationships of these interfaces.



The SPI defines the following management contracts that give adapter consistent view of the infrastructure provided by the server and give sever consistent view of all the adapters thus helping with integration of adapters and servers.

- Lifecycle management allows application server to control the startup of the adapter and notification to allow it to shutdown in an orderly fashion
- Work management allows the adapter to use the server resources such as threads in an efficient way and allows server to manage system resources appropriately.
- Connection management lets the server control the pooling, reusing and caching of the physical connections to the EIS system thus allowing for better scalability.
- Transactions allow the server to control EIS resource managers and provide application clients with the transactional access to external resources.
- Security contract allow for secure access to the EIS systems with security information configured and provided by the application server
- Message inflow contract allows Resource Adapter to deliver events initiated by the EIS system to the application component executing on the application server.
- Transaction inflow contract allow the application server to participate and execute in the context of the transaction initiated by the EIS system.

The CCI defines set of interfaces to access EIS functionality, through the resource adapter, from the application client. The CCI also provides access to some of the SPIs for transactions and security management to allow for executions of clients running in the non-managed mode, without the presence of the Application Server.

C.2 Selected JCA CCI Interfaces

Record

```
   public interface javax.resource.cci.Record
       extends java.lang.Cloneable, java.io.Serializable {

public String getRecordName();
   public void setRecordName(String name);
public void setRecordShortDescription(String description);
public String getRecordShortDescription();
         public boolean equals(Object other);
         public int hashCode();
         public Object clone() throws CloneNotSupportedException;
   }
```

Interaction

```
   public interface javax.resource.cci.Interaction {

         public Connection getConnection();
         public void close() throws ResourceException;
         public boolean execute(InteractionSpec ispec,
                        Record input, Record output) throws ResourceException;
         public Record execute(InteractionSpec ispec,
                        Record input) throws ResourceException;

   }
```

MessageListener

```
   interface javax.resource.cci.MessageListener {

         Record onMessage(Record inputData) throws ResourceException;
   }
```

D. Acknowledgements

The following individuals have participated in the creation of this specification and are gratefully acknowledged:

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E. Revision History

[optional; should not be included in OASIS Standards]

Revision	Date	Editor	Changes Made
1	2008-01-16	Anish Karmarkar	Applied the OASIS template + related changes to the Submission
2	2008-08-06	Piotr Przybylski	Updates for consistency with JMS Binding and to resolve the following: BINDINGS-13 BINDINGS-14 BINDINGS-28 BINDINGS-30 BINDINGS-32 BINDINGS-38
cd01-rev1	2008-10-16	Simon Holdsworth	Updates to resolve following issues: BINDINGS-41
cd01-rev2	2008-10-20	Piotr Przybylski	Update for RFC2119 conformance Updated to resolve following issues: BINDINGS-53
cd02	2009-02-16	Simon Holdsworth	Renamed and applied editorial issues
cd02-rev1	2009-05-22	Simon Holdsworth	Updates to resolve issue BINDINGS-63 (conformance statement numbering) Updated assembly namespace to 200903
cd02-rev2	2009-05-22	Simon Holdsworth	Updates to resolve following issues: BINDINGS-22 BINDINGS-45 BINDINGS-58 BINDINGS-69 Fixed errors in schema
cd02-rev3	2009-06-19	Simon Holdsworth	Updates to resolve following issues: BINDINGS-75 Added acknowledgements
cd02-rev4	2009-06-24	Simon Holdsworth	Updates to resolve following issues BINDINGS-78 Renamed document to old form Editorial fixes around external references; changed all links to hyperlinks

cd02-rev5	2009-06-24	Simon Holdsworth	Fixed broken cross-reference
cd03	2009-06-29	Simon Holdsworth	Update name to cd03

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