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Extensible Provisioning Protocol  
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#### Abstract

This document describes an application layer client-server protocol for the provisioning and management of objects stored in a shared central repository. Specified in XML, the protocol defines generic object management operations and an extensible framework that maps protocol operations to objects. This document includes a protocol specification, an object mapping template, and an XML media type registration.

#### 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 [RFC2119].

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 protocol.

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## 1. Introduction

This document describes specifications for the Extensible Provisioning Protocol (EPP) version 1.0, an XML text protocol that permits multiple service providers to perform object provisioning operations using a shared central object repository. EPP is specified using the Extensible Markup Language (XML) 1.0 as described in [XML] and XML Schema notation as described in [XMLS-1] and [XMLS-2]. EPP meets and exceeds the requirements for a generic registry registrar protocol as described in [GRRP].

EPP content is identified by MIME media type application/epp+xml. Registration information for this media type is included in an appendix to this document.

EPP is intended for use in diverse operating environments where transport and security requirements vary greatly. It is unlikely that a single transport or security specification will meet the needs of all anticipated operators, so EPP was designed for use in a layered protocol environment. Bindings to specific transport and security protocols are outside the scope of this specification.

This original motivation for this protocol was to provide a standard Internet domain name registration protocol for use between domain name registrars and domain name registries. This protocol provides a means of interaction between a registrar's applications and registry applications. It is expected that this protocol will have additional uses beyond domain name registration.

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.

This document is being discussed on the "ietf-provreg" mailing list. To join the list, send a message to <majordomo@cafax.se> with the words "subscribe ietf-provreg" in the body of the message. There is a web site for the list archives at <http://www.cafax.se/ietf-provreg>.

## 2. Protocol Description

EPP is an XML protocol that can be layered over multiple transport protocols. Protected using lower-layer security protocols, clients exchange identification, authentication, and option information, and then engage in a series of client-initiated command-response exchanges. All EPP commands are atomic (there is no partial success or partial failure) and idempotent (executing a command more than once has the same net effect on system state as successfully executing the command once).

EPP provides four basic service elements: service discovery, commands, responses, and an extension framework that supports definition of managed objects and the relationship of protocol requests and responses to those objects.

A connection-oriented EPP server **MUST** respond to connection creation by returning a greeting to a client. A connection-less EPP server **MUST** be prompted to provide a greeting to a client. In both cases, a client **SHOULD** wait for a greeting before sending an EPP command to the server. A server **MUST** respond to each EPP command with a coordinated response that describes the results of processing the command. Commands and responses **MAY** be exchanged synchronously or asynchronously; asynchronous exchanges may result in higher error rates if a client issues commands without waiting to receive the responses for prior commands.

Implementers **MUST** consider the mechanics of command-response synchronization when implementing a client that supports asynchronous command-response exchanges. Server implementers **MUST** support asynchronous command-response exchanges.

EPP commands fall into three categories: session management commands, query commands, and data transform commands. Session management commands are used to establish and end persistent sessions with an EPP server. Query commands are used to perform read-only object information retrieval operations. Transform commands are used to perform read-write object management operations.

EPP uses XML namespaces to provide an extensible object management framework and to identify schemas required for XML instance parsing and validation. These namespaces and schema definitions are used to identify both the base protocol schema and the schemas for managed objects.

All XML instances **SHOULD** begin with an `<?xml?>` declaration to identify the version of XML that is being used, optionally identify use of the UTF-8 character set defined in [RFC2279], and optionally to provide a

hint to an XML parser that an external schema file is needed to validate the XML instance. EPP use with character sets other than UTF-8 is not described in this document. Conforming XML parsers are required to understand UTF-8, thus the "encoding" attribute is OPTIONAL.

Example XML declarations:

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
```

```
<?xml version="1.0" standalone="no"?>
```

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

```
<?xml version="1.0"?>
```

## 2.1 Protocol Identification

All EPP XML instances MUST begin with an <epp> element. This element identifies the start of an EPP protocol element, the namespace used within the protocol, and the location of the protocol schema. This start element and the associated ending element MUST be applied to all structures sent by both clients and servers.

Example "start" and "end" EPP elements:

```
<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">
</epp>
```

## 2.2 Hello Format

EPP MAY be carried over both connection-oriented and connection-less transport protocols. An EPP client MAY request a <greeting> from an EPP server at any time by sending a <hello> to a server. Use of this element is essential in a connection-less environment where a server can not return a <greeting> in response to a client-initiated connection. An EPP <hello> MUST be an empty element with no child elements.

Example <hello>:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <hello/>
C:</epp>
```

### 2.3 Greeting Format

An EPP server responds to a successful connection and <hello> element by returning a <greeting> element to the client. An EPP greeting contains the following elements:

- An <svID> element that contains the name of the server.
- An <svDate> element that contains the server's current date and time in UTC.
- An <svcMenu> element that identifies the services supported by the server, including:
  - One or more <version> elements that identify the protocol versions supported by the server.
  - One or more <lang> elements that contain the identifiers of the text response languages known by the server. Language identifiers MUST be structured as documented in [RFC3066]. Only language identifiers listed in [ISO639] MAY be used.
  - One or more <objURI> elements that contain namespace URIs representing the objects that the server is capable of managing. A server MAY limit object management privileges on a per-client basis.
  - An OPTIONAL <svcExtension> element that contains one or more <extURI> elements that contain namespace URIs representing object extensions supported by the server.
  - An OPTIONAL <dcp> (data collection policy) element that contains child elements used to describe the server's policy for data collection and management. Policy elements SHOULD be disclosed to all entities directly and indirectly involved in subsequent server interactions, though the method of disclosing policy data outside of direct protocol interaction is beyond the scope of this specification. Child elements include the following:

- An <access> element that describes access provided by the server to data received from the client. The <access> element MUST contain one of the following child elements:

<social/>	Access is given to social data only.
<technical/>	Access is given to technical data only.
<all/>	Access is given to technical and social data.
<noaccess/>	Data exists, but access is not given.
<null/>	Data is not persistent, so no access is possible.

- One or more <statement> elements that describe data collection purposes, data recipients, and data retention. Each <statement> element MUST contain a <purpose> element, a <recipient> element, and a <retention> element. The <purpose> element MUST contain one or more of the following child elements:

<contact/>	Contact for marketing purposes.
<dnReg/>	Domain name registration.
<ipReg/>	IP address registration.
<other/>	Other purpose.
<tmReg/>	Trademark registration.

The <recipient> element MUST contain one or more of the following child elements:

<other/>	Other entities following unknown practices.
<ours/>	Server operator and/or server operator's agents.
<public/>	Public forums.
<same/>	Other entities following server practices.
<unrelated/>	Unrelated third parties.

The <retention> element MUST contain one of the following child elements:

<business/>	Data persists per business practices.
<functional/>	Data persists per functional requirements.
<indefinite/>	Data persists indefinitely.
<legal/>	Data persists per legal requirements.
<none/>	Data is not persistent.

