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EPP Mapping for DNAME delegation of domain names
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Abstract

This document describes an Extensible Provisioning Protocol (EPP) extension mapping for the provisioning and management of Domain Name System for domain names stored in a shared central repository. Specified in XML, this mapping extends the EPP domain name mapping to provide the ability to delegate a domain names through DNAME resource records, thus making the new domain an alias of a previous domain.

REMOVE BEFORE PUBLICATION This document should be discussed on the Registration Protocols Extensions (regext) mailing list. The source of this document is kept on a Gitlab at Framagit [1]. A list of open issues is there as well [2].

Status of This Memo

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[1.](#) Introduction

This document describes an extension mapping for version 1.0 of the Extensible Provisioning Protocol (EPP) described in [RFC 5730](#) [[RFC5730](#)]. This mapping, an extension of the domain name mapping

described in [RFC 5731](#) [[RFC5731](#)], is specified using the Extensible Markup Language (XML) 1.0 [[W3C.REC-xml-20001006](#)] and XML Schema notation ([[W3C.REC-xmlschema-1-20041028](#)] [[W3C.REC-xmlschema-2-20041028](#)]).

The EPP core protocol specification [[RFC5730](#)] 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. Familiarity with the Domain Name System (DNS) described in [RFC 1034](#) [[RFC1034](#)] and [RFC 1035](#) [[RFC1035](#)] and with the DNS DNAME Resource Record type described in [RFC 6672](#) [[RFC6672](#)] is required to understand the DNS concepts described in this document. (DNAME have properties that may be surprising at first; for instance, it aliases only the subdomains, not the owner name of the DNAME record itself.)

The EPP mapping described in this document specifies a mechanism for the provisioning and management of domain names in a shared central repository. Today, most registries allow only delegation of domain names to name servers specified in NS resource records. DNAME [[RFC6672](#)] allow another type of delegation, which can be useful for instance for the new AS 112 [[RFC7535](#)], as proposed in [[I-D.bortzmeyer-dname-root](#)]. Information exchanged via this mapping can be extracted from the repository and used to publish DNAME resource records.

[1.1](#). 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 [BCP 14](#), [RFC 2119](#) [[RFC2119](#)].

In examples, "C:" represents lines sent by a protocol client, and "S:" represents lines returned by a protocol server. "/////" is used to note element values that have been shortened to better fit page boundaries. Indentation and white space in examples is provided only to illustrate element relationships and is not a mandatory feature of this protocol.

XML is case sensitive. Unless stated otherwise, XML specifications

and examples provided in this document MUST be interpreted in the character case presented in order to develop a conforming implementation.

dnDeleg-1.0 is used as an abbreviation for urn:ietf:params:xml:ns:dnDeleg-1.0.

2. Object Attributes

This extension adds additional elements to the EPP domain name mapping [[RFC5731](#)]. Only those new elements are described here.

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DNAME information is published by a DNS server to indicate that a child zone is actually an alias of another zone. A DNAME resource record (RR) contains a single field named target. See [RFC 6672](#) [[RFC6672](#)] for the specific field format.

3. Presentation

It is the server policy to allow DNAME delegations or not. It is also the server policy to allow (or not) a domain to switch between these two types of delegation with a EPP <update>.

The interface relies on the use of the <dnDeleg:dnDelegTarget> element for creates, adds, removes, and <domain:info> responses. The data is provided by the client. If the DNAME target is in a zone managed by the server, the server operator MAY check its existence in its database and the fact that it is not itself a DNAME. Otherwise, the server operator MAY issue out-of-band DNS queries to check if the target really exists.

The <dnDeleg:dnDelegTarget> element contains a domain name, as described in [Section 2.1 of RFC 6672](#) [[RFC6672](#)]. The value of the <dnDeleg:dnDelegTarget> element is represented as a eppcom:labelType ([\[RFC5730\]](#), [section 4.4](#), and [\[W3C.REC-xmlschema-2-20041028\]](#)).

