WSDL-SOAP to CORBA Interworking
Version 1.0

formal/04-04-01
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1 Scope

This specification defines a mapping between WSDL specifications, with a SOAP Binding, to a corresponding set of OMG IDL interface specifications.

This specification is applicable to the domain of WSDL specifications that use only the constructs that result from the CORBA to WSDL-SOAP specification. This simplifies the mapping and allows for mapping from a restricted WSDL-SOAP subset to CORBA IDL interfaces.

This specification assumes that the CORBA to WSDL-SOAP mapping includes an identifier for the source OMG IDL file in the resulting WSDL specification. The WSDL to IDL translator can key off this identifier to revert to the original IDL specification, rather than performing the translation algorithm specified in this specification.

2 Conformance

Implementations must support at least one of the following three conformance points:

1. Interworking between RPC/Encoded WSDL Soap Bindings and OMG IDL.
2. Interworking between RPC/Literal WSDL Soap Bindings and OMG IDL.
3. Interworking between Document/Literal WSDL Soap Bindings and OMG IDL.

A system that does not support a particular SOAP binding use for interaction translation (i.e., encoded vs. literal) need not translate unsupported WSDL Soap bindings.

An additional optional conformance point pertains to the reverse translation optimization, specified in Section 7.2, “Optimization to Avoid Round-Trip Translation,” on page 5.

- An implementation may support a CORBA Client interworking with a WSDL Port, for a WSDL Port Type that was originally defined as an OMG IDL interface.

3 Normative References

The following normative documents contain provisions which, through reference in this text, constitute provisions of this specification. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply.

CORBA to WSDL/SOAP Interworking, version FTF output, OMG Document ptc/03-05-15

Common Object Request Broker Architecture (CORBA/IIOP), version 3.0.3, OMG Document formal/2004-03-01 (Chapter 3 has IDL specification)

Java™ Language to IDL Mapping Specification, version 1.2, OMG Document formal/2002-08-06

Web Services Description Language (WSDL) 1.1, W3C Note 15 March 2001, http://www.w3.org/TR/wsdl

Simple Object Access Protocol (SOAP) 1.1, W3C Note 08 May 2000, http://www.w3.org/TR/SOAP

4 Terms and Definitions

For the purposes of this specification, the terms and definitions given in the normative reference and the following apply.

The following terms are defined in CORBA/IIOP Specification:

- Interface
- Attribute
- Operation
- Module
- Exception

The following terms are defined in WSDL 1.1 Specification:

- Service
- Port
- Port type
- Message
- Binding
- Part
- Documentation
- Target namespace

The following terms are defined in SOAP 1.1 Specification:

- Soap Encoding

This specification defines no new additional terms.

5 Symbols

List of symbols/abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSDL</td>
<td>Web Services Description Language</td>
</tr>
<tr>
<td>SOAP</td>
<td>Simple Object Access Protocol</td>
</tr>
<tr>
<td>IDL</td>
<td>Interface Definition Language</td>
</tr>
<tr>
<td>CORBA</td>
<td>Common Object Request Broker Architecture</td>
</tr>
</tbody>
</table>
6 Acknowledgments

The following companies submitted and/or supported this specification:

- Cape Clear
- Fujitsu
- Hewlett-Packard
- IONA
- Sankhya Technologies Private Limited
7 WSDL to IDL Mapping

7.1 Feature Description

The overall goal of this specification is to provide a natural mapping from a valid set of WSDL service definition files to a valid set of OMG IDL specification files.

An IDL file can be generated from a WSDL file, but the generated IDL file lacks some information required to implement a CORBA/SOAP interaction translation gateway. To supplement the information, WSDL to IDL converter could (in an implementation specific manner) generate an Identifier information file and a SOAP information file in addition to the IDL file.

This specification focuses on the standard mapping of the WSDL file to the corresponding IDL specification. In addition to the service definition, a WSDL file can have service endpoint information. This information cannot be translated into an IDL construct.

7.2 Optimization to Avoid Round-Trip Translation

If a WSDL specification is the result of translation of an OMG IDL specification, then the reverse mapping from that translated WSDL specification should be the original IDL specification.
To accomplish this, the IDL to WSDL translation specified by the CORBA to WSDL/SOAP Interworking specification provides a hint, in the form of an XML schema annotation giving both a reference to the source IDL and the version of the mapping used. Hints may be provided that refer to the source IDL file, or to the repository ID for a given generated construct (including any prefixes defined by a #pragma prefix directives).

The reverse translation from WSDL to IDL would use this hint to shortcut the translation process by having the original IDL specification be the reverse translation from the WSDL.

This will avoid round trip divergence of the IDL specifications associated with a WSDL service, which would result using the WSDL to IDL mapping translations to generate a new IDL specification associated with the WSDL output from the CORBA to WSDL-SOAP mapping specification.

The interaction translation mechanisms required to support a CORBA Client accessing a WSDL Port differ depending on the origin of the port definition.

In particular, an implementation of this specification may encounter a WSDL port type that resulted from a translation of an IDL definition. When that happens, the interaction translation mechanisms, defined in this specification, to support a CORBA client accessing such a WSDL Port are inappropriate. The appropriate mechanisms are similar to those required to support a CORBA server sending a response to a WSDL port for an Operation that originated as an IDL interface operation. These translation mechanisms are specified in the CORBA to WSDL/Soap specification (formal/03-11-02).

Note – Since the interaction time translation mechanisms to support this reverse specification translation option are different than those designed to support specifications originating as WSDL port types, this feature is an optional conformance point for this specification.

7.3 WSDL to IDL Conversion

IDL specification is generated from a given WSDL according to the rules shown in the following sub-sections.

7.3.1 Generation of IDL Modules

A WSDL document may contain several different target namespaces associated with WSDL and XML constructs, which are translated to corresponding IDL constructs.

A WSDL description can contain multiple namespaces, including:
- The wsdl:definitions element can have its own target namespace.
- The wsdl:definition can use wsdl:import to import a wsdl namespace.
- Zero or more schema in the types section each have a target namespace (which is allowed, by WS-I profile, to be same as target namespace for the wsdl description).
- The schema in a types section can use xsd:import to import multiple namespaces.

An IDL module declaration is created from the WSDL <definitions> element.

The WSDL <definitions> element has two optional attributes, “targetNamespace” and “name.” An IDL module is generated for a WSDL file as described below:

1. If the targetNamespace attribute is present for the WSDL <definitions> element, everything before the final “/” is mapped to IDL typeprefix or #pragma prefix directive in the generated IDL file. The portion of the targetNamespace after the final “/” is mapped as the IDL module name for the generated IDL definition. Any ‘:’ character is mapped
to an underscore ‘_’ character. If the generated module name contains a ‘.’ or any special character, it is mapped to an underscore ‘_’ character.

2. If the targetNamespace attribute is not present, and the WSDL name attribute is present, the value of the WSDL name attribute is used as the IDL module name. No IDL typeprefix or #pragma prefix directive is generated in this case.

3. If neither targetNamespace nor the WSDL name attribute is present in the <definitions> element, then no IDL module is generated.

Using the same algorithm as specified above to map from the target namespace value to an IDL module name and type prefix, the mapping from WSDL to IDL shall use a separate IDL module for each of the target namespaces that contain constructs that are mapped to IDL constructs.

For example:

```xml
<!-- WSDL -->
<?xml version="1.0"?>
<definitions name="StockQuote" ...>
    ...
</definitions>
```

is mapped to IDL as follows:

```idl
// OMG IDL
module StockQuote {
    ...
    ...
};
```

The following WSDL construct maps as shown below

```xml
<!-- WSDL -->
<?xml version="1.0"?>
<definitions name="StockQuote"
    targetNamespace="http://example.com/stockquote.wsdl"
    ...
    ...
</definitions>
```

In pre-CORBA 3.0 IDL using pragma prefix as shown below:

```idl
// OMG IDL
#pragma prefix "http://example.com"
module stockquote_wSDL {
    ...
    ...
};
```

Or in CORBA 3.0 or later IDL using typeprefix as shown below:
// OMG IDL
module stockquote_wsdl {
    typedef stockquote_wsdl "http://example.com";
    ...
};

7.3.2 Generation of IDL Interfaces

An IDL interface declaration is created for each WSDL <portType> defined in the WSDL file. The value of the name attribute of WSDL <portType> element is used as the IDL interface name.

For example:

<!-- WSDL -->
<portType name="StockQuotePortType">
    ...
</portType>

is mapped to IDL as follows:

// OMG IDL
interface StockQuotePortType {
    ...
};

7.3.3 Generation of IDL Operations

An IDL operation declaration is created for each WSDL <operation> element appearing inside a WSDL <portType> element.

The syntax of an IDL operation declaration is given below. It consists of operation name <op_name>, operation return type <return_type>, a comma separated list of parameters <parameter>, and optional raises and context expression, each of which is generated from the WSDL <operation> element as mentioned below:

<return_type> <op_name> ( <parameter> [, , ] )
    [ raises ( exception_ name [, ] ) ]
    [ context ( context_name [, ] ) ];

Operation name:

The IDL operation name <op_name> is generated from the value of the name attribute in <operation> element in WSDL <portType> declaration.

Operation type:

WSDL defines four types of operations: One-way, Request-response, Solicit-response, and Notification. All of these are mapped to normal IDL operations. If only <input> message element exists in the <portType> element, then it is mapped to an IDL operation with return type void and with no output parameters. IDL oneway opera-
tions are not used.

Data type of return value:

The return type of the IDL operation is determined based on the following rules:

• If the Operation is of Request-Response format, the return type is the first part under the element <wsdl:output> if that part doesn’t appear in the “parameterOrder” list. Otherwise the return type is void.
• If the Operation is of Solicit-Response format, the return type is the first part under the element <wsdl:input> if that part doesn’t appear in the “parameterOrder” list. Otherwise the return type is void.
• If it is One-Way or Notification, the return type is void.

Parameters:

An IDL <parameter> is generated for each WSDL <part> element appearing inside a WSDL <message> element.

The syntax of the IDL operation parameter is given below. IDL supports “in,” “out,” and “inout” parameter attributes.

```
in
out  data_type parameter_name
inout
```

IDL operation parameter generation is determined based on the following rules.

1. If the parameterOrder attribute is specified in the <wsdl:operation> element in <portType> declaration, parameter list is returned in the same order specified as the parts in the parameterOrder attribute. Each parameter type is determined as follows:
   • Part that is specified in both a Request/Solicit message and a Response message will be an “inout” parameter.
   • Part that is specified only in a Request/Solicit message will be an “in” parameter. One-Way, Notification will only have “in” parameters.
   • Part that is specified only in Response message will be an “out” parameter.

2. If the parameterOrder attribute is not specified in the <wsdl:operation> element in <portType> declaration, it is determined as follows:
   • Construct a list of all the parts in Request/Solicit/One-Way/Notification messages in the order of parts specified, excluding the first part of the Response message of Request/Solicit-Response operations.
   • Use the list as if specified for the parameterOrder attribute and process accordingly.

   If the <part> element specifies “element” attribute instead of “type,” it points to the Schema that defines the element. This becomes the “in” parameter if the ‘message’ is referred by <wsdl:input> element in a <wsdl:operation> element in <wsdl:portType>, or the “out” parameter if the ‘message’ is referred by <wsdl:output> element and appears in the parameterOrder attribute. If the <wsdl:output> element doesn’t appear in the parameterOrder attribute, then it becomes the return type.

Raises expressions:

If <wsdl:fault> exists in an <operation> element inside a <portType> element, it is mapped to an IDL User Exception, and a raises expression is generated for the corresponding IDL operation declaration. The generated raises expression lists all the mapped user exceptions for that IDL operation.
The name of the generated IDL User Exception is the value of the `name` attribute in the `<wsdl:fault>` element. The generated User Exception structure consists of mapped data members that are a list of “parts” that comprise the `<wsdl:message>` pointed to by the fault message name in `<wsdl:fault>` element (<wsdl:fault
am="fault_message_name"/>).

Refer to Section 7.3.6, “Generation of User Exceptions,” on page 11 for an example mapping.

Context expressions:

Context expression is not generated. It is not necessary for SOAP.

The following is an example of mapping a WSDL `<operation>` element to an IDL operation.

```xml
<!-- WSDL -->
<message name="GetTradePricesInput">
   <part name="tickerSymbol" type="xsd:string"/>
   <part name="timePeriod" type="xsd:int"/>
</message>

<message name="GetTradePricesOutput">
   <part name="result" type="xsd:string"/>
   <part name="frequency" type="xsd:float"/>
</message>

<portType name="StockQuotePortType">
   <operation name="GetTradePrices" parameterOrder="tickerSymbol timePeriod frequency">
      <input message="tns:GetTradePricesInput"/>
      <output message="tns:GetTradePricesOutput"/>
   </operation>
</portType>
```

The above WSDL fragment is mapped to an IDL operation as follows:

```
// OMG IDL

interface StockQuotePortType {
   wstring GetTradePrices(in wstring tickerSymbol, 
in long timePeriod, out float frequency);
};
```

7.3.4 Generation of IDL Attributes

IDL attributes are not generated from WSDL.

7.3.5 Generation of IDL Typedef

An IDL typedef is generated for the XML schema type restrictions for XML schema data types used as the datatype of return values and parameters.

For example:

```xml
<!-- WSDL -->
<xsd:simpleType name="Number">
   <xsd:restriction base="xsd:int"/>
</xsd:simpleType>
```
7.3.6 Generation of User Exceptions

If `<wsdl:fault>` exists in an `<operation>` element inside a `<portType>` element, it is mapped to an IDL User Exception. The name of the generated IDL User Exception is the value of the `name` attribute in the `<wsdl:fault>` element. The generated User Exception structure consists of mapped data members that are lists of “parts” that comprise the `<wsdl:message>` pointed to by the fault message name in `<wsdl:fault>` element (<`wsdl:fault name="fault_message_name"/>).

For example:

```xml
<!-- WSDL -->
<message name="BadInput">
  <part name="errorMessage" type="xsd:string"/>
  <part name="errorCode" type="xsd:int"/>
</message>

<portType name="StockQuotePortType">
  <operation name="GetTradePrices" />
    <input />
    <output />
    <fault message="BadInput"/>
  </operation>
</portType>
```

is mapped to IDL as follows:

```idl
// OMG IDL

interface StockQuotePortType {
  exception BadInput {
    wstring errorMessage;
    long errorCode;
  };

  GetTradePrices( ... ) raises BadInput;
};
```
7.4 Simple Type Conversion

This section shows how simple types used in WSDL are mapped to CORBA.

7.4.1 Mapping for SOAP Data Types

According to the SOAP 1.1 specification, all types defined in section “3. Built-in datatypes” of “W3C Working Draft “XML Schema Part2: Datatypes” are adopted as simple types. The SOAP-ENC schema and namespace declares an element for all these simple types. Mapping of SOAP data type to IDL data type is performed according to the table below.

(In the following table, the SOAP data types are shown in the conventional “SOAP-ENC” namespace, to distinguish them from the IDL types).

<table>
<thead>
<tr>
<th>SOAP data type</th>
<th>CORBA data type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOAP-ENC:int</td>
<td>long</td>
</tr>
<tr>
<td>SOAP-ENC:unsignedInt</td>
<td>unsigned long</td>
</tr>
<tr>
<td>SOAP-ENC:short</td>
<td>short</td>
</tr>
<tr>
<td>SOAP-ENC:unsignedShort</td>
<td>unsigned short</td>
</tr>
<tr>
<td>SOAP-ENC:long</td>
<td>long long</td>
</tr>
<tr>
<td>SOAP-ENC:unsignedLong</td>
<td>unsigned long long</td>
</tr>
<tr>
<td>SOAP-ENC:float</td>
<td>float</td>
</tr>
<tr>
<td>SOAP-ENC:double</td>
<td>double</td>
</tr>
<tr>
<td>SOAP-ENC:boolean</td>
<td>boolean</td>
</tr>
<tr>
<td>SOAP-ENC:string</td>
<td>wstring</td>
</tr>
</tbody>
</table>

The mapping for string datatype is discussed in Section 7.4.5, “Mapping for String Types,” on page 16.

SOAP-ENC:unsignedByte  | octet

Enumerations  |  enum

Error if the base is not a string.
The mapping for enumerations is discussed in Section 7.4.4, “Mapping for Enumerators,” on page 15.

Arrays  | sequence, if one-dimensional variant, array, otherwise

The mapping for Array datatype is discussed in Section 7.6, “Mapping for SOAP Array Type,” on page 20.

Structs  | struct
7.4.2 Mapping for XML Schema Built-in Datatypes

WSDL supports the XML Schema built-in datatypes that are defined in “3. Built-in datatypes” of W3C Working Draft “XML Schema Part2: Datatypes.” These XML Schema built-in datatypes map onto a corresponding IDL type as shown in the table below.

(In the following table, the XML Schema types are shown in the conventional “xsd” namespace, to distinguish them from the IDL types).

<table>
<thead>
<tr>
<th>XML Schema Data Type</th>
<th>CORBA Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>primitive</td>
<td></td>
</tr>
<tr>
<td>xsd:string</td>
<td>wstring</td>
</tr>
<tr>
<td></td>
<td>The mapping for string datatype is discussed in Section 7.4.5, “Mapping for String Types,” on page 16.</td>
</tr>
<tr>
<td>xsd:boolean</td>
<td>boolean</td>
</tr>
<tr>
<td>xsd:float</td>
<td>float</td>
</tr>
<tr>
<td>xsd:double</td>
<td>double</td>
</tr>
<tr>
<td>xsd:decimal</td>
<td>See Section 7.4.3, “Restriction to WSDL Type System,” on page 14</td>
</tr>
<tr>
<td>xsd:duration</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:dateTime</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:time</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:date</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:gYearMonth</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:gYear</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:gMonthDay</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:gDay</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:gMonth</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:hexBinary</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:base64Binary</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:anyURI</td>
<td>wstring</td>
</tr>
<tr>
<td>xsd:QName</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:NMTOKEN</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>derived</td>
<td></td>
</tr>
<tr>
<td>xsd:normalizedString</td>
<td>wstring</td>
</tr>
<tr>
<td>xsd:token</td>
<td>wstring</td>
</tr>
<tr>
<td>xsd:language</td>
<td>wstring</td>
</tr>
<tr>
<td>xsd:NMTOKEN</td>
<td>wstring</td>
</tr>
<tr>
<td>xsd:NMTOKENS</td>
<td>wstring</td>
</tr>
<tr>
<td>xsd:Name</td>
<td>wstring</td>
</tr>
</tbody>
</table>
If the XML Schema name space is one of the following, the above conversion takes place. It will be possible to override the conversion rule with external property files.

- http://www.w3.org/2001/XMLSchema
- http://www.w3.org/2000/10/XMLSchema
- http://www.w3.org/1999/XMLSchema

<table>
<thead>
<tr>
<th>XML Schema Type</th>
<th>OMG IDL Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>xsd:NCName</td>
<td>wstring</td>
</tr>
<tr>
<td>xsd:ID</td>
<td>wstring</td>
</tr>
<tr>
<td>xsd:IDREF</td>
<td>wstring</td>
</tr>
<tr>
<td>xsd:IDREFS</td>
<td>wstring</td>
</tr>
<tr>
<td>xsd:ENTITY</td>
<td>wstring</td>
</tr>
<tr>
<td>xsd:ENTITIES</td>
<td>wstring</td>
</tr>
<tr>
<td>xsd:integer</td>
<td>fixed</td>
</tr>
<tr>
<td>xsd:nonPositiveInteger</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:negativeInteger</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:long</td>
<td>long long</td>
</tr>
<tr>
<td>xsd:int</td>
<td>long</td>
</tr>
<tr>
<td>xsd:short</td>
<td>short</td>
</tr>
<tr>
<td>xsd:byte</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:nonNegativeInteger</td>
<td>See Section 7.4.3</td>
</tr>
<tr>
<td>xsd:unsignedLong</td>
<td>unsigned long long</td>
</tr>
<tr>
<td>xsd:unsignedInt</td>
<td>unsigned long</td>
</tr>
<tr>
<td>xsd:unsignedShort</td>
<td>unsigned short</td>
</tr>
<tr>
<td>xsd:unsignedByte</td>
<td>octet</td>
</tr>
<tr>
<td>xsd:positiveInteger</td>
<td>See Section 7.4.3</td>
</tr>
</tbody>
</table>

If the XML Schema name space is one of the following, the above conversion takes place. It will be possible to override the conversion rule with external property files.

- http://www.w3.org/2001/XMLSchema
- http://www.w3.org/2000/10/XMLSchema
- http://www.w3.org/1999/XMLSchema

### 7.4.3 Restriction to WSDL Type System

The following datatypes cannot be directly mapped to a corresponding OMG IDL datatype. This interworking specification provides a generic mapping of these unsupported types to individual typedefs of OMG IDL `wstring`, to hold the UTF encoding of the XML schema type value.

- decimal,
- nonPositiveInteger,
- nonNegativeInteger,
- PositiveInteger,
- NOTATION,
- duration,
time,
dateTime,
date,
gYearMonth,
gYear,
gMonthDay,
gDay,
gMonth,
hexBinary,
base64Binary,
Qname,

The IDL module (using omg.org type prefix) that defines the corresponding types is:

```idl
module stringmappedXMLtypes {
    typeprefix stringmappedXMLtypes "omg.org";
typedef wstring decimal;
typedef wstring nonPositiveInteger;
typedef wstring nonNegativeInteger;
typedef wstring PositiveInteger;
typedef wstring NOTATION;
typedef wstring duration;
typedef wstring time;
typedef wstring dateTime;
typedef wstring date;
typedef wstring gYearMonth;
typedef wstring gYear;
typedef wstring gMonthDay;
typedef wstring gDay;
typedef wstring gMonth;
typedef wstring hexBinary;
typedef wstring base64Binary;
typedef wstring Qname,
};
```

### 7.4.4 Mapping for Enumerators

The enumeration in XML Schema is used to constrain the values of almost every simple type, except the boolean type. It limits a simple type to a set of distinct values.

Enumeration in XML Schema derived by restriction on ‘string’ can be mapped to IDL enumeration.
Here is an example.

```xml
<!-- WSDL -->
<simpleType name="A_or_B_or_C" restriction base="string"
    <enumeration value = "A"/>
    <enumeration value = "B"/>
    <enumeration value = "C"/>
</simpleType name>

// OMG IDL

enum A_or_B_or_C {A, B, C};
```

If the restriction is on any other datatype, it cannot be mapped to OMG IDL.

### 7.4.5 Mapping for String Types

String is the set of finite-length sequences of characters in XML. It is mapped to OMG IDL `wstring` datatype.

String datatypes derived by restriction of Schema components `<length>` and `<maxLength>` are treated as bounded `wstring`.

**Note** – If the value of the `<length>` element is 1 and value of attribute `fixed` is `true`, it can be mapped to OMG IDL `wchar` datatype. This specification only specifies mapping to IDL `wstring` datatype.

<table>
<thead>
<tr>
<th>String Type</th>
<th>WSDL</th>
<th>IDL</th>
</tr>
</thead>
</table>
| bounded     | string derived by restriction of 
  • length N  
  • maxLength N | `wstring <N>` |
| unbounded   | string derived by restriction of 
  • minlength N  
  • pattern | `wstring` |

Example:

```xml
<!-- WSDL -->
<element name="Country" type="string"/>
  <element name="Place">
    <simpleType>
      <restriction base="string">
        <length value="5"/>
      </restriction>
    </simpleType>
  </element>
</element>
```
7.4.6 Mapping for Any

The `anyType` represents an abstraction called the `ur-type` that is the base type from which all simple and complex types are derived. An anyType type does not constrain its content in any way. It is possible to use anyType like other type. It can be mapped to the OMG IDL datatype `any`.

Example:

```xml
<!-WSDL -->
<element name="T" type="anyType"/>
```

7.4.7 Anonymous XML Types

Anonymous types are deprecated in CORBA. While it is allowable, in some cases, to map an anonymous XML type specification to an anonymous IDL type spec (e.g., for sequences as members of an IDL struct), there are cases that require an explicit IDL type name (e.g., for operation parameters).

Whenever it is explicitly required by the IDL syntax, the anonymous XML types are mapped to an explicit IDL typedef.

The name of the type to use for the generated IDL typedef is constructed by prefixing the name of the element (which has an anonymous XML type specification attached) with the string "T_". In case of collision with another type starting with "T_", the translator will add sufficient extra "_" character(s) to the end of the prefix to resolve the collision.

7.5 Mapping for Complex XML Schema Types

This section shows how complex XML schema types used in WSDL are mapped to CORBA.

7.5.1 Mapping for Sequence Group Element

The sequence element in WSDL specifies that the child elements must appear in the order it is specified. It can be mapped to the OMG IDL `struct` datatype.

Example:

```xml
<!-WSDL -->
<complexType name = "myStruct">
<sequence>
    <element name="member_1" type="short"/>
    <element name="member_2" type="long"/>
```
7.5.2 Mapping for Choice Group Element

The choice group element in WSDL allows only one of its children to appear in an instance. It can be mapped to discriminated union of OMG IDL with the discriminator type taken as IDL datatype long.

Example:

```xml
<!--WSDL -->
<complexType name="myUnion">
  <choice>
    <element name="c" type="char"/>
    <element name="s" type="short"/>
  </choice>
</complexType>
```

```idl
// OMG IDL
union myUnion switch (long) {
  case 1: char c;
  case 2: short s;
};
```

7.5.3 Mapping for All Group Element

The all element in WSDL specifies that the child elements do not need to appear in the order they are specified. It is mapped to the OMG IDL struct datatype, using the same rules as for a Sequence Group Element.

The interaction translator is responsible to arrange the child elements in the proper order to be mapped to the corresponding IDL Struct.

Example:

```xml
<!--WSDL -->
<complexType name = "myAll">
  <all>
    <element name="a_member_1" type="short"/>
    <element name="a_member_2" type="long"/>
  </all>
</complexType>
```
7.5.4 Mapping Elements with Cardinality Constraints to IDL Sequence Member

For use in the complex type mappings above, there is a special rule for mapping elements of an XML complex type, when those elements have minOccurs=0, or maxOccurs>1.

If an element, which is a member of an XML complex type, has minOccurs=0 or has maxOccurs>1, that element will be mapped to an unnamed IDL Sequence.

Example:

```xml
<complexType name = "mesgInfoType">
  <xsd:sequence>
    <xsd:element name="infoItem1" type="short"/>
    <xsd:element name="optInfo" type="myStruct" minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>
```

```idl
// OMG IDL
struct mesgInfoType {
  short infoItem1:
  sequence<myStruct> optInfo;
};
```

7.5.5 Mapping Attributes of Complex Type

Attributes of sequence and all group complex types are mapped as additional members of the IDL struct.

Complex types that use attribute groups have the attributes in that group mapped explicitly as members of the IDL struct, in the same order as if the attribute group definitions were expanded in line.

If a Complex Type with simpleContent has one or more attributes, that complex type is mapped to an IDL Struct, with the first member of the IDL struct being of the simple type and having the name "value." The attributes are each mapped as additional members of the IDL Struct.

If an XML schema attribute is defined anonymously (e.g., it uses an inline enumeration extension of string), the mapping shall generate an explicit IDL typedef using the "T_" prefix applied to the name of the attribute as the type name, just as for XML schema elements that are defined anonymously.

Attributes of a choice group element are not mapped.

If an attribute of the complex type is optional, then it is mapped to a struct member that is a sequence (just as if it were an element with minOccurs=0). Optional attributes are represented as IDL sequences in order to allow zero members, to cover the case of the attribute not being present.
Example:

```xml
<xsd:complexType> taggedShort
    <xsd:simpleContent>
        <xsd:extension base="xsd:short">
            <xsd:attribute name="type" tag="xsd:string" use="optional"/>
        </xsd:extension>
    </xsd:simpleContent>
</xsd:complexType>

// OMG IDL
struct taggedShort {
    short value;
    sequence<wstring> tag;
};
```

### 7.6 Mapping for SOAP Array Type

SOAP Array type extends the "**SOAP-ENC:Array**" type defined in the SOAP 1.1 encoding Schema. SOAP array datatype is mapped to either a `sequence` or `array` OMG IDL construct based on the following cases:

1. One-dimensional SOAP array without size specification maps to OMG IDL unbounded `sequence` datatype.
2. One-dimensional SOAP array with size specification maps to OMG IDL bounded `sequence` datatype.
3. Multi-dimensional array with size specification maps to OMG IDL `array` datatype.
4. Multi-dimensional array without size specification cannot be mapped to an IDL construct and it is valid for the translation mechanism to generate an error for this case.

The name of the mapped IDL sequence or array datatype is generated from the value of the `<xsd:complexType>` element.

The type of the SOAP array item, mentioned in the "**type**" attribute of the `<xsd:element>` or in the "**wsdl:arrayType**" attribute, becomes the base type of the mapped IDL sequence or array. This type is mapped to an OMG IDL construct according to the datatype mapping rules in this specification.

The IDL `sequence` or `array` bound is determined from the "**maxOccurs**" attribute of the `<xsd:element>`. If "**maxOccurs**" value is "**unbounded**" for a multi-dimensional array, it can’t be mapped.

The dimension of the array is determined from the "**SOAP-ENC:arrayType**" attribute.

The following example shows the mapping of a SOAP Array datatype to OMG IDL unbounded `sequence`.

```xml
<!--WSDL -->
<xsd:complexType name = "ArrayOfLong">
    <xsd:complexContent>
        <xsd:restriction base="SOAP-ENC:Array">
            <xsd:attribute
                ref="SOAP-ENC:arrayType"
                wsdl:arrayType="xsd:int[]"/>
        </xsd:restriction>
    </xsd:complexContent>
</xsd:complexType>
```
The following example shows the mapping of a SOAP `Array` datatype to OMG IDL bounded `sequence`.

```xml
<!-- WSDL -->
<xsd:complexType name = "ArrayOfLong">
    <xsd:complexContent>
        <xsd:restriction base="SOAP-ENC:Array">
            <xsd:sequence>
                <xsd:element
                    name="item" type="xsd:int"
                    minOccurs="10" maxOccurs="10"/>
            </xsd:sequence>
            <xsd:attribute
                ref="SOAP-ENC:arrayType"
                wsdl:arrayType="xsd:int"]["/>
        </xsd:restriction>
    </xsd:complexContent>
</xsd:complexType>

// OMG IDL
typedef sequence<long> ArrayOfLong;
```

### 7.7 Mapping IDL Name

Normally, names in WSDL map to identical names in IDL. However, names (e.g., IDL keywords) that cannot be used in IDL need to be converted. Following the OMG specification “Java™ Language to IDL Mapping Specification,” the conversion below shall be applied.

1. **IDL keyword**

   If the WSDL identifier clashes with an IDL keyword, prepend an underscore “_” (to form an escaped identifier).

   For example, the WSDL name `oneway` is mapped to the OMG IDL identifier `_oneway`.

2. **WSDL Names starting with underscore**

   If the WSDL identifier begins with an underscore “_,” the underscore is replaced by “J_.”

   For example, the WSDL name `_fred` is mapped to `J_fred` in IDL.

3. **Unicode characters in WSDL**

   IDL does not support Unicode. Thus, if ‘$’ or a kanji character is included in the identifier, it is replaced by “U” and a 4-digit hexadecimal number (in upper case).

   For example, the WSDL name `a$b` is mapped to `aU0024b` in IDL.

4. **Method is overloaded**

   IDL does not support overloaded methods. If the WSDL operation is overloaded, two underscores “__” are added to the method name, followed by IDL type names of the parameters separated by two underscores “__.” A space in the type (like in `long long`) is replaced with an underscore “_.” The underscore at the beginning of an escaped identifier is
removed.

For example, if the WSDL mapping results in the following two IDL operations, they are transformed as shown below:

```csharp
void hello();
void hello(in long x, in abc y);
```

This is transformed as:

```csharp
void hello__();
void hello__long__abc(in long x, in abc y);
```

If the in/out parameter names are overloaded in the same method, it is an error. Also, if a method that doesn’t include in/out is overloaded, it is an error.

5. **WSDL identifiers that differ only in case**

IDL names are not case sensitive. Thus, if there are two or more names that are distinguished only by case, an underscore “_” is appended to the original name, and then decimal numbers indicating the positions of the uppercase characters are appended, separated by an underscore. Indices are zero based.

For example, the WSDL names `jack`, `Jack`, and `jAcK` are mapped to IDL as `jack_`, `Jack_0`, and `jAcK_1_3` respectively.

However, it is an error for the following names to be distinguished only by case.

- `module name`
- `interface name`

6. **If the identifiers are not unique after application of the mapping rules above, it is an error.**

### 7.8 Identifier Information File

The Identifier Information file is a text file in XML format that collects identifiers.

- `<name>` sets the name before conversion (IDL).
- `<name_to>` sets the name after conversion (WSDL).
- `<name_to>` is not generated if identifiers were not converted.
7.9 Input Data

Input data is a WSDL file containing a WSDL document. Structure of a WSDL document is shown below.

```xml
<?xml version="1.0"?>
<definitions>
  <types>
  </types>
  <message>
  </message>
  <portType>
  </portType>
  <binding>
  </binding>
  <service>
  </service>
</definitions>
```

7.10 Output Data

7.10.1 IDL File

Format of the generated IDL file is as follows:

```plaintext
module module_name {
  interface interface_name {
    typedef type type_name;
    exception exception_structure_name {
      data_type member_name;
    }
  }
}
```
7.10.2 SOAP Information File

This file contains the information that is missing from IDL but necessary for the SOAP-CORBA gateway. Information described in the SOAP information file is as follows.

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Parameter Value</th>
<th>Description</th>
</tr>
</thead>
</table>
| SOAPAction     | Method name and ACTION information | Specify the method name with full scope in the IDL (e.g., module1::interface1::op1).
|                |                | Following the method name, specify the value of soapAction property in <soap:body> element. |
|                |                | Separate the method name and the value of soapAction by one or more spaces. |

7.10.3 Identifier Information File

This file contains a table of original names and converted names, in case names (identifiers) are converted. The <name> element is generated even if they are not converted.
A Sample Input and Output of WSDL to IDL

A.1 Input: Sample WSDL

Example 5: SOAP binding of request-response RPC operation over HTTP. The type of startTime and endTime is changed from "xsd:timeInstant" to "xsd:string."

```xml
<?xml version="1.0"?>
<definitions name="StockQuote"
    targetNamespace="http://example.com/stockquote.wsdl"
    xmlns:tns="http://example.com/stockquote.wsdl"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    xmlns:xsd1="http://example.com/stockquote/schema"
    xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
    xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
    xmlns="http://schemas.xmlsoap.org/wsdl/">
    <types>
        <schema targetNamespace="http://example.com/stockquote/schema"
            xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
            xmlns="http://www.w3.org/2001/XMLSchema">
            <complexType name="TimePeriod">
                <all>
                    <element name="startTime" type="xsd:string"/>
                    <element name="endTime" type="xsd:string"/>
                </all>
            </complexType>
            <complexType name="ArrayOfFloat">
                <complexContent>
                    <restriction base="soapenc:Array">
                        <attribute ref="soapenc:arrayType" wsdl:arrayType="xsd:float[]"/>
                    </restriction>
                </complexContent>
            </complexType>
        </schema>
    </types>
    <message name="GetTradePricesInput">
        <part name="tickerSymbol" type="xsd:string"/>
        <part name="timePeriod" type="xsd1:TimePeriod"/>
    </message>
    <message name="GetTradePricesOutput">
        <part name="result" type="xsd1:ArrayOfFloat"/>
        <part name="frequency" type="xsd:float"/>
    </message>
    <portType name="StockQuotePortType">
        <operation name="GetTradePrices"
            parameterOrder="tickerSymbol timePeriod frequency">
            <input message="tns:GetTradePricesInput"/>
            <output message="tns:GetTradePricesOutput"/>
        </operation>
    </portType>
    <binding name="StockQuoteSoapBinding" type="tns:StockQuotePortType">
        <soap:binding style="rpc" transport="http://schemas.xmlsoap.org/soap/http"/>
        <operation name="GetTradePrices"/>
    </binding>
</definitions>
```
A.2 Output: Sample OMG IDL

```idl
#pragma prefix "http://example.com"
module stockquote_wdsl {
  interface StockQuotePortType {
    typedef sequence<float> ArrayOfFloat;
    typedef struct TimePeriod {
      wstring startTime;
      wstring endTime;
    };
    ArrayOfFloat GetTradePrices(
      in  wstring tickerSymbol,
      in TimePeriod timePeriod,
      out float frequency);
  };
}
```

A.3 Output: Sample SOAP Information File

```
# SOAP information file
# list of SOAPAction information
SOAPAction ::StockQuoteService::StockQuoteSoapBinding::GetTradePrices  http://example.com/GetTradePrices
```
A.4 Output: Sample Identifier Information File

```xml
<module>
  <name>stockquote_wsd1</name>
  <interface>
    <name>StockQuotePortType</name>
    <typedef>
      <name>ArrayOfFloat</name>
    </typedef>
    <typedef>
      <name>TimePeriod</name>
    </typedef>
    <method>
      <name>GetTradePrices</name>
    </method>
  </interface>
</module>
```
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WSDL-SOAP to CORBA Interworking, v1.0
WSDL-SOAP to CORBA Interworking
Reference Sheet

The formal version of WSDL-SOAP to CORBA Interworking is based on these documents:

- Revised submission document: mars/03-05-07
- FTF Report: ptc/03-10-16
- Convenience document: ptc/03-11-05