Example greeting:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <greeting>
S:    <svID>Example Company EPP server epp.example.com</svID>
S:    <svDate>2000-06-08T22:00:00.0Z</svDate>
S:    <svcMenu>
S:      <version>1.0</version>
S:      <lang>en</lang>
S:      <lang>fr</lang>
S:      <objURI>urn:ietf:params:xml:ns:contact-1.0</objURI>
S:      <objURI>urn:ietf:params:xml:ns:domain-1.0</objURI>
S:      <objURI>urn:ietf:params:xml:ns:host-1.0</objURI>
S:      <svcExtension>
S:        <extURI>http://custom/objlxt-1.0</extURI>
S:      </svcExtension>
S:    </svcMenu>
S:    <dcp>
S:      <access><all/></access>
S:      <statement>
S:        <purpose><dnReg/><contact/></purpose>
S:        <recipient><ours/><public/></recipient>
S:        <retention><business/></retention>
S:      </statement>
S:    </dcp>
S:  </greeting>
S:</epp>
```

## 2.4 Command Format

An EPP client interacts with an EPP server by sending commands to the server and receiving responses from the server. Commands and responses need not be exchanged synchronously. In addition to the standard EPP elements, an EPP command contains the following elements:

- A <creds> (client identity credentials) element that provides client identity information. Use of this element MAY be OPTIONAL or REQUIRED depending on how the client wishes to manage sessions with the server. A <creds> element contains the following elements:

- A <clID> element that contains the client identifier assigned to the client by the server.

- A <pw> element that contains the client's plain text password. The value of this element is case sensitive.
- An OPTIONAL <newPW> element that contains a new plain text password to be assigned to the client for use with subsequent <creds> elements. The value of this element is case sensitive.
- An <options> element that contains the following child elements:
  - A <version> element that contains the protocol version to be used for the command or ongoing server session.
  - A <lang> element that contains the text response language to be used for the command or ongoing server session commands.

The values of the <version> and <lang> elements MUST exactly match one of the values presented in the EPP greeting.

- A command element whose tag corresponds to one of the valid EPP commands described in this document. The command element MAY contain either protocol-specified or object-specified child elements.
- An OPTIONAL <extension> element that MAY be used for server-defined command extensions.
- An OPTIONAL <clTRID> (client transaction identifier) element that uniquely identifies the command to the client.

EPP supports both session-less and session-oriented operating modes, though the two operating modes MAY NOT be mixed. An ongoing server session that preserves client identity and authorization information MAY be created and ended using the <login> and <logout> commands. Commands MAY also be executed outside of an established session through use of the <creds> element within the command.

Session-less operation implies that object service availability and client identity MUST be checked on a per-command basis. Significant improvements in server processing performance MAY be realized using the protocol's session-oriented operating mode.

Example command without credentials:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <info>
C:      <obj:info xmlns:obj="urn:ietf:params:xml:ns:obj"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
C:        <obj:name>example</obj:name>
C:      </obj:info>
C:    </info>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

Example command with credentials:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <creds>
C:      <clID>ClientX</clID>
C:      <pw>foo-BAR2</pw>
C:      <newPW>bar-FOO2</newPW>
C:      <options>
C:        <version>1.0</version>
C:        <lang>en</lang>
C:      </options>
C:    </creds>
C:    <info>
C:      <obj:info xmlns:obj="urn:ietf:params:xml:ns:obj"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
C:        <obj:name>example</obj:name>
C:      </obj:info>
C:    </info>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

## 2.5 Response Format

An EPP server responds to a client command by returning a response to the client. EPP commands are atomic, so a command must either succeed completely or fail completely. Success and failure results MUST NOT be mixed. In addition to the standard EPP elements, an EPP response contains the following elements:

- One or more <result> elements that document the success or failure of command execution. If the command was processed successfully, only one <result> element MUST be returned. If the command was not processed successfully, multiple <result> elements MAY be returned to document failure conditions. Each <result> element contains the following attribute and child elements:

- A "code" attribute whose value is a four-digit, decimal number that describes the success or failure of the command.

- A <msg> element containing a human-readable description of the response code. The language of the response is identified via an OPTIONAL "lang" attribute. If not specified, the default attribute value MUST be "en" (English). An OPTIONAL "id" attribute MAY be present when responding to an EPP <poll> command. See the description of the <poll> command for more information describing the server message queue.

- Zero or more OPTIONAL <value> elements that echo client-provided values that caused server error conditions.

- An OPTIONAL <data> element that contains a child <status> element used to return information in response to a <status> command.

- An OPTIONAL <msgQ> element containing a "count" attribute that identifies the number of service messages queued for client retrieval. This element MUST NOT be present if there are no messages queued for client retrieval. This element MAY be present in responses to EPP commands other than the <poll> command if messages are queued for retrieval. This element MUST be present in responses to the EPP <poll> command if messages are queued for retrieval. The <msgQ> element has one OPTIONAL child element, <qDate>, that provides the date and time that a particular message was enqueued. The <qDate> element MUST be present when returning a message in a <poll> response, and it MUST be absent otherwise.

- An OPTIONAL <resData> (response data) element that contains child elements specific to the command and associated object.

- An OPTIONAL <extension> element that MAY be used for server-defined response extensions.

- A <trID> (transaction identifier) element containing the transaction identifier assigned by the server to the command for which the response is being returned. The transaction identifier is formed using the <clTRID> associated with the command if supplied by the client and a <svTRID> (server transaction identifier) that is assigned by and unique to the server.

Transaction identifiers provide command-response synchronization integrity. They SHOULD be logged, retained, and protected to ensure that both the client and the server have consistent temporal and state management records.

Example response without <value> or <resData>:

```
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:  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">Command completed successfully</msg>
S:    </result>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

Example response with <resData>:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <obj:creData xmlns:obj="urn:ietf:params:xml:ns:obj"
S:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
S:        <obj:name>example</obj:name>
S:      </obj:creData>
S:    </resData>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

Example response with error <value>:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="2005">
S:      <msg>Parameter value range error</msg>
S:      <value>2525</value>
S:    </result>
S:    <result code="2006">
S:      <msg>Parameter value syntax error</msg>
S:      <value>ex(ample</value>
S:      <value>abc.ex(ample</value>
S:    </result>
S:  <trID>
S:    <clTRID>ABC-12345</clTRID>
S:    <svTRID>54321-XYZ</svTRID>
S:  </trID>
S: </response>
S:</epp>
```

Example response with notice of waiting server messages:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <msgQ count="4"/>
S:  <trID>
S:    <clTRID>ABC-12345</clTRID>
S:    <svTRID>54321-XYZ</svTRID>
S:  </trID>
S: </response>
S:</epp>
```

Command success or failure MUST NOT be assumed if no response is returned or if a returned response is malformed. Protocol idempotency ensures the safety of retrying a command in cases of response delivery

failure.

## 2.6 Protocol Extension Framework

EPP provides an extension framework that allows features to be added at the protocol, object, and command-response levels.

### 2.6.1 Protocol Extension

The EPP extension framework allows for definition of new protocol elements identified using XML namespace notation with a reference to an XML schema that defines the namespace. The <epp> element that identifies the beginning of a protocol instance includes multiple child element choices, one of which is an <extension> element whose children define the extension. For example, a protocol extension element would be described in generic terms as follows:

```
C:<epp>
C: <extension>
C:   <ext:foo xmlns:ext="urn:ietf:params:xml:ns:ext "
C:     xsi:schemaLocation="urn:ietf:params:xml:ns:ext ext.xsd">
C:       <!-- One or more extension elements. -->
C:   </ext:foo>
C: </extension>
C:</epp>
```

This document does not define mappings for specific extensions. Extension specifications MUST be described in separate documents that define the objects and operations subject to the extension.

### 2.6.2 Object Extension

EPP provides an extensible object management framework that defines the syntax and semantics of protocol operations applied to a managed object. This framework pushes the definition of each protocol operation into the context of a specific object, providing the ability to add mappings for new objects without having to modify the base protocol.

Protocol elements that contain data specific to objects are identified using XML namespace notation with a reference to an XML schema that defines the namespace. The schema for EPP supports use of dynamic object schemas on a per-command and per-response basis. For example, the start of an object-specific command element would be described in generic terms as follows:

```
C:<EPPCommandName>
C: <object:command xmlns:object="urn:ietf:params:xml:ns:object"
C:   xsi:schemaLocation="urn:ietf:params:xml:ns:object object.xsd">
C:   <!-- One or more object-specific command elements. -->
C: </object:command>
C:</EPPCommandName>
```

An object-specific response element would be described similarly:

```
S:<resData>
S: <object:resData xmlns:object="urn:ietf:params:xml:ns:object"
S:   xsi:schemaLocation="urn:ietf:params:xml:ns:object object.xsd">
S:   <!-- One or more object-specific response elements. -->
S: </object:resData>
S:</resData>
```

This document does not define mappings for specific objects. The mapping of EPP to an object MUST be described in separate documents that specifically address each command and response in the context of the object. A suggested object mapping outline is included as an appendix to this document.

### 2.6.3 Command-Response Extension

EPP provides a facility for protocol command and response extensions. Protocol commands and responses MAY be extended by an <extension> element that contains additional elements whose syntax and semantics are not explicitly defined by EPP or an EPP object mapping. This element is OPTIONAL. Extensions are typically defined by agreement between client and server and MAY be used to extend EPP for unique operational needs. A server-extended command element would be described in generic terms as follows:

```
C:<EPPCommandName>
C: <object:command xmlns:object="urn:ietf:params:xml:ns:object"
C:   xsi:schemaLocation="urn:ietf:params:xml:ns:object object.xsd">
C:   <!-- One or more object-specific command elements. -->
C: </object:command>
C: <extension>
C:   <!-- One or more server-defined elements. -->
C: </extension>
C:</EPPCommandName>
```

An server-extended response element would be described similarly:

```
S:<response>
S: <result code="1000">
S:   <msg lang="en">Command completed successfully</msg>
S: </result>
S: <extension>
S:   <!-- One or more server-defined elements. -->
S: </extension>
S: <trID>
S:   <clTRID>ABC-12345</clTRID>
S:   <svTRID>54321-XYZ</svTRID>
S: </trID>
S:</response>
```

This document does not define any specific server extensions. The mapping of server extensions to EPP MUST be described in separate documents that specifically address extended commands and responses in the server's operational context.

## 2.7 Object Identification

Some objects, such as name servers and contacts, MAY have utility in multiple repositories. However, maintaining disjoint copies of object information in multiple repositories can lead to inconsistencies that have adverse consequences for the Internet. For example, changing a name server name in one repository, but not in a second repository that refers to the server for domain name delegation, can produce unexpected DNS query results.

Globally unique identifiers can help facilitate object information sharing between repositories. A globally unique identifier MUST be assigned to every object when the object is created, and the identifier MUST be returned within the response for the command that created the object. Specific identifier values are a matter of repository policy, but they SHOULD be constructed according to the following algorithm:

a) Divide the provisioning repository world into a number of object repository classes.

b) Each repository within a class is assigned an identifier that is maintained by IANA.

(c) Each repository is responsible for assigning a unique local identifier for each object within the repository.