4. Examples

Example use of the dnDeleg:dnDelegTarget, for instance for an EPP <create>:

<dnamedeleg:dnametarget>foo.bar.example</dnamedeleg:dnametarget>

[5.](#) EPP Command Mapping

A detailed description of the EPP syntax and semantics can be found in the EPP core protocol specification [[RFC5730](#)]. The command mappings described here are specifically for use in provisioning and managing DNAME delegations via EPP.

[5.1.](#) 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.

[5.1.1.](#) EPP <check> Command

This extension does not add any elements to the EPP <check> command or <check> response described in the EPP domain mapping [[RFC5731](#)]. Note that an EPP client cannot use <check> to find out if a server authorizes DNAME delegation for this specific domain (EPP login information is not sufficient because the fact that the server supports the extension does not mean it is authorized for all names.) [REMOVE BEFORE PUBLICATION: issue #3 discussed the case.]

[5.1.2.](#) EPP <info> Command

This extension does not add any elements to the EPP <info> command described in the EPP domain mapping [[RFC5731](#)]. [REMOVE BEFORE PUBLICATION: issue #6 discussed whether or not it would be a good idea.] However, additional elements are defined for the <info> response.

When an <info> command has been processed successfully, the EPP <resData> element MUST contain child elements as described in the EPP domain mapping [[RFC5731](#)]. In addition, the EPP <extension> element SHOULD contain a child <dnamedeleg:dnametarget> element that

identifies the extension namespace if the domain object has data associated with this extension, based on server policy and depending on support of the client for dnameDeleg, based on the EPP login services it provided. The <dnameDeleg:dnameTarget> element contains a domain name as its value. A server MUST NOT return both a <dnameDeleg:dnameTarget> and a <domain:ns> ([RFC5731], [section 3.1.2](#)).

Example <info> Response

```
S:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
S:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0"
S:  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:infData
S:        xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
S:        <domain:name>example.com</domain:name>
S:        <domain:roid>EXAMPLE1-REP</domain:roid>
S:        <domain:status s="ok"/>
```

```

S:      <domain:registrant>jd1234</domain:registrant>
S:      <domain:contact type="admin">sh8013</domain:contact>
S:      <domain:contact type="tech">sh8013</domain:contact>
S:      <domain:clID>ClientX</domain:clID>
S:      <domain:crID>ClientY</domain:crID>
S:      <domain:crDate>1999-04-03T22:00:00.0Z</domain:crDate>
S:      <domain:upID>ClientX</domain:upID>
S:      <domain:upDate>1999-12-03T09:00:00.0Z</domain:upDate>
S:      <domain:exDate>2005-04-03T22:00:00.0Z</domain:exDate>
S:      <domain:trDate>2000-04-08T09:00:00.0Z</domain:trDate>
S:      <domain:authInfo>
S:          <domain:pw>2fooBAR</domain:pw>
S:      </domain:authInfo>
S:  </domain:infData>
S: </resData>
S: <extension>
S:   <dnameDeleg:dnameTarget xmlns:dnameDeleg="urn:ietf:params:xml:ns:dnameD
S:       foo.bar.example
S:   </dnameDeleg:dnameTarget>
S: </extension>
S: <trID>
S:   <clTRID>ABC-12345</clTRID>
S:   <svTRID>54322-XYZ</svTRID>
S: </trID>
S: </response>
S:</epp>

```

An EPP error response MUST be returned if an <info> command cannot be processed for any reason.

[5.2.](#) EPP <transfer> Command

This extension does not add any elements to the EPP <transfer> command or <transfer> response described in the EPP domain mapping [[RFC5731](#)]. A domain cannot be switched from NS delegation to DNAME delegation (or vice-versa) through a transfer.

Note that this may be one additional reason for a transfer to fail:

if the gaining registrar does not support DNAME delegation. The server MUST return error code 2106.

[6.](#) EPP Transform Commands

EPP provides five commands to transform objects: <create> to create an instance of an object, <delete> to delete an instance of an object, <renew> to extend the validity period of an object, <transfer> to manage object sponsorship changes, and <update> to change information associated with an object.

[6.1.](#) EPP <create> Command

This extension defines an additional element for the EPP <create> command described in the EPP domain mapping [[RFC5731](#)]. No additional elements are defined for the EPP <create> response.

The EPP <create> command provides a transform operation that allows a client to create a domain object. In addition to the EPP command elements described in the EPP domain mapping [[RFC5731](#)], the command MUST contain an <extension> element, and the <extension> element MUST contain a child <dnsDeleg:dnameTarget> element that identifies the extension namespace if the client wants to associate data defined in this extension to the domain object. The <dnsDeleg:dnameTarget> has a domain name as value. A client MUST NOT send both a <dnsDeleg:dnameTarget> and <domain:ns> elements. TODO See issue #4 for the choice of the error code(s).


```

C:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
C:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0"
C:  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
C:  <command>
C:    <create>
C:      <domain:create
C:        xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
C:        <domain:name>example.com</domain:name>
C:        <domain:period unit="y">2</domain:period>
C:        <domain:registrant>jd1234</domain:registrant>
C:        <domain:contact type="admin">sh8013</domain:contact>
C:        <domain:contact type="tech">sh8013</domain:contact>
C:        <domain:authInfo>
C:          <domain:pw>2fooBAR</domain:pw>
C:        </domain:authInfo>
C:      </domain:create>
C:    </create>
C:    <extension>
C:      <dnameDeleg:dnameTarget xmlns:dnameDeleg="urn:ietf:params:xml:ns:dnameD
C:    </extension>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>

```

When a <create> command has been processed successfully, the EPP response is as described in the EPP domain mapping [[RFC5731](#)].

[6.2.](#) EPP <delete> Command

This extension does not add any elements to the EPP <delete> command or <delete> response described in the EPP domain mapping [[RFC5731](#)].

[6.3.](#) EPP <renew> Command

This extension does not add any elements to the EPP <renew> command or <renew> response described in the EPP domain mapping [[RFC5731](#)].

[6.4.](#) EPP <transfer> Command

This extension does not add any elements to the EPP <transfer> command or <transfer> response described in the EPP domain mapping [[RFC5731](#)].

[6.5.](#) EPP <update> Command

This extension defines additional elements for the EPP <update> command described in the EPP domain mapping [[RFC5731](#)]. No additional elements are defined for the EPP <update> response.

The EPP <update> command provides a transform operation that allows a client to modify the attributes of a domain object. In addition to the EPP command elements described in the EPP domain mapping, the command MUST contain an <extension> element, and the <extension> element MUST contain a child <dnadeleg:dnameTarget> element that identifies the extension namespace if the client wants to update the domain object with data defined in this extension. The <dnadeleg:dnameTarget> element has a domain name as its value. If present, it updates the DNAME delegation to the new target, if the domain was already DNAME-delegated, or it switches the domain to a DNAME delegation, if it was previously a NS delegation. A server MAY refuse such a switch, per its policy. In the same way, a [RFC 5731](#) [[RFC5731](#)] update with NS information, without the extension described here, switches to NS delegation if the domain was previously DNAME-delegated.

TODO there is an issue with the switch from NS to DNAME delegation if the domain had in-bailiwick name servers. See issue #7.

Example <update> Command, Adding and Removing:

```
C:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
C:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0"
C:  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
C:  <command>
C:    <update>
C:      <domain:update
C:        xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
C:        <domain:name>example.com</domain:name>
C:      </domain:update>
C:    </update>
C:    <extension>
C:      <dnadeleg:dnameTarget xmlns:dnadeleg="urn:ietf:params:xml:ns:dnadeleg-1.0">
C:      </dnadeleg:dnameTarget>
C:    </extension>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When an extended <update> command has been processed successfully, the EPP response is as described in the EPP domain mapping [[RFC5731](#)].

[7.](#) 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:dnameDeleg-1.0"
  xmlns:dnameDeleg="urn:ietf:params:xml:ns:dnameDeleg-1.0"
  xmlns="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">

  <annotation>
    <documentation>
      Extensible Provisioning Protocol v1.0
      domain name extension schema
      for provisioning DNAME domain names.
    </documentation>
  </annotation>

  <!--
  Child element found in EPP commands and response.
  -->
  <element name="dnameTarget" type="string"/>

</schema>
END
```

[8.](#) 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 [[RFC3629](#)]. Conformant XML processors recognize both UTF-8 and UTF-16 [[RFC2781](#)]. 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 [[RFC5731](#)], the internationalization requirements in the EPP domain mapping [[RFC5731](#)]

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are followed by this extension. This extension does not override any of the EPP domain mapping [[RFC5731](#)] internationalization features.

[9.](#) IANA Considerations

This document uses URNs to describe XML namespaces and XML schemas conforming to a registry mechanism described in [RFC 3688](#) [[RFC3688](#)]. Two URI assignments have been completed by the IANA.

Registration request for the extension namespace:

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

Registrant Contact: IESG

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

Registration request for the extension XML schema:

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

Registrant Contact: IESG

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

[10.](#) Security Considerations

The mapping extensions described in this document do not provide any security services beyond those described by EPP [[RFC5730](#)], the EPP domain name mapping [[RFC5731](#)], and protocol layers used by EPP. The security considerations described in these other specifications apply to this specification as well.

As with other domain object transforms, the EPP transform operations described in this document MUST be restricted to the sponsoring client as authenticated using the mechanisms described in Sections [2.9.1.1](#) and [7](#) of [RFC 5730](#) [[RFC5730](#)]. Any attempt to perform a transform operation on a domain object by any client other than the sponsoring client MUST be rejected with an appropriate EPP authorization error.

The provisioning service described in this document involves the exchange of information that can have an operational impact on the DNS. A trust relationship MUST exist between the EPP client and server, and provisioning of DNAME delegation MUST only be done after the identities of both parties have been confirmed using a strong authentication mechanism. This is just a repeat of [\[RFC5734\]](#), [section 8](#).

An EPP client might be acting as an agent for a zone administrator who wants to send DNAME delegation information to be published by the server operator. Man-in-the-middle attacks are thus possible as a result of direct client activity or inadvertent client data manipulation.

[11](#). Acknowledgements

Most of the text has been copied from [[RFC5910](#)], so thanks to its authors.

Thanks to James Gould for a detailed review and for John Levine and Patrick Mevzek for good remarks. Thanks to Patrick Mevzek for the first implementation.

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12.2. Informative References

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[12.3](#). URIs

- [1] <https://framagit.org/bortzmeyer/ietf-epp-dname>
- [2] <https://framagit.org/bortzmeyer/ietf-epp-dname/issues>
- [3] <https://metacpan.org/pod/Net::DRI>
- [4] https://metacpan.org/source/PMEVZEK/Net-DRI-0.96_10/lib/Net/DRI/Protocol/EPP/Extensions/DNAME.pm

[Appendix A](#). Generic Resource Records type

The goal of this document is not to allow arbitrary DNS Resource record types (such as TXT or LOC). Such a mapping would require the

ability to add, update and remove individual records, but it would allow the EPP server to implement a "delegation-less" registry. An example of such attempt to define a standard protocol for provisioning a lot of resource record types is [[I-D.hildebrand-deth](#)]. But we don't follow that path. Instead, we keep the idea that the EPP server registers only delegations, either through NS records or, as here, a DNAME record. This keeps the mapping much simpler.

For this reason, the possibility to add other resource records together with the DNAME ([\[RFC6672\], section 2.4](#)) is out-of-scope here.

[Appendix B](#). Implementation status

RFC-EDITOR: REMOVE BEFORE PUBLICATION

This section records the status of known implementations of the protocol defined by this specification at the time of posting of this Internet-Draft, and is based on a proposal described in [[RFC7942](#)]. The description of implementations in this section is intended to assist the IETF in its decision processes in progressing drafts to RFCs. Please note that the listing of any individual implementation here does not imply endorsement by the IETF. Furthermore, no effort has been spent to verify the information presented here that was supplied by IETF contributors. This is not intended as, and must not be construed to be, a catalog of available implementations or their features. Readers are advised to note that other implementations may exist.

According to [[RFC7942](#)], "this will allow reviewers and working groups to assign due consideration to documents that have the benefit of running code, which may serve as evidence of valuable experimentation and feedback that have made the implemented protocols more mature. It is up to the individual working groups to use this information as they see fit".

This EPP extension is implemented in the Net::DRI EPP client [[3](#)], written in Perl. The specific part of Net::DRI is DNAME.pm [[4](#)].

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