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Abstract

This document describes an Extensible Provisioning Protocol (EPP) extension mapping for the management of Domain Name System (DNS) domain names using Internationalized Domain Name (IDN) identifiers. Specified in XML, this mapping extends the EPP domain name mapping to provide additional features required for IDN domain name processing.

Conventions Used In This Document

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 2119 [1].
In examples, "C:" represents lines sent by a protocol client and "S:" represents lines returned by a protocol server. Indentation and white space in examples is provided only to illustrate element relationships and is not a REQUIRED feature of this specification.

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1. Introduction

This document describes an extension mapping for version 1.0 of the Extensible Provisioning Protocol (EPP). This mapping, an extension of the domain name mapping described in [2], is specified using the Extensible Markup Language (XML) 1.0 as described in [3] and XML Schema notation as described in [4] and [5].

The EPP core protocol specification [6] provides a complete description of EPP command and response structures. A thorough understanding of the base protocol specification is necessary to understand the mapping described in this document.
Fundamental to the understanding of this extension are the documents that describe the process for Internationalizing Domain Names in Applications (IDNA) [7], and by implication, the format of and process for constructing these strings, (Stringprep [8], nameprep [9], and importantly, punycode [10]).

XML is case sensitive. Unless stated otherwise, XML specifications and examples provided in this document MUST be interpreted in the character case presented to develop a conforming implementation.

1.1 Changes From Previous Version

(Note to RFC editor: please remove this section completely before publication as an RFC.)

This document is an initial release, there is no previous version.

2. Object Attributes

This extension adds additional elements to the domain name mapping described in the EPP domain mapping [2]. Only new element descriptions are described here.

3. EPP Command Mapping

A detailed description of the EPP syntax and semantics can be found in the EPP core protocol specification [6]. The command mappings described here are specifically for use in implementing internationalized domain name processes via EPP.

3.1 EPP Query Commands

EPP provides three commands to retrieve object information: <check> to determine if an object is known to the server, <info> to retrieve detailed information associated with an object, and <transfer> to retrieve object transfer status information.

3.1.1 EPP <check> Command

Domain name validation logic MUST allow punycode names.

If the <check> command contains at least one <domain:name> element with IDN value then in addition to the standard EPP command elements, the <check> command MUST contain an <idn:check> extension element.

The <idn:check> element contains the following child elements:
An `<idn:script>` element that contains script name.

Example `<check>` command:

```xml
C:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
C:     xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
C:     xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0
C:     epp-1.0.xsd'>
C:  <command>
C:    <check>
C:      <domain:check
C:          xmlns:domain='urn:ietf:params:xml:ns:domain-1.0'
C:          xsi:schemaLocation='urn:ietf:params:xml:ns:domain-1.0
C:          domain-1.0.xsd'>
C:        <domain:name>xn--bq-uia.info</domain:name>
C:      </domain:check>
C:    </check>
C:    <clTRID>CLI-1097596300572</clTRID>
C:    <extension>
C:      <idn:check xmlns:idn='urn:iana:xml:ns:idn'
C:                 xsi:schemaLocation='urn:iana:xml:ns:idn idn.xsd'>
C:        <idn:script>de</idn:script>
C:      </idn:check>
C:    </extension>
C:  </command>
C:</epp>
```

A `<check>` command can contain more than one IDN name to check, in such cases, only a single `<idn:script>` element SHOULD be specified.

Example `<check>` command specifying multiple IDN names.

```xml
C:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
C:     xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
C:     xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0
C:     epp-1.0.xsd'>
C:  <command>
C:    <check>
C:      <domain:check
C:          xmlns:domain='urn:ietf:params:xml:ns:domain-1.0'
C:          xsi:schemaLocation='urn:ietf:params:xml:ns:domain-1.0
C:          domain-1.0.xsd'>
C:        <domain:name>xn--oq-xka.info</domain:name>
C:        <domain:name>xn--bq-uia.info</domain:name>
C:      </domain:check>
C:    </check>
C:</epp>
```
The value of <idn:script> SHALL be used by the server to process all IDN names contained in the same <check> command.

An EPP error response MUST be returned for a <check> command that contains at least one <domain:name> element with an IDN value and does not contain the <idn:check> or <idn:script> extension elements as well.

Example <check> response when the <idn:check> element is omitted:

S:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
     xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
     xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0 epp-1.0.xsd'>
  <response>
    <result code='2003'>
      <msg lang='en-US'>Required parameter missing</msg>
      <value xmlns:oxrs='urn:afilias:params:xml:ns:oxrs-1.0'>
        <oxrs:xcp>2003:Required parameter missing</oxrs:xcp>
      </value>
    </result>
    <trID>
      <clTRID>CLI-1065207438144</clTRID>
      <svTRID>SRO-1097598449989</svTRID>
    </trID>
  </response>
</epp>

Example <check> response when the <idn:script> element is omitted:

S:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
     xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
     xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0 epp-1.0.xsd'>
  <response>
    <result code='2003'>
      <msg lang='en-US'>Required parameter missing</msg>
      <value xmlns:oxrs='urn:afilias:params:xml:ns:oxrs-1.0'>
        <oxrs:xcp>2003:Required parameter missing</oxrs:xcp>
      </value>
    </result>
    <trID>CLI-1065207438144</trID>
  </response>
</epp>
When a <check> request contains an IDN whose translated punycode <domain:name> value contains character(s) that are not in the script table specified in the <idn:script> element value, the <domain:cd> element MUST indicate that the IDN is NOT available.

Example <check> response when <domain:name> value has conflict with the value of <idn:script> element:

```
S:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
    xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
    xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0
epp-1.0.xsd'>
S:  <response>
S:    <result code='1000'>
S:      <msg lang='en-US'>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:chkData
          xmlns:domain='urn:ietf:params:xml:ns:domain-1.0'
          xsi:schemaLocation='urn:ietf:params:xml:ns:domain-1.0
domain-1.0.xsd'>
S:        <domain:cd>
S:          <domain:name avail='0'>xn--dn-mja.info</domain:name>
S:          <domain:reason>Character from an invalid script</domain:reason>
S:        </domain:cd>
S:      </domain:chkData>
S:    </resData>
S:    <trID>
S:      <clTRID>CLI-1065207438144</clTRID>
S:      <svTRID>SRO-1097598809161</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```
3.1.2 EPP <info> Command

Domain name validation logic MUST allow punycode names.

XML syntax for domain info response will be modified for IDN domain names. Extension element <idn:infData> will be added. The element SHALL contain the following elements:

- An <idn:script> element that contains script name.

Example <info> response for IDN name:

```xml
S:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
S:     xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
S:     xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0
S:     epp-1.0.xsd'>
S:  <response>
S:    <result code='1000'>
S:      <msg lang='en-US'>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:infData
S:              xmlns:domain='urn:ietf:params:xml:ns:domain-1.0'
S:              xsi:schemaLocation='urn:ietf:params:xml:ns:domain-1.0
S:              domain-1.0.xsd'>
S:        <domain:name>xn--b7q-uia.info</domain:name>
S:        <domain:roid>D224-LRMS</domain:roid>
S:        <domain:status s='ok'/>
S:        <domain:registrant>OTNE-C1</domain:registrant>
S:        <domain:contact type='tech'>OTNE-C2</domain:contact>
S:        <domain:contact type='admin'>OTNE-C3</domain:contact>
S:        <domain:contact type='billing'>OTNE-C4</domain:contact>
S:        <domain:ns>
S:          <domain:hostObj>ns1.valid.info</domain:hostObj>
S:          <domain:hostObj>ns2.valid.info</domain:hostObj>
S:        </domain:ns>
S:        <domain:clID>ClientA</domain:clID>
S:        <domain:crID>ClientA</domain:crID>
S:        <domain:crDate>2004-10-12T17:57:41.0Z</domain:crDate>
S:        <domain:exDate>2006-10-12T17:57:41.0Z</domain:exDate>
S:        <domain:authInfo>
S:          <domain:pw>foo-BAR</domain:pw>
S:        </domain:authInfo>
S:      </domain:infData>
S:    </resData>
S:  </response>
S:</epp>
```
3.1.3 EPP <transfer> Command

This extension does not add any elements to the EPP <transfer> command or <transfer> response described in the EPP domain mapping [2].

3.2 EPP Transform Commands

3.2.1 EPP <create> Command

Domain name validation logic MUST allow punycode names.

EPP <create> request for a non-IDN name that contains IDN extension will be accepted. The IDN extension will be ignored in such case.

Example <create> command:

C:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
C:     xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
C:     xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0
C:     epp-1.0.xsd'>
C:  <command>
C:    <create>
C:      <domain:create
C:        xmlns:domain='urn:ietf:params:xml:ns:domain-1.0'
C:        xsi:schemaLocation='urn:ietf:params:xml:ns:domain-1.0
domain-1.0.xsd'>
C:        <domain:name>xn--bq-uia.info</domain:name>
C:        <domain:period unit='y'>2</domain:period>
C:        <domain:authInfo>
C:          <domain:pw>foo-BAR</domain:pw>
C:        </domain:authInfo>
C:      </domain:create>
C:    </create>
C:  </command>
C:</epp>
Example <create> response.

S:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
    xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
    xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0
epp-1.0.xsd'>
  <response>
    <result code='1000'>
      <msg lang='en-US'>Command completed successfully</msg>
    </result>
    <resData>
      <domain:creData
        xmlns:domain='urn:ietf:params:xml:ns:domain-1.0'
        xsi:schemaLocation='urn:ietf:params:xml:ns:domain-1.0
domain-1.0.xsd'>
        <domain:name>xn--bq-uia.info</domain:name>
        <domain:crDate>2004-10-12T17:57:41.0Z</domain:crDate>
        <domain:exDate>2006-10-12T17:57:41.0Z</domain:exDate>
      </domain:creData>
    </resData>
    <trID>
      <clTRID>CLI-1097603861301</clTRID>
      <svTRID>SRW-6011</svTRID>
    </trID>
  </response>
</epp>
EPP domain create request for an IDN name that has missing <idn:create> extension will return error response with response code 2003 ("Required parameter missing").

Example <create> command with <idn:create> element missing:

```
C:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
C:     xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
C:     xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0
epp-1.0.xsd'>
C:  <command>
C:    <create>
C:      <domain:create
C:          xmlns:domain='urn:ietf:params:xml:ns:domain-1.0'
C:          xsi:schemaLocation='urn:ietf:params:xml:ns:domain-1.0
domain-1.0.xsd'>
C:        <domain:name>xn--bq-uia.info</domain:name>
C:        <domain:period unit='y'>2</domain:period>
C:        <domain:authInfo>
C:          <domain:pw>foo-BAR</domain:pw>
C:        </domain:authInfo>
C:        <domain:ns>
C:          <domain:hostObj>ns1.valid.info</domain:hostObj>
C:          <domain:hostObj>ns2.valid.info</domain:hostObj>
C:        </domain:ns>
C:        <domain:registrant>OTNE-C1</domain:registrant>
C:        <domain:contact type='admin'>OTNE-C2</domain:contact>
C:        <domain:contact type='billing'>OTNE-C3</domain:contact>
C:        <domain:contact type='tech'>OTNE-C4</domain:contact>
C:      </domain:create>
C:    </create>
C:    <clTRID>CLI-1088191770366</clTRID>
C:  </command>
C:</epp>
```

Example <create> response for a request with <idn:create> element missing:

```
S:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
S:     xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
S:     xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0
epp-1.0.xsd'>
S:  <response>
S:    <result code='2003'>
S:      <msg lang='en-US'>Required parameter missing</msg>
S:    </result>
S:    <value xmlns:oxrs='urn:afilias:params:xml:ns:oxrs-1.0'>
```
S:    <oxrs:xcp>2003:Required parameter missing
S:(idn:create)</oxrs:xcp>
S:      </value>
S:    </result>
S:    <trID>
S:      <clTRID>CLI-1088191770366</clTRID>
S:      <svTRID>SRW-6015</svTRID>
S:    </trID>
S:  </response>
S:</epp>

EPP domain create request for an IDN name that has missing <idn:script> element in <idn:create> extension will return error response with response code 2003 ("Required parameter missing").

Example <create> command with <idn:script> element missing:

C:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
C:     xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
C:     xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0
epp-1.0.xsd'>
C:  <command>
C:    <create>
C:      <domain:create
C:              xmlns:domain='urn:ietf:params:xml:ns:domain-1.0'
C:              xsi:schemaLocation='urn:ietf:params:xml:ns:domain-1.0
domain-1.0.xsd'>
C:        <domain:name>xn--bq-uia.info</domain:name>
C:        <domain:period unit='y'>2</domain:period>
C:        <domain:authInfo>
C:          <domain:pw>foo-BAR</domain:pw>
C:        </domain:authInfo>
C:        <domain:ns>
C:          <domain:hostObj>ns1.valid.info</domain:hostObj>
C:          <domain:hostObj>ns2.valid.info</domain:hostObj>
C:        </domain:ns>
C:        <domain:registrant>OTNE-C1</domain:registrant>
C:        <domain:contact type='admin'>OTNE-C2</domain:contact>
C:        <domain:contact type='billing'>OTNE-C3</domain:contact>
C:        <domain:contact type='tech'>OTNE-C4</domain:contact>
C:      </domain:create>
C:    </create>
C:    <clTRID>CLI-1088191770366</clTRID>
C:    <extension>
C:      <idn:create xmlns:idn='urn:iana:xml:ns:idn'
C:          xsi:schemaLocation='urn:iana:xml:ns:idn idn.xsd'>
Example <create> response for a request with element <idn:script> missing:

S:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
S:     xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
S:     xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0
S:     epp-1.0.xsd'>
S:  <response>
S:    <result code='2003'>
S:      <msg lang='en-US'>Required parameter missing</msg>
S:      <value xmlns:oxrs='urn:afilias:params:xml:ns:oxrs-1.0'>
S:        <oxrs:xcp>2003:Required parameter missing
S:        </oxrs:xcp>
S:    </result>
S:    <trID>
S:      <clTRID>CLI-1088191770366</clTRID>
S:      <svTRID>SRW-6016</svTRID>
S:    </trID>
S:  </response>
S:</epp>

An EPP domain create request for an IDN name MUST NOT contain characters that belong to a script other than that specified in the <idn:script> element. If the IDN name provided contains characters that do not belong to the specified script then the server will return an error response with the response code 2306 ("Parameter value policy error").

In such case the response MUST contain <idn:creData> extension element. The <idn:creData> element contains the following child elements:

- A <idn:script> element that contains the script name that was included in the request
- A <idn:reason> element that contains more detailed description of the error in the script name.

Example <create> command with characters that do not match the specified <idn:script> value:
Example <create> response for a request with characters that do not match the specified <idn:script> value:

S:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
S:     xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
S:     xsi:schemalocation='urn:ietf:params:xml:ns:epp-1.0
S:     epp-1.0.xsd'
S:     <response>
S:       <result code='2306'>
S:         <msg lang='en-US'>Parameter value policy error</msg>
S:     </response>
S:</epp>

Example <create> response for a request with characters that do not match the specified <idn:script> value:
EPP domain create request for an IDN name that contains invalid value for `<idn:script>` element SHALL return error response with response code 2306 ("Parameter value policy error").

In such case the response MUST contain `<idn:creData>` extension element. The `<idn:creData>` element contains the following child element:

- A `<idn:script>` element that contains the script name that was included in the request
- A `<idn:reason>` element that contains more detailed description of the error in the script name.

Example `<create>` command with incorrect script name:

```xml
C:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
     xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
     xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0 epp-1.0.xsd'>
  <command>
    <create>
      <domain:create xmlns:domain='urn:ietf:params:xml:ns:domain-1.0'
                      xsi:schemaLocation='urn:ietf:params:xml:ns:domain-1.0 domain-1.0.xsd'>
        <domain:name>xn--bq-uia.info</domain:name>
      </domain:create>
    </create>
  </command>
</epp>
```
Example <create> response for an invalid script name:

S:<epp xmlns='urn:ietf:params:xml:ns:epp-1.0'
     xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
     xsi:schemaLocation='urn:ietf:params:xml:ns:epp-1.0 epp-1.0.xsd'>
  <response>
    <result code='2306'>
      <msg lang='en-US'>Parameter value policy error</msg>
      <value xmlns:oxrs='urn:afilias:params:xml:ns:oxrs-1.0'>
        <oxrs:xcp>2306:Parameter value policy error (de-AT)</oxrs:xcp>
      </value>
    </result>
    <extension>
      <idn:creData xmlns:idn='urn:iana:xml:ns:idn'
                    xsi:schemaLocation='urn:iana:xml:ns:idn idn.xsd'>
        <idn:script>de-AT</idn:script>
        <idn:reason>Invalid script name</idn:reason>
      </idn:creData>
    </extension>
  <trID>
</epp>
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Domain create XML syntax for non-IDN domain names SHALL NOT change.

3.2.2 EPP <delete> Command

This extension does not add any elements to the EPP <delete> command or <delete> response described in the EPP domain mapping [2].

3.2.3 EPP <renew> Command

This extension does not add any elements to the EPP <renew> command or <renew> response described in the EPP domain mapping [2].

3.2.4 EPP <transfer> Command

This extension does not add any elements to the EPP <transfer> command or <transfer> response described in the EPP domain mapping [2].

3.2.5 EPP <update> Command

This extension does not add any elements to the EPP <update> command or <update> response described in the EPP domain mapping [2].

4. Formal Syntax

An EPP object mapping is specified in XML Schema notation. The formal syntax presented here is a complete schema representation of the object mapping suitable for automated validation of EPP XML instances. The BEGIN and END tags are not part of the schema; they are used to note the beginning and ending of the schema for URI registration purposes.

BEGIN

<?xml version="1.0" encoding="UTF-8"?>

<schema targetNamespace="urn:ietf:params:xml:ns:idn-1.0"
  xmlns:idn="urn:ietf:params:xml:ns:idn-1.0"
  xmlns="http://www.w3.org/2000/10/XMLSchema"
  elementFormDefault="qualified">

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Child elements found in EPP commands.

<!--
Element name="check" type="idn:cmdType"/>
<element name="info" type="idn:cmdType"/>
<element name="create" type="idn:cmdType"/>

<!--
Utility Types
-->

<complexType name="cmdType">
  <sequence>
    <element name="script" type="idn:scriptType"
      minOccurs="1" maxOccurs="1"/>
  </sequence>
</complexType>

<simpleType name="scriptType">
  <restriction base="token">
    <length value="2"/>
  </restriction>
</simpleType>

<!--
Child response elements
-->

<element name="infData" type="idn:infDataType"/>
<element name="creData" type="idn:creDataType"/>

<!--
Response elements
-->


5. Internationalization Considerations

EPP is represented in XML, which provides native support for encoding information using the Unicode character set and its more compact representations including UTF-8 [11]. Conformant XML processors recognize both UTF-8 and UTF-16 [12]. Though XML includes provisions to identify and use other character encodings through use of an "encoding" attribute in an <?xml?> declaration, use of UTF-8 is RECOMMENDED in environments where parser encoding support incompatibility exists.

As an extension of the EPP domain mapping [2], the elements, element content, attributes, and attribute values described in this document MUST inherit the internationalization conventions used to represent higher-layer domain and core protocol structures present in an XML instance that includes this extension.
6. IANA Considerations

This document uses URNs to describe XML namespaces and XML schemas conforming to a registry mechanism described in FIXME: Need XREF[8]. Two URI assignments are requested.

Registration request for the IDN namespace:

URI: urn:ietf:params:xml:ns:idn-1.0

Registrant Contact: See the "Author’s Address" section of this document.

XML: None. Namespace URIs do not represent an XML specification.

Registration request for the IDN XML schema:

URI: urn:ietf:params:xml:schema:idn-1.0

Registrant Contact: See the "Author’s Address" section of this document.

XML: See the "Formal Syntax" section of this document.

7. Security Considerations

The mapping extensions described in this document do not provide any security services beyond those described by EPP [6], the EPP domain name mapping [2], and protocol layers used by EPP. The security considerations described in these other specifications apply to this specification as well.

8. References


9. Authors’ Addresses

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Acknowledgment

Funding for the RFC Editor function is currently provided by the Internet Society.