(d) The globally unique identifier is a concatenation of the local identifier, followed by a hyphen ("-"), followed by the repository

identifier.

## 2.8 Protocol Commands

EPP provides commands to manage sessions, retrieve object information, and perform transformation operations on objects. All EPP commands are atomic and idempotent, either succeeding completely or failing completely and producing predictable results in case of repeated execution. This section describes each EPP command, including examples with representative server responses.

### 2.8.1 Session Management Commands

EPP provides two commands for session management: <login> to establish a session with a server, and <logout> to end a session with a server. The <login> command establishes an ongoing server session that preserves client identity and authorization information during the duration of the session. Alternatively, identity credentials MAY be provided with an EPP command to facilitate session-less operation.

Session-oriented and session-less operating modes MUST NOT be mixed. Commands other than the <login> command MUST NOT include identity credentials when submitted after successfully processing a <login> command.

#### 2.8.1.1 EPP <login> Command

The EPP <login> command is used to establish a session with an EPP server in response to a greeting issued by the server. A <login> command MUST be sent to a server before any other EPP command.

A client identifier and initial password MUST be created on the server before a client can successfully complete a <login> command. The client identifier and initial password MUST be delivered to the client using an out-of-band method that protects the identifier and password from inadvertent disclosure.

A <creds> element MUST be provided with the <login> command. Once a session has been established with the <login> command, subsequent commands MUST NOT include a <creds> element.

In addition to the standard EPP command elements, the <login> command contains the following child elements:

- A <svcs> element that contains one or more <objURI> elements that contain namespace URIs representing the objects to be managed during the session. The <svcs> element MAY contain an OPTIONAL <svcExtension> element that contains one or more <extURI> elements

that identify object extensions to be used during the session.

The PLAIN SASL mechanism presented in [RFC2595] describes a format for providing a user identifier, an authorization identifier, and a password as part of a single plain text string. The EPP authentication mechanism is similar, though EPP does not require a session-level authorization identifier and the user identifier and password are separated into distinct XML elements. Additional identification and authorization schemes MUST be provided at other protocol layers to provide more robust security services.

Example <login> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <creds>
C:      <clID>ClientX</clID>
C:      <pw>foo-BAR2</pw>
C:      <newPW>bar-FOO2</newPW>
C:      <options>
C:        <version>1.0</version>
C:        <lang>en</lang>
C:      </options>
C:    </creds>
C:    <login>
C:      <svcs>
C:        <objURI>urn:ietf:params:xml:ns:contact-1.0</objURI>
C:        <objURI>urn:ietf:params:xml:ns:domain-1.0</objURI>
C:        <objURI>urn:ietf:params:xml:ns:host-1.0</objURI>
C:        <svcExtension>
C:          <extURI>http://custom/objlxt-1.0</extURI>
C:        </svcExtension>
C:      </svcs>
C:    </login>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When a <login> command has been processed successfully, a server MUST respond with an EPP response with no <resData> element. If successful, the server will respond by creating and maintaining a new session that SHOULD be terminated by a future <logout> command.

Example <login> 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

The EPP <login> command is used to establish a session with an EPP server. A <login> command MUST be rejected if received within the bounds of an existing session. This action MUST be open to all authorized clients.

#### 2.8.1.2 EPP <logout> Command

The EPP <logout> command is used to end a session with an EPP server. The <logout> command MUST be represented as an empty element with no child elements.

A server MAY also end a session asynchronously due to client inactivity or excessive client session longevity. The parameters for determining excessive client inactivity or session longevity are a matter of server policy and are not specified by this protocol.

Example <logout> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <logout/>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When a <logout> command has been processed successfully, a server MUST respond with an EPP response with no <resData> element. If successful, the server MUST also end the current session.

Example <logout> 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1500">
S:      <msg>Command completed successfully; ending session</msg>
S:    </result>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

The EPP <logout> command is used to end a session with an EPP server. A <logout> command MUST be rejected if the command has not been preceded by a successful <login> command. This action MUST be open to all authorized clients.

## 2.8.2 Query Commands

EPP provides four commands to retrieve object information: <check> to determine if an object is known to the server, <info> to retrieve detailed information associated with a known object, <poll> to receive service notifications from the server, and <transfer> to retrieve object transfer status information. A <status> command is provided to allow a client to determine if a previously issued transform command was received and processed by the server.

### 2.8.2.1 EPP <check> Command

The EPP <check> command is used to determine if an object may be provisioned within a repository. It provides a hint that allows a client to anticipate the success or failure of provisioning an object using the <check> command. Object availability and provisioning conditions are a matter of server policy.

The elements needed to identify an object are object-specific, so the child elements of the <check> command are specified using the EPP extension framework. In addition to the standard EPP command

elements, the <check> command contains the following child elements:

- An object-specific <obj:check> element that identify the objects to be queried. Multiple objects of the same type MAY be queried within a single <check> command.

Example <check> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <check>
C:      <obj:check xmlns:obj="urn:ietf:params:xml:ns:obj"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
C:        <obj:name>example1</obj:name>
C:        <obj:name>example2</obj:name>
C:        <obj:name>example3</obj:name>
C:      </obj:check>
C:    </check>
C:  <clTRID>ABC-12346</clTRID>
C: </command>
C:</epp>
```

When a <check> command has been processed successfully, a server MUST respond with an EPP <resData> element that MUST contain a child element that identifies the object namespace and the location of the object schema. The child elements of the <resData> element are object-specific, though the EPP <resData> element MUST contain a child <obj:chkData> element that contains one or more <obj:cd> (check data) elements. Each <obj:cd> elements contains the following child elements:

- An object-specific element that identifies the queried object. This element MUST contain an "avail" attribute whose value indicates object availability at the moment the <check> command was completed. A value of "1" or "true" means that the object is available. A value of "0" or "false" means that the object is not available.

- An OPTIONAL <obj:reason> element that MAY be provided when an object is not available for provisioning. If present, this element contains server-specific text to help explain why the object is unavailable. This text MUST be represented in the response language previously negotiated with the client; an OPTIONAL "lang" attribute MAY be present to identify the language if the negotiated value is something other than a default value of "en" (English).

Example <check> 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <obj:chkData xmlns:obj="urn:ietf:params:xml:ns:obj"
S:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
S:        <obj:cd>
S:          <obj:name avail="1">example1</obj:name>
S:        </obj:cd>
S:        <obj:cd>
S:          <obj:name avail="0">example2</obj:name>
S:          <obj:reason>In use</obj:reason>
S:        </obj:cd>
S:        <obj:cd>
S:          <obj:name avail="1">example3</obj:name>
S:        </obj:cd>
S:      </obj:chkData>
S:    </resData>
S:    <trID>
S:      <clTRID>ABC-12346</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

The EPP <check> command is used to determine if an object may be provisioned within a repository. This action MUST be open to all authorized clients.

#### 2.8.2.2 EPP <info> Command

The EPP <info> command is used to retrieve information associated with an existing object. The elements needed to identify an object and the type of information associated with an object are both object-specific, so the child elements of the <info> command are specified using the EPP extension framework. In addition to the standard EPP command elements, the <info> command contains the following child elements:

- An object-specific <obj:info> element that identifies the object to be queried.

Example <info> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <info>
C:      <obj:info xmlns:obj="urn:ietf:params:xml:ns:obj"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
C:        <!-- Object-specific elements. -->
C:      </obj:info>
C:    </info>
C:  </command>
C:</epp>
```

When an <info> command has been processed successfully, a server MUST respond with an EPP <resData> element that MUST contain a child element that identifies the object namespace and the location of the object schema and the Repository Object Identifier (ROID) that was assigned to the object when the object was created. Other child elements of the <resData> element are object-specific.

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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <obj:infData xmlns:obj="urn:ietf:params:xml:ns:obj"
S:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
S:        <obj:roid>EXAMPLE1-VRSN</obj:roid>
S:        <!-- Object-specific elements. -->
S:      </obj:infData>
S:    </resData>
S:    <trID>
S:      <clTRID>ABC-12346</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

The EPP <info> command is used to retrieve information associated with an existing object. This action SHOULD be limited to authorized clients; restricting this action to the sponsoring client is RECOMMENDED.

### 2.8.2.3 EPP <poll> Command

The EPP <poll> command is used to discover and retrieve service messages queued by a server for individual clients. A <poll> command MUST return the first message from the message queue. Each response returned from the server includes a server-unique message identifier that MUST be provided to acknowledge receipt of the message, and a counter that indicates the number of messages in the queue. As a message is received by the client, the client MUST respond to the message with an explicit acknowledgement to confirm that the message has been received. A server MUST dequeue the message and decrement the queue counter after receiving acknowledgement from the client, making the next message in the queue (if any) available for retrieval.

Multiple message types MAY be available for client retrieval. EPP <transfer> actions MUST be reported to all clients involved in the transfer process through queued messages describing the transfer

action using the same object-specific forms specified for <transfer> command responses. Other types of service information MAY be defined and delivered as a matter of server policy. Server operators SHOULD consider time-sensitivity and resource management factors when selecting a delivery method for service information because some message types MAY be reasonably delivered using non-protocol methods that require fewer server resources.

Message queues can consume server resources if clients do not retrieve and acknowledge messages on a regular basis. Servers MAY implement other mechanisms to dequeue and deliver messages if queue maintenance needs exceed resource consumption limits.

Some of the information returned in response to a <poll> command MAY be object-specific, so some child elements of the <poll> response MAY be specified using the EPP extension framework. The <poll> command MUST be represented as an empty element with no child elements. An "op" attribute with value "req" is REQUIRED to retrieve the first message from the server message queue. An "op" attribute (with value "ack") and a "msgID" attribute (whose value corresponds to the value of the "id" attribute copied from the <msg> element in the message being acknowledged) are REQUIRED to acknowledge receipt of a message.

Example <poll> request command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <poll op="req"/>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

The returned result code identifies responses with message information returned in response to a <poll> command.

Example <poll> response with object-specific information:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1301">
S:      <msg id="12345">Transfer requested.</msg>
S:    </result>
S:    <msgQ count="5">
S:      <qDate>2000-06-08T22:00:00.0Z</qDate>
S:    </msgQ>
S:    <resData>
S:      <obj:trnData xmlns:obj="urn:ietf:params:xml:ns:obj"
S:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
S:        <obj:name>example</obj:name>
S:        <obj:trStatus>pending</obj:trStatus>
S:        <obj:reID>ClientX</obj:reID>
S:        <obj:reDate>2000-06-08T22:00:00.0Z</obj:reDate>
S:        <obj:acID>ClientY</obj:acID>
S:        <obj:acDate>2000-06-13T22:00:00.0Z</obj:acDate>
S:        <obj:exDate>2002-09-08T22:00:00.0Z</obj:exDate>
S:      </obj:trnData>
S:    </resData>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

A client MUST acknowledge each response to dequeue the message and make subsequent messages available for retrieval.

Example <poll> acknowledgement command:

```
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:   xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:     epp-1.0.xsd">
C:   <command>
C:     <poll op="ack" msgID="12345"/>
C:     <clTRID>ABC-12346</clTRID>
C:   </command>
C:</epp>
```

A <poll> acknowledgement response notes the ID of the message that has been acknowledged and the number of messages remaining in the queue.

Example <poll> acknowledgement 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:   xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:     epp-1.0.xsd">
S:   <response>
S:     <result code="1000">
S:       <msg id="12345">Command completed successfully</msg>
S:     </result>
S:     <msgQ count="4"/>
S:     <trID>
S:       <clTRID>ABC-12346</clTRID>
S:       <svTRID>54322-XYZ</svTRID>
S:     </trID>
S:   </response>
S:</epp>
```

Service messages MAY also be returned without object information.

Example <poll> response without object-specific information:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1301">
S:      <msg id="12346">Credit balance low.</msg>
S:    </result>
S:    <msgQ count="4">
S:      <qDate>2000-06-08T22:10:00.0Z</qDate>
S:    </msgQ>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

The returned result code and message is used to note an empty server message queue.

Example <poll> response to note an empty message queue:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1300">
S:      <msg>Command completed successfully; no messages</msg>
S:    </result>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

The EPP <poll> command is used to discover and retrieve client service messages from a server. This action SHOULD be limited to authorized clients; queuing service messages and limiting queue access on a per-client basis is RECOMMENDED.

#### 2.8.2.4 EPP <status> Command

The EPP <status> command is used to determine if an previously issued transform command was received and processed by a server. While EPP provides command completion status by returning a response to every command, responses may be lost due to network, hardware, or software failures. In such cases, it is often useful to be able to determine command status after the failure situation has been discovered and corrected. With the search space for previously completed command identifiers potentially being very large, this command includes elements and attributes to help focus the search. In addition to the standard EPP command elements, the <status> command contains the following child elements:

- A <clTRID> (client transaction identifier) element that contains the transaction identifier assigned by the client to the earlier command whose status is in question.

In addition, the <status> element contains a "command" attribute that is used to identify the type of the earlier command. Valid values are "create", "delete", "renew", "transfer", and "update".

It is important to note that a client transaction identifier is not required for every transform command, so clients who wish to use the <status> command successfully MUST provide a client identifier with all transactions whose status might be queried in the future.

Example <status> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <status command="create">
C:      <clTRID>ABC-12345</clTRID>
C:    </status>
C:    <clTRID>ABC-12346</clTRID>
C:  </command>
C:</epp>
```

When a <status> command has been processed successfully, a server MUST respond with an EPP response with no <resData> element. Status information is returned in the child <data> element of the <result> element. The <data> element contains a child <status> element that contains the following child elements:

- Zero or more <clTRID> elements that contain the client transaction identifier used to identify the queried command. No <clTRID> elements will be returned if the server fails to recognize the identifier. Servers are not required to enforce client transaction identifier uniqueness, so a single client identifier may be associated with multiple commands if a client reuses identifiers. One element will be returned if the server recognizes the identifier and the client enforces identifier uniqueness. Multiple elements MAY be returned if the server recognizes the identifier and the client does not enforce identifier uniqueness. Each <clTRID> element contains an "ack" attribute whose positive boolean value confirms that the command was received and the requested action was completed. A negative boolean value indicates that the requested action was not completed.

Example <status> response for a recognized transaction:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:      <data>
S:        <status>
S:          <clTRID ack="1">ABC-12345</clTRID>
S:        </status>
S:      </data>
S:    </result>
S:    <trID>
S:      <clTRID>ABC-12346</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

An empty <status> element is returned when a server fails to recognize a client transaction.

Example <status> response for an unrecognized transaction:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:      <data><status/></data>
S:    </result>
S:    <trID>
S:      <clTRID>ABC-12346</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

The EPP <status> command is used to retrieve information associated with client commands. This action SHOULD be limited to authorized clients; restricting this action to the issuing client is RECOMMENDED.

#### 2.8.2.5 EPP <transfer> Query Command

The EPP <transfer> command provides a query operation that allows a client to determine real-time status of pending and completed transfer requests. The elements needed to identify an object that is the subject of a transfer request are object-specific, so the child elements of the <transfer> query command are specified using the EPP extension framework. In addition to the standard EPP command elements, the <transfer> command contains an "op" attribute with value "query", and the following child elements:

- An object-specific <obj:transfer> element that identifies the object whose transfer status is requested.

Example <transfer> query command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <transfer op="query">
C:      <obj:transfer xmlns:obj="urn:ietf:params:xml:ns:obj"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
C:        <!-- Object-specific elements. -->
C:      </obj:transfer>
C:    </transfer>
C:  <clTRID>ABC-12346</clTRID>
C: </command>
C:</epp>
```

When an <transfer> query command has been processed successfully, a server MUST respond with an EPP <resData> element that MUST contain a child element that identifies the object namespace and the location of the object schema. The child elements of the <resData> element are object-specific, but they MUST include elements that identify the object, the status of the transfer, the identifier of the client that requested the transfer, the date and time that the request was made, the identifier of the client that SHOULD act upon the request, the date and time by which an action is expected, and an OPTIONAL date and time noting changes in the object's validity period (if applicable) that occur as a result of the transfer.

Example <transfer> query 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <obj:trnData xmlns:obj="urn:ietf:params:xml:ns:obj"
S:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
S:        <obj:name>example</obj:name>
S:        <obj:trStatus>pending</obj:trStatus>
S:        <obj:reID>ClientX</obj:reID>
S:        <obj:reDate>2000-06-08T22:00:00.0Z</obj:reDate>
S:        <obj:acID>ClientY</obj:acID>
S:        <obj:acDate>2000-06-13T22:00:00.0Z</obj:acDate>
S:        <obj:exDate>2002-09-08T22:00:00.0Z</obj:exDate>
S:      </obj:trnData>
S:    </resData>
S:    <trID>
S:      <clTRID>ABC-12346</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

The EPP <transfer> command provides a query operation that allows a client to determine real-time status of pending and completed transfer requests. This action SHOULD be limited to authorized clients; restricting queries to the requesting and responding clients is RECOMMENDED. Object transfer MAY be unavailable or limited by object-specific policies.

### 2.8.3 Object Transform Commands

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

#### 2.8.3.1 EPP <create> Command

The EPP <create> command is used to create an instance of an object. An object may be created for an indefinite period of time, or an object may be created for a specific validity period. The EPP mapping for an object MUST describe the status of an object with respect to time, to include expected client and server behavior if a validity period is used.

The elements needed to identify an object and associated attributes are object-specific, so the child elements of the <create> command are specified using the EPP extension framework. In addition to the standard EPP command elements, the <create> command contains the following child elements:

- An object-specific <obj:create> element that identifies the object to be created and the elements that are required to create the object.

Example <create> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <create>
C:      <obj:create xmlns:obj="urn:ietf:params:xml:ns:obj"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
C:        <!-- Object-specific elements. -->
C:      </obj:create>
C:    </create>
C:  </command>
C:</epp>
```

When a <create> command has been processed successfully, a server MAY respond with an EPP <resData> element that MUST contain a child element that identifies the object namespace and the location of the object schema. The child elements of the <resData> element are object-specific.

Example <create> response with <resData>:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <obj:creData xmlns:obj="urn:ietf:params:xml:ns:obj"
S:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
S:        <!-- Object-specific elements. -->
S:      </obj:creData>
S:    </resData>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

The EPP <create> command is used to create an instance of an object. This action SHOULD be limited to authorized clients and MAY be restricted on a per-client basis.

#### 2.8.3.2 EPP <delete> Command

The EPP <delete> command is used to remove an instance of an existing object. The elements needed to identify an object are object-specific, so the child elements of the <delete> command are specified using the EPP extension framework. In addition to the standard EPP command elements, the <delete> command contains the following child elements:

- An object-specific <obj:delete> element that identifies the object to be deleted.

Example <delete> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <delete>
C:      <obj:delete xmlns:obj="urn:ietf:params:xml:ns:obj"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
C:        <!-- Object-specific elements. -->
C:      </obj:delete>
C:    </delete>
C:  <clTRID>ABC-12346</clTRID>
C: </command>
C:</epp>
```

When a <delete> command has been processed successfully, a server MAY respond with an EPP <resData> element that MUST contain a child element that identifies the object namespace and the location of the object schema. The child elements of the <resData> element are object-specific.

Example <delete> response without <resData>:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <trID>
S:      <clTRID>ABC-12346</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

The EPP <delete> command is used to remove an instance of an existing object. This action SHOULD be limited to authorized clients; restricting this action to the sponsoring client is RECOMMENDED.

### 2.8.3.3 EPP <renew> Command

The EPP <renew> command is used to extend the validity period of an existing object. The elements needed to identify and extend the validity period of an object are object-specific, so the child elements of the <renew> command are specified using the EPP extension framework. In addition to the standard EPP command elements, the <renew> command contains the following child elements:

- An object-specific <obj:renew> element that identifies the object to be renewed and the elements that are required to extend the validity period of the object.

Example <renew> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <renew>
C:      <obj:renew xmlns:obj="urn:ietf:params:xml:ns:obj"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
C:        <!-- Object-specific elements. -->
C:      </obj:renew>
C:    </renew>
C:  <clTRID>ABC-12346</clTRID>
C: </command>
C:</epp>
```

When a <renew> command has been processed successfully, a server MAY respond with an EPP <resData> element that MUST contain a child element that identifies the object namespace and the location of the object schema. The child elements of the <resData> element are object-specific.

Example <renew> response with <resData>:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <obj:creData xmlns:obj="urn:ietf:params:xml:ns:obj"
S:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
S:        <!-- Object-specific elements. -->
S:      </obj:creData>
S:    </resData>
S:    <trID>
S:      <clTRID>ABC-12346</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

The EPP <renew> command is used to extend the validity period of an existing object. This action SHOULD be limited to authorized clients; restricting this action to the sponsoring client is RECOMMENDED. Object renewal MAY be unavailable or limited by object-specific policies.

#### 2.8.3.4 EPP <transfer> Command

The EPP <transfer> command is used to manage changes in client sponsorship of an existing object. Clients may initiate a transfer request, cancel a transfer request, approve a transfer request, and reject a transfer request using the "op" command attribute.

A client who wishes to assume sponsorship of a known object from another client uses the <transfer> command with the value of the "op" attribute set to "request". Once a transfer has been requested, the same client may cancel the request using a <transfer> command with the value of the "op" attribute set to "cancel". A request to cancel the transfer MUST be sent to the server before the current sponsoring client either approves or rejects the transfer request and before the server automatically processes the request due to responding client inactivity.

Once a transfer request has been received by the server, the server MUST notify the current sponsoring client of the requested transfer by queuing a service message for retrieval via the <poll> command. The current status of a pending <transfer> command for any object MAY be found using the <transfer> query command.

The current sponsoring client MAY explicitly approve or reject the transfer request. The client may approve the request using a <transfer> command with the value of the "op" attribute set to "approve". The client may reject the request using a <transfer> command with the value of the "op" attribute set to "reject".

A server MAY automatically approve or reject all transfer requests that are not explicitly approved or rejected by the current sponsoring client within a fixed amount of time. The amount of time to wait for explicit action and the default server behavior are local matters not specified by EPP, but they SHOULD be documented in a server-specific profile document that describes default server behavior for client information.

Objects MAY have associated authorization information that MUST be provided to complete a <transfer> command. The type of authorization information required is object-specific; passwords or more complex mechanisms based on public key cryptography are typical.

The elements needed to identify and complete the transfer of an object are object-specific, so the child elements of the <transfer> command are specified using the EPP extension framework. In addition to the standard EPP command elements, the <transfer> command contains the following child elements:

- An object-specific <obj:transfer> element that identifies the object to be transferred and the elements that are required to process the transfer command.

Example <transfer> request command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <transfer op="request">
C:      <obj:transfer xmlns:obj="urn:ietf:params:xml:ns:obj"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
C:        <!-- Object-specific elements. -->
C:      </obj:transfer>
C:    </transfer>
C:  <clTRID>ABC-12346</clTRID>
C: </command>
C:</epp>
```

When an <transfer> command has been processed successfully, a server MAY respond with an EPP <resData> element that MUST contain a child element that identifies the object namespace and the location of the object schema. The child elements of the <resData> element are object-specific, but they MUST include elements that identify the object, the status of the transfer, the identifier of the client that requested the transfer, the date and time that the request was made, the identifier of the client that SHOULD act upon the request, the date and time by which an action is expected, and an OPTIONAL date and time noting changes in the object's validity period (if applicable) that occur as a result of the transfer.

Example <transfer> request response with <resData>:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <obj:trnData xmlns:obj="urn:ietf:params:xml:ns:obj"
S:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
S:        <obj:name>example</obj:name>
S:        <obj:trStatus>pending</obj:trStatus>
S:        <obj:reID>ClientX</obj:reID>
S:        <obj:reDate>2000-06-08T22:00:00.0Z</obj:reDate>
S:        <obj:acID>ClientY</obj:acID>
S:        <obj:acDate>2000-06-13T22:00:00.0Z</obj:acDate>
S:        <obj:exDate>2002-09-08T22:00:00.0Z</obj:exDate>
S:      </obj:trnData>
S:    </resData>
S:    <trID>
S:      <clTRID>ABC-12346</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

The EPP <transfer> command is used to manage changes in client sponsorship of an existing object. This action SHOULD be limited to authorized clients; restricting <transfer> requests to a client other than the current sponsoring client, <transfer> approval requests to the current sponsoring client, and <transfer> cancellation requests to the original requesting client is RECOMMENDED. Object transfer MAY be unavailable or limited by object-specific policies.

#### 2.8.3.5 EPP <update> Command

The EPP <update> command is used to change information associated with an existing object. The elements needed to identify and modify an object are object-specific, so the child elements of the <update> command are specified using the EPP extension framework. In addition to the standard EPP command elements, the <update> command contains the following child elements:

- An object-specific <obj:update> element that identifies the object to be updated and the elements that are required to modify the object. Object-specific elements MUST identify values to be added, values to be removed, or values to be changed.

Example <update> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <update>
C:      <obj:update xmlns:obj="urn:ietf:params:xml:ns:obj"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:obj obj.xsd">
C:        <!-- Object-specific elements. -->
C:      </obj:update>
C:    </update>
C:  <clTRID>ABC-12346</clTRID>
C: </command>
C:</epp>
```

When an <update> command has been processed successfully, a server MAY respond with an EPP <resData> element that MUST contain a child element that identifies the object namespace and the location of the object schema. The child elements of the <resData> element are object-specific.

Example <update> request response without <resData>:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <trID>
S:      <clTRID>ABC-12346</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

The EPP <update> command is used to change information associated with

an existing object. This action SHOULD be limited to authorized clients; restricting this action to the sponsoring client is RECOMMENDED.

### 3. Result Codes

EPP result codes are based on the Theory of Reply Codes described in Appendix E of [RFC821]. EPP uses four decimal digits to describe the success or failure of each EPP command. Each of the digits of the reply have special significance.

The first digit denotes command success or failure. The second digit denotes the response category, such as command syntax or security. The third and fourth digits provide explicit response detail within each response category.

There are two values for the first digit of the reply code:

1yzz Positive completion reply. The command has been accepted and processed by the system without error.

2yzz Negative completion reply. The command was not accepted and the requested action did not occur.

The second digit groups responses into one of six specific categories:

x0zz Protocol Syntax  
x1zz Implementation-specific Rules  
x2zz Security  
x3zz Data Management  
x4zz Server System  
x5zz Connection Management

The third and fourth digits provide response detail within the categories defined by the first and second digits. Specific result codes are listed in the table below.

Every EPP response MUST include a result code and a human-readable description of the result code. The language used to represent the description MAY be identified using an instance of the "lang" attribute within the <msg> element. If not specified, the default language is English, identified as "en". A description of the structure of valid values for the "lang" attribute is described in [RFC3066]. A list of valid values for the "lang" attribute is available in [ISO639].

Response text MAY be translated into other languages, though the translation MUST preserve the meaning of the code as described here. Response code values MUST NOT be changed when translating text.

Response text in the table below is enclosed in quotes to clearly mark the beginning and ending of each response string. Quotes MUST NOT be

used to delimit these strings when returning response text via the protocol.

Successful command completion responses:

Code      Response text in US English

---

1000      "Command completed successfully"  
This is the nominal response code for a successfully completed command. This response code MUST be returned in responses for all commands other than for the situations relating to the <logout>, <poll>, and <update> commands as described here.

1300      "Command completed successfully; no messages"  
This response code MUST be returned when responding to a <poll> request command and the server message queue is empty.

1301      <None specified>  
This response code MUST be returned when returning a <poll> service message to a client. Message text for this response code is a matter of server policy and is not specified by this protocol.

1500      "Command completed successfully; ending session"  
This response code MUST be returned when responding to a successful <logout> command.

Command error responses:

Code      Response text in US English

---

2000      "Unknown command"  
This response code MUST be returned when a server receives a command element that is not defined by EPP.

2001      "Command syntax error"  
This response code MUST be returned when a server receives an improperly formed command element.

2002      "Command use error"  
This response code MUST be returned when a server receives a properly formed command element, but the command can not be executed due to a sequencing or context error. For example, a <logout> command can not be executed without having first completed a <login> command.

2003      "Required parameter missing"  
This response code MUST be returned when a server receives a command

for which a required parameter value has not been provided.

2004 "Parameter value range error"

This response code MUST be returned when a server receives a command parameter whose value is outside the range of values specified by the protocol. The error value SHOULD be returned via a <value> element in the EPP response.

2005 "Parameter value syntax error"

This response code MUST be returned when a server receives a command containing a parameter whose value is improperly formed. The error value SHOULD be returned via a <value> element in the EPP response.

2100 "Unimplemented protocol version"

This response code MUST be returned when a server receives a command element specifying a protocol version that is not implemented by the server.

2101 "Unimplemented command"

This response code MUST be returned when a server receives a valid EPP command element that is not implemented by the server. For example, a <transfer> command MAY be unimplemented for certain object types.

2102 "Unimplemented option"

This response code MUST be returned when a server receives a valid EPP command element that contains a protocol option that is not implemented by the server. For example, a server MAY not implement the protocol's session-less operating mode.

2103 "Unimplemented extension"

This response code MUST be returned when a server receives a valid EPP command element that contains a protocol command extension that is not implemented by the server.

2104 "Billing failure"

This response code MUST be returned when a server attempts to execute a billable operation and the command can not be completed due to a client billing failure.

2105 "Object is not eligible for renewal"

This response code MUST be returned when a client attempts to <renew> an object that is not eligible for renewal in accordance with server policy.

2106 "Object is not eligible for transfer"

This response code MUST be returned when a client attempts to <transfer> an object that is not eligible for transfer in accordance

with server policy.

2200 "Authentication error"

This response code MUST be returned when a server notes an error when validating client credentials.

2201 "Authorization error"

This response code MUST be returned when a server notes a client authorization error when executing a command. This error is used to note that a client lacks privileges to execute the requested command.

2202 "Invalid authorization information"

This response code MUST be returned when a server receives invalid command authorization information required to confirm authorization to execute a command. This error is used to note that a client has the privileges required to execute the requested command, but the authorization information provided by the client does not match the authorization information archived by the server.

2300 "Object pending transfer"

This response code MUST be returned when a server receives a command to transfer an object that is pending transfer due to an earlier transfer request.

2301 "Object not pending transfer"

This response code MUST be returned when a server receives a command to confirm, reject, or cancel the transfer an object when no command has been made to transfer the object.

2302 "Object exists"

This response code MUST be returned when a server receives a command to create an object that already exists in the repository.

2303 "Object does not exist"

This response code MUST be returned when a server receives a command to query or transform an object that does not exist in the repository.

2304 "Object status prohibits operation"

This response code MUST be returned when a server receives a command to transform an object that can not be completed due to server policy or business practices. For example, a server MAY disallow <transfer> commands under terms and conditions that are matters of local policy, or the server may have received a <delete> command for an object whose status prohibits deletion.

2305 "Object association prohibits operation"

This response code MUST be returned when a server receives a command to transform an object that can not be completed due to dependencies

on other objects that are associated with the target object. For example, a server MAY disallow <delete> commands while an object has active associations with other objects.

2306 "Parameter value policy error"

This response code MUST be returned when a server receives a command containing a parameter value that is syntactically valid, but semantically invalid due to local policy. For example, the server MAY support a subset of a range of valid protocol parameter values. The error value SHOULD be returned via a <value> element in the EPP response.

2307 "Unimplemented object service"

This response code MUST be returned when a server receives a command to operate on an object service that is not supported by the server.

2308 "Data management policy violation"

This response code MUST be returned when a server receives a command whose execution results in a violation of server data management policies. For example, removing all attribute values or object associations from an object MAY be a violation of a server's data management policies.

2400 "Command failed"

This response code MUST be returned when a server is unable to execute a command due to an internal server error that is not related to the protocol. The failure MAY be transient. The server MUST keep any ongoing session active.

2500 "Command failed; server ending session"

This response code MUST be returned when a server receives a command that can not be completed due to an internal server error that is not related to the protocol. The failure is not transient, and will cause other commands to fail as well. The server MUST end any ongoing active session.

2501 "Timeout; server ending session"

This response code MUST be returned when a server receives a command that can not be completed due to a session-oriented timeout.

2502 "Session limit exceeded; server closing connection"

This response code MUST be returned when a server receives a <login> command, and the command can not be completed because the client has exceeded a system-defined limit on the number of sessions that the client can establish. It may be possible to establish a session by ending existing unused sessions.

## 4. Formal Syntax

EPP is specified in XML Schema notation. The formal syntax presented here is a complete schema representation of EPP suitable for automated validation of EPP XML instances.

Two schemas are presented here. The first schema is the base EPP schema. The second schema defines elements and structures that MAY be used by both the base EPP schema and object mapping schemas. The BEIGN 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.

### 4.1 Base Schema

BEGIN

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

```
<schema targetNamespace="urn:ietf:params:xml:ns:epp-1.0"
  xmlns:epp="urn:ietf:params:xml:ns:epp-1.0"
  xmlns:eppcom="urn:ietf:params:xml:ns:eppcom-1.0"
  xmlns="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">
```

```
<!--
```

```
Import common element types.
```

```
-->
```

```
<import namespace="urn:ietf:params:xml:ns:eppcom-1.0"
  schemaLocation="eppcom-1.0.xsd"/>
```

```
<annotation>
```

```
<documentation>
```

```
Extensible Provisioning Protocol v1.0 schema.
```

```
</documentation>
```

```
</annotation>
```

```
<!--
```

```
Every EPP XML instance must begin with this element.
```

```
-->
```

```
<element name="epp" type="epp:eppType"/>
```

```
<!--
```

```
An EPP XML instance must contain a greeting, hello, command,
response, or extension.
```

```
-->
```

```
<complexType name="eppType">
```

```
<choice>
```

```
<element name="greeting" type="epp:greetingType"/>
```

```
<element name="hello"/>
```

```

    <element name="command" type="epp:commandType"/>
    <element name="response" type="epp:responseType"/>
    <element name="extension" type="epp:extAnyType"/>
  </choice>
</complexType>

<!--
A greeting is sent by a server in response to a client connection
or <hello>.
-->
<complexType name="greetingType">
  <sequence>
    <element name="svID" type="epp:sIDType"/>
    <element name="svDate" type="dateTime"/>
    <element name="svcMenu" type="epp:svcMenuType"/>
    <element name="dcp" type="epp:dcpType"
      minOccurs="0"/>
  </sequence>
</complexType>

<!--
Server IDs are strings with minimum and maximum length restrictions.
-->
<simpleType name="sIDType">
  <restriction base="normalizedString">
    <minLength value="3"/>
    <maxLength value="64"/>
  </restriction>
</simpleType>

<!--
A server greeting identifies available object services.
-->
<complexType name="svcMenuType">
  <sequence>
    <element name="version" type="epp:versionType"
      maxOccurs="unbounded"/>
    <element name="lang" type="language"
      maxOccurs="unbounded"/>
    <element name="objURI" type="anyURI"
      maxOccurs="unbounded"/>
    <element name="svcExtension" type="epp:extURIType"
      minOccurs="0"/>
  </sequence>
</complexType>

<!--
Data Collection Policy types.
```

```
-->
<complexType name="dcpType">
  <sequence>
    <element name="access" type="epp:dcpAccessType"/>
    <element name="statement" type="epp:dcpStatementType"
      maxOccurs="unbounded"/>
  </sequence>
</complexType>

<complexType name="dcpAccessType">
  <choice>
    <element name="all"/>
    <element name="noAccess"/>
    <element name="null"/>
    <element name="social"/>
    <element name="technical"/>
  </choice>
</complexType>

<complexType name="dcpStatementType">
  <sequence>
    <element name="purpose" type="epp:dcpPurposeType"/>
    <element name="recipient" type="epp:dcpRecipientType"/>
    <element name="retention" type="epp:dcpRetentionType"/>
  </sequence>
</complexType>

<complexType name="dcpPurposeType">
  <choice maxOccurs="5">
    <element name="contact"/>
    <element name="dnReg"/>
    <element name="ipReg"/>
    <element name="other"/>
    <element name="tmReg"/>
  </choice>
</complexType>

<complexType name="dcpRecipientType">
  <choice maxOccurs="5">
    <element name="other"/>
    <element name="ours"/>
    <element name="public"/>
    <element name="same"/>
    <element name="unrelated"/>
  </choice>
</complexType>

<complexType name="dcpRetentionType">
```

```
<choice>
  <element name="business"/>
  <element name="functional"/>
  <element name="indefinite"/>
  <element name="legal"/>
  <element name="none"/>
</choice>
</complexType>

<!--
Extension framework types.
-->
<complexType name="extAnyType">
  <sequence>
    <any namespace="##other"/>
  </sequence>
</complexType>

<complexType name="extURIType">
  <sequence>
    <element name="extURI" type="anyURI"
      maxOccurs="unbounded"/>
  </sequence>
</complexType>

<!--
An EPP version number is a dotted pair of decimal numbers.
-->
<simpleType name="versionType">
  <restriction base="token">
    <pattern value="[1-9]\.[0-9]"/>
    <enumeration value="1.0"/>
  </restriction>
</simpleType>

<!--
Command types.
-->
<complexType name="commandType">
  <sequence>
    <element name="creds" type="epp:credsType"
      minOccurs="0"/>
    <choice>
      <element name="check" type="epp:readWriteType"/>
      <element name="create" type="epp:readWriteType"/>
      <element name="delete" type="epp:readWriteType"/>
      <element name="info" type="epp:readWriteType"/>
      <element name="login" type="epp:loginType"/>
    </choice>
  </sequence>
</complexType>
```

```

    <element name="logout"/>
    <element name="poll" type="epp:pollType"/>
    <element name="renew" type="epp:readWriteType"/>
    <element name="status" type="epp:statusType"/>
    <element name="transfer" type="epp:transferType"/>
    <element name="update" type="epp:readWriteType"/>
  </choice>
  <element name="extension" type="epp:extAnyType"
    minOccurs="0"/>
  <element name="clTRID" type="epp:trIDStringType"
    minOccurs="0"/>
</sequence>
</complexType>

```

```
<!--
```

Credentials and options may be specified as part of a <login> command to create a session, or they may be specified with other commands to operate in session-less mode. The two modes can not be mixed.

```
-->
```

```

<complexType name="credsType">
  <sequence>
    <element name="clID" type="eppcom:clIDType"/>
    <element name="pw" type="epp:pwType"/>
    <element name="newPW" type="epp:pwType"
      minOccurs="0"/>
    <element name="options" type="epp:credsOptionsType"/>
  </sequence>
</complexType>

```

```

<complexType name="credsOptionsType">
  <sequence>
    <element name="version" type="epp:versionType"/>
    <element name="lang" type="language"/>
  </sequence>
</complexType>

```

```

<simpleType name="pwType">
  <restriction base="token">
    <minLength value="6"/>
    <maxLength value="16"/>
  </restriction>
</simpleType>

```

```
<!--
```

The <login> command.

```
-->
```

```

<complexType name="loginType">

```

```
<sequence>
  <element name="svcs" type="epp:loginSvcType"/>
</sequence>
</complexType>

<complexType name="loginSvcType">
  <sequence>
    <element name="objURI" type="anyURI"
      maxOccurs="unbounded"/>
    <element name="svcExtension" type="epp:extURIType"
      minOccurs="0"/>
  </sequence>
</complexType>

<!--
The <poll> command.
-->
<complexType name="pollType">
  <attribute name="op" type="epp:pollOpType"
    use="required"/>
  <attribute name="msgID" type="token"/>
</complexType>

<simpleType name="pollOpType">
  <restriction base="token">
    <enumeration value="ack"/>
    <enumeration value="req"/>
  </restriction>
</simpleType>

<!--
The <status> command.
-->
<complexType name="statusType">
  <sequence>
    <element name="clTRID" type="epp:trIDStringType"/>
  </sequence>
  <attribute name="command" type="epp:statusCommandType"
    use="required"/>
</complexType>

<simpleType name="statusCommandType">
  <restriction base="token">
    <enumeration value="create"/>
    <enumeration value="delete"/>
    <enumeration value="renew"/>
    <enumeration value="transfer"/>
    <enumeration value="update"/>
  </restriction>
</simpleType>
```

```
    </restriction>
  </simpleType>

<!--
The <transfer> command. This is object-specific, and uses attributes
to identify the requested operation.
-->
  <complexType name="transferType">
    <sequence>
      <any namespace="##other"/>
    </sequence>
    <attribute name="op" type="epp:transferOpType"
      use="required"/>
  </complexType>

  <simpleType name="transferOpType">
    <restriction base="token">
      <enumeration value="approve"/>
      <enumeration value="cancel"/>
      <enumeration value="query"/>
      <enumeration value="reject"/>
      <enumeration value="request"/>
    </restriction>
  </simpleType>

<!--
All other object-centric commands. EPP doesn't specify the syntax or
semantics of object-centric command elements. The elements MUST be
described in detail in another schema specific to the object.
-->
  <complexType name="readWriteType">
    <sequence>
      <any namespace="##other"/>
    </sequence>
  </complexType>

  <complexType name="trIDType">
    <sequence>
      <element name="clTRID" type="epp:trIDStringType"
        minOccurs="0"/>
      <element name="svTRID" type="epp:trIDStringType"/>
    </sequence>
  </complexType>

  <simpleType name="trIDStringType">
    <restriction base="token">
      <minLength value="3"/>
      <maxLength value="64"/>
    </restriction>
  </simpleType>
```

```
    </restriction>
  </simpleType>

<!--
Response types.
-->
<complexType name="responseType">
  <sequence>
    <element name="result" type="epp:resultType"
      maxOccurs="unbounded"/>
    <element name="msgQ" type="epp:msgQType"
      minOccurs="0"/>
    <element name="resData" type="epp:extAnyType"
      minOccurs="0"/>
    <element name="extension" type="epp:extAnyType"
      minOccurs="0"/>
    <element name="trID" type="epp:trIDType"/>
  </sequence>
</complexType>

<complexType name="resultType">
  <sequence>
    <element name="msg" type="epp:msgType"/>
    <element name="value" type="string"
      minOccurs="0" maxOccurs="unbounded"/>
    <element name="data" type="epp:resultDataType"
      minOccurs="0"/>
  </sequence>
  <attribute name="code" type="epp:resultCodeType"
    use="required"/>
</complexType>

<complexType name="resultDataType">
  <sequence>
    <element name="status" type="epp:statusResultDataType"/>
  </sequence>
</complexType>

<complexType name="statusResultDataType">
  <sequence>
    <element name="clTRID" type="epp:trIDStatusType"
      minOccurs="0"/>
  </sequence>
</complexType>

<complexType name="trIDStatusType">
  <simpleContent>
    <extension base="epp:trIDStringType">
```

```
        <attribute name="ack" type="boolean"
            use="required" />
    </extension>
</simpleContent>
</complexType>

<complexType name="msgQType">
    <sequence>
        <element name="qDate" type="dateTime"
            minOccurs="0" />
    </sequence>
    <attribute name="count" type="unsignedLong"
        default="0" />
</complexType>

<!--
Human-readable text may be expressed in languages other than English.
-->
<complexType name="msgType">
    <simpleContent>
        <extension base="normalizedString">
            <attribute name="lang" type="language"
                default="en" />
            <attribute name="id" type="token" />
        </extension>
    </simpleContent>
</complexType>

<!--
EPP result codes.
-->
<simpleType name="resultCodeType">
    <restriction base="unsignedShort">
        <enumeration value="1000" />
        <enumeration value="1300" />
        <enumeration value="1301" />
        <enumeration value="1500" />
        <enumeration value="2000" />
        <enumeration value="2001" />
        <enumeration value="2002" />
        <enumeration value="2003" />
        <enumeration value="2004" />
        <enumeration value="2005" />
        <enumeration value="2100" />
        <enumeration value="2101" />
        <enumeration value="2102" />
        <enumeration value="2103" />
        <enumeration value="2104" />
    </restriction>
</simpleType>
```

```
<enumeration value="2105"/>
<enumeration value="2106"/>
<enumeration value="2200"/>
<enumeration value="2201"/>
<enumeration value="2202"/>
<enumeration value="2300"/>
<enumeration value="2301"/>
<enumeration value="2302"/>
<enumeration value="2303"/>
<enumeration value="2304"/>
<enumeration value="2305"/>
<enumeration value="2306"/>
<enumeration value="2307"/>
<enumeration value="2308"/>
<enumeration value="2400"/>
<enumeration value="2500"/>
<enumeration value="2501"/>
<enumeration value="2502"/>
</restriction>
</simpleType>
```

```
<!--
End of schema.
-->
</schema>
END
```

## 4.2 Shared Structure Schema

BEGIN

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

```
<schema targetNamespace="urn:ietf:params:xml:ns:eppcom-1.0"
  xmlns:eppcom="urn:ietf:params:xml:ns:eppcom-1.0"
  xmlns="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">
```

```
<annotation>
  <documentation>
    Extensible Provisioning Protocol v1.0
    shared structures schema.
  </documentation>
</annotation>
```

```
<!--
Object authorization information types.
-->
```

```
<complexType name="authInfoType">
  <simpleContent>
    <extension base="normalizedString">
      <attribute name="type" type="eppcom:authType"
        use="required"/>
      <attribute name="roid" type="eppcom:roidType"/>
    </extension>
  </simpleContent>
</complexType>
```

```
<simpleType name="authType">
  <restriction base="token">
    <enumeration value="pw"/>
  </restriction>
</simpleType>
```

```
<!--
<check> response types.
-->
```

```
<complexType name="reasonType">
  <simpleContent>
    <extension base="eppcom:reasonBaseType">
      <attribute name="lang" type="language"/>
    </extension>
  </simpleContent>
</complexType>
```

```
<simpleType name="reasonBaseType">
```

```
    <restriction base="token">
      <minLength value="1"/>
      <maxLength value="32"/>
    </restriction>
  </simpleType>

<!--
Abstract client and object identifier type.
-->
  <simpleType name="clIDType">
    <restriction base="token">
      <minLength value="3"/>
      <maxLength value="16"/>
    </restriction>
  </simpleType>

<!--
DNS label type.
-->
  <simpleType name="labelType">
    <restriction base="token">
      <minLength value="1"/>
      <maxLength value="255"/>
    </restriction>
  </simpleType>

<!--
Repository Object Identifier type.
-->
  <simpleType name="roidType">
    <restriction base="token">
      <pattern value="\w{1,80}-\w{1,8}"/>
    </restriction>
  </simpleType>

<!--
Transfer status identifiers.
-->
  <simpleType name="trStatusType">
    <restriction base="token">
      <enumeration value="clientApproved"/>
      <enumeration value="clientCancelled"/>
      <enumeration value="clientRejected"/>
      <enumeration value="pending"/>
      <enumeration value="serverApproved"/>
      <enumeration value="serverCancelled"/>
    </restriction>
  </simpleType>
```

```
<!--  
End of schema.  
-->  
</schema>  
END
```

## 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. Compliant XML processors are REQUIRED to understand both UTF-8 and UTF-16. Though XML includes provisions to identify other character set encodings through use of an "encoding" attribute in an `<?xml?>` declaration, EPP use with character sets other than UTF-8 is NOT RECOMMENDED.

EPP includes a provision for returning a human-readable message with every result code. This document describes result codes in English, but the actual text returned with a result MAY be provided in a language negotiated when a session is established. Languages other than English MUST be noted through specification of a "lang" attribute for each message. Valid values for the "lang" attribute and "lang" negotiation elements are described in [RFC3066] and [ISO639].

All date-time values presented via EPP MUST be expressed in Universal Coordinated Time using the Gregorian calendar. XML Schema allows use of time zone identifiers to indicate offsets from the zero meridian, but this option MUST NOT be used with EPP. The extended date-time form defined in [ISO8601] MUST be used to represent date-time values as XML Schema does not support truncated date-time forms.

## 6. IANA Considerations

This document uses URNs to describe XML namespaces and XML schemas conforming to a registry mechanism described in [IETF-XML]. Four URI assignments are requested.

Registration request for the EPP namespace:

URI: urn:ietf:params:xml:ns:epp-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 EPP XML schema:

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

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

XML: See the "Base Schema" section of this document.

Registration request for the EPP shared structure namespace:

URI: urn:ietf:params:xml:ns:eppcom-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 EPP shared structure XML schema:

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

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

XML: See the "Shared Structure Schema" section of this document.

## 7. Security Considerations

EPP provides only simple client authentication services. A passive attack is sufficient to recover client identifiers and passwords, allowing trivial command forgery. Protection against most common attacks and more robust security services MUST be provided by other protocol layers.

EPP uses a variant of the PLAIN SASL mechanism described in [RFC2595] to provide a simple application-layer authentication service. Where the PLAIN SASL mechanism specifies provision of an authorization identifier, authentication identifier, and password as a single string separated by ASCII NUL characters, EPP specifies use of a combined authorization and authentication identifier and a password provided as distinct XML elements.

Repeated password guessing attempts can be discouraged by limiting the number of <login> attempts that can be attempted on an open connection. A server MAY close an open connection if multiple <login> attempts are made with either an invalid client identifier, an invalid password, or both an invalid client identifier and an invalid password.

EPP uses authentication information associated with objects to confirm object transfer authority. Authentication information exchanged between EPP clients and third party entities MUST be exchanged using a facility that provides privacy and integrity services to protect against unintended disclosure and modification while in transit.

## 8. Acknowledgements

This document was originally written as an individual submission Internet-Draft. The provreg working group later adopted it as a working group document and provided many invaluable comments and suggested improvements.

Specific suggestions that have been incorporated into this document were provided by Chris Bason, Eric Brunner-Williams, Jordyn Buchanan, Dave Crocker, Ayesha Damaraju, Sheer El-Showk, John Immordino, Dan Kohn, Klaus Malorny, Dan Manley, Michael Mealling, Patrick Mevzek, Budi Rahardjo, Asbjorn Steira, and Rick Wesson.

## 9. References

- [GRRP] S. Hollenbeck: "Generic Registry-Registrar Protocol Requirements", work in progress.
- [IETF-XML] M. Mealling: "The IETF XML Registry", work in progress.
- [ISO639] ISO 639:1988 (E/F): "Code for the representation of names of languages - The International Organization for Standardization".
- [ISO8601] ISO 8601:1988 (E): "Data elements and interchange formats - Information interchange - Representation of dates and times - The International Organization for Standardization".
- [RFC821] J. Postel: "Simple Mail Transfer Protocol", RFC 821, August 1982.
- [RFC2119] S. Bradner: "Key Words for Use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [RFC2279] F. Yergeau: "UTF-8, a transformation format of ISO 10646", RFC 2279, January 1998.
- [RFC2595] C. Newman: "Using TLS with IMAP, POP3 and ACAP", RFC 2595, June 1999.
- [RFC3023] M. Murata et al.: "XML Media Types", RFC 3023, January 2001.
- [RFC3066] H. Alvestrand: "Tags for the Identification of Languages", BCP 47, RFC 3066, January 2001.
- [XML] Editors T. Bray et al.: "Extensible Markup Language (XML) 1.0 (Second Edition)", W3C Recommendation 6 October 2000.
- [XMLS-1] Editors H. Thompson et al.: "XML Schema Part 1: Structures", W3C Recommendation 2 May 2001.
- [XMLS-2] Editors P. Biron, A. Malhotra: "XML Schema Part 2: Datatypes", W3C Recommendation 2 May 2001.

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## A. Revisions From Previous Version

-04 to -05:

Added definitions of atomic and idempotent to the first paragraph of section 2.

Removed extra "/" from <msgQ> element in section 2.8.2.3.

Updated examples and schemas specifying formal syntax.

Changed namespace and schema URIs to conform to the most recent Mealling XML registration procedures I-D. Also changed the "IANA Considerations" section to adhere to the registration procedures described in the draft.

Added text to section 2. to be more explicit about synchronous vs. asynchronous command-response exchange issues.

Added data collection policy element description to section 2.3.

Modified <greeting> and <login> to identify objects and extensions using URIs instead of schema identifiers, which eliminates parser errors when processing an unexpected schema.

Added protocol element extension description to section 2.6 and combined other extension sections into section 2.6.

Rewrote section 2.8.2.1 to change the focus of the <check> command from an object existence query to a query to determine if an object can be provisioned. Modified response elements accordingly.

Added <status> command description to section 2.8.2.5.

Modified descriptions of return elements to note that a <resData> element may or may not be present depending on object semantics.

Added contributor names to the Acknowledgements section. Sorry if I missed anyone.

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## Acknowledgement

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## C: Object Mapping Template

This appendix describes a recommended outline for documenting the EPP mapping of an object. Documents that describe EPP object mappings SHOULD describe the mapping in a format similar to the one used here. Additional sections are required if the object mapping is written in Internet-Draft or RFC format.

### 1. Introduction

Provide an introduction that describes the object and an overview of the mapping to EPP.

### 2. Object Attributes

Describe the attributes associated with the object, including references to syntax specifications as appropriate. Examples of object attributes include a name or identifier and dates associated with modification events.

### 3. EPP Command Mapping

#### 3.1 EPP Query Commands

##### 3.1.1 EPP <check> Command

Describe the object-specific mappings required to implement the EPP <check> command. Include both sample commands and sample responses.

##### 3.1.2 EPP <info> Command

Describe the object-specific mappings required to implement the EPP <info> command. Include both sample commands and sample responses.

##### 3.1.3 EPP <poll> Command

Describe the object-specific mappings required to implement the EPP <poll> command. Include both sample commands and sample responses.

##### 3.1.4 EPP <transