            Abstract Syntax Notation X (ASN.X) Representation
                     of Encoding Instructions for
             the Generic String Encoding Rules (GSER)

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Abstract

   Abstract Syntax Notation X (ASN.X) is an Extensible Markup Language
   (XML) representation for Abstract Syntax Notation One (ASN.1)
   specifications. This document specifies the ASN.X representation of
   encoding instructions for the Generic String Encoding Rules (GSER).

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1. Introduction

   Abstract Syntax Notation X (ASN.X) [ASN.X] is an Extensible Markup
   Language (XML) [XML10][XML11] representation for Abstract Syntax
   Notation One (ASN.1) [X.680] specifications. The ASN.X
   representation for the ASN.1 basic notation [X.680] [X.680-1] is
   described elsewhere [ASN.X].

   The grammar of ASN.1 permits the application of encoding instructions
   [X.680-1], through type prefixes and encoding control sections, that
   modify how abstract values are encoded by nominated encoding rules.

   The generic notation for type prefixes and encoding control sections
   is defined by the ASN.1 basic notation; however, the notation for
   specific encoding instructions, i.e., the EncodingInstruction and
   EncodingInstructionAssignmentList productions of the notation, are
   defined separately for each set of encoding rules using encoding
   instructions. This document specifies the ASN.X representation for
   EncodingInstructionAssignmentList and EncodingInstruction as they are
   defined for the Generic String Encoding Rules (GSER) [GSER][GSEREI].

   ASN.X is defined in terms of rules for translating from an ASN.1
   specification. This does not preclude an ASN.X module being written
   directly without a pre-existing ASN.1 module; however, such an ASN.X
   module is considered valid if and only if there exists, in principle,
   an ASN.1 module that when translated would yield the ASN.X module.

   By design, an ASN.X module is also the Robust XML Encoding Rules
   (RXER) [RXER] encoding of an ASN.1 value. The ASN.1 type definitions
   for such values, insofar as they pertain to the ASN.1 basic notation,
   are provided elsewhere [ASN.X]; however, this document provides the
   ASN.1 type definitions for representing GSER encoding instructions as
   abstract values. These definitions appear in Appendix A.

   The ASN.X translation of the ASN.1 module in Appendix A is presented
   in Appendix B.

   The General Considerations of the specification for ASN.X [ASN.X]
   also apply here.

2. Conventions

   The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
   "SHOULD", "SHOULD NOT", "RECOMMENDED", and "MAY" in this document are
   to be interpreted as described in BCP 14, RFC 2119 [BCP14]. The key
   word "OPTIONAL" is exclusively used with its ASN.1 meaning.

A reference to an ASN.1 production [X.680] (e.g., Type, NamedType) is
a reference to the text in an ASN.1 specification corresponding to
that production.

The description of the translation of GSER encoding instructions into
ASN.X makes use of definitions from the XML Information Set (Infoset)
[INFOSET]. In particular, information item property names follow the
Infoset convention of being shown in square brackets, e.g.,
[local name]. Literal values of Infoset properties are enclosed in
double quotes; however, the double quotes are not part of the
property values. In the sections that follow, "information item"
will be abbreviated to "item", e.g., "element information item" is
abbreviated to "element item". Element items will be referred to by
their [local name] in angle brackets, e.g., "the <type> element item"
means the element item with the [local name] "type".

3. EncodingInstructionAssignmentList Translation

As described in the specification for ASN.X [ASN.X], the translation
of an EncodingControlSection for GSER is an element item with the
[local name] "GSER". The translation of the
EncodingInstructionAssignmentList in such an EncodingControlSection
determines the content of the <GSER> element item.

The EncodingInstructionAssignmentList for GSER is currently defined
to be empty [GSEREI]; therefore, the [attributes] and [children] of
the <GSER> element item are both empty.

4. EncodingInstruction Translation

The translation of an EncodingInstruction for GSER can appear in the
translation of an EncodingPrefix. The translation for an
EncodingPrefix is described by the specification for ASN.X.

The translation of an EncodingInstruction for GSER is the translation
of the ChoiceOfStringsInstruction in the EncodingInstruction
(currently the only defined encoding instruction for GSER).

4.1. ChoiceOfStringsInstruction Translation

The translation of a ChoiceOfStringsInstruction is an element item
with the [local name] "choiceOfStrings".

If the ChoiceOfStringsInstruction has an AlternativesPrecedence, then
an attribute item with the [local name] "precedence" SHALL be added
to the [attributes] of the <choiceOfStrings> element item. The
[normalized value] of this attribute item is the white space
separated list of qualified names for the expanded names [XMLNS10] of

the NamedType instances (see [RXEREI]) corresponding to the
identifiers nested in the PrecedenceList in the
AlternativesPrecedence.

Example

```
[GSER:CHOICE-OF-STRINGS PRECEDENCE utf8 visible] CHOICE {
    visible  [RXER:NAME "ascii"] VisibleString,
    utf8     UTF8String
}

<type xmlns:asnx="urn:ietf:params:xml:ns:asnx">
 <prefixed>
  <GSER><choiceOfStrings precedence="utf8 ascii"/></GSER>
  <type>
   <choice>
    <element name="ascii" identifier="visible"
             type="asnx:VisibleString"/>
    <element name="utf8" type="asnx:UTF8String"/>
   </choice>
  </type>
 </prefixed>
</type>
```

5. Security Considerations

   The ASN.X translation of a GSER encoding instruction is semantically
   equivalent to the original GSER encoding instruction. The security
   considerations that apply to an application built from an original
   ASN.1 specification with GSER encoding instructions apply equally to
   an application built from the ASN.X translation of the ASN.1
   specification.

   See the main specification for ASN.X [ASN.X] for security
   considerations related to ASN.X modules.

6. Normative References

   [BCP14]   Bradner, S., "Key words for use in RFCs to Indicate
               Requirement Levels", BCP 14, RFC 2119, March 1997.

   [GSER]   Legg, S., "Generic String Encoding Rules (GSER) for ASN.1
               Types", RFC 3641, October 2003.

   [GSEREI]   Legg, S., "Encoding Instructions for the Generic String
               Encoding Rules (GSER)", RFC 4792, January 2007.

    [RXER]   Legg, S. and D. Prager, "Robust XML Encoding Rules (RXER)
                for Abstract Syntax Notation One (ASN.1)", RFC 4910, July
                2007.

    [RXEREI]   Legg, S., "Encoding Instructions for the Robust XML
                Encoding Rules (RXER)", RFC 4911, July 2007.

    [ASN.X]   Legg, S., "Abstract Syntax Notation X (ASN.X)", RFC 4912,
                July 2007.

    [X.680]   ITU-T Recommendation X.680 (07/02) | ISO/IEC 8824-1,
                Information technology - Abstract Syntax Notation One
                (ASN.1): Specification of basic notation.

    [X.680-1]   ITU-T Recommendation X.680 (2002) Amendment 1 (10/03) |
                ISO/IEC 8824-1:2002/Amd 1:2004, Support for EXTENDED-XER.

    [XML10]   Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E. and
                F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fourth
                Edition)", W3C Recommendation,
                http://www.w3.org/TR/2006/REC-xml-20060816, August 2006.

    [XML11]   Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E.,
                Yergeau, F., and J. Cowan, "Extensible Markup Language
                (XML) 1.1 (Second Edition)", W3C Recommendation,
                http://www.w3.org/TR/2006/REC-xml11-20060816, August 2006.

    [XMLNS10]   Bray, T., Hollander, D., Layman, A., and R. Tobin,
                "Namespaces in XML 1.0 (Second Edition)", W3C
                Recommendation,
                http://www.w3.org/TR/2006/REC-xml-names-20060816, August
                2006.

    [INFOSET]   Cowan, J. and R. Tobin, "XML Information Set (Second
                Edition)", W3C Recommendation,
                http://www.w3.org/TR/2004/REC-xml-infoset-20040204,
                February 2004.

Appendix A. ASN.1 for GSER Encoding Instruction Notation

   This appendix is normative.

   GSER-EncodingInstructionNotation
       { iso(1) identified-organization(3) dod(6)
         internet(1) private(4) enterprise(1)
         xmled(21472) asnx(1) module(0) gser-ei-notation(2) }

   -- Copyright (C) The IETF Trust (2007). This version of
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   DEFINITIONS
   RXER INSTRUCTIONS
   AUTOMATIC TAGS
   EXTENSIBILITY IMPLIED ::= BEGIN

   IMPORTS
       PrecedenceList
           FROM AbstractSyntaxNotation-X
               { iso(1) identified-organization(3) dod(6)
                 internet(1) private(4) enterprise(1)
                 xmled(21472) asnx(1) module(0) notation(1) }
       ;

   GSER-EncodingInstruction ::= [SINGULAR-INSERTIONS] CHOICE {
       choiceOfStrings GSER-ChoiceOfStringsInstruction
   }

   GSER-EncodingInstructionAssignmentList ::= SEQUENCE { }

   GSER-ChoiceOfStringsInstruction ::= SEQUENCE {
       precedence [ATTRIBUTE] PrecedenceList OPTIONAL
   }

   ENCODING-CONTROL RXER

       SCHEMA-IDENTITY   "urn:oid:1.3.6.1.4.1.21472.1.0.2"

        TARGET-NAMESPACE "urn:ietf:params:xml:ns:asnx" PREFIX "asnx"

    END

Appendix B. ASN.X for GSER Encoding Instruction Notation

    This appendix is non-normative.

    <?xml version="1.0"?>
    <asnx:module xmlns:asnx="urn:ietf:params:xml:ns:asnx"
                 name="GSER-EncodingInstructionNotation"
                 identifier="1.3.6.1.4.1.21472.1.0.2"
                 schemaIdentity="urn:oid:1.3.6.1.4.1.21472.1.0.2"
                 targetNamespace="urn:ietf:params:xml:ns:asnx"
                 targetPrefix="asnx"
                 extensibilityImplied="true">

     <annotation>
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     </annotation>

     <import name="AbstractSyntaxNotation-X"
             identifier="1.3.6.1.4.1.21472.1.0.1"
             schemaIdentity="urn:oid:1.3.6.1.4.1.21472.1.0.1"
             namespace="urn:ietf:params:xml:ns:asnx"/>

     <namedType name="GSER-EncodingInstruction">
      <type>
       <choice insertions="singular">
        <element name="choiceOfStrings"
                 type="asnx:GSER-ChoiceOfStringsInstruction"/>
       </choice>
      </type>
     </namedType>

     <namedType name="GSER-EncodingInstructionAssignmentList">
      <type>

```
      <sequence/>
     </type>
    </namedType>

    <namedType name="GSER-ChoiceOfStringsInstruction">
     <type>
      <sequence>
       <optional>
        <attribute name="precedence" type="asnx:PrecedenceList"/>
       </optional>
      </sequence>
     </type>
    </namedType>

   </asnx:module>
```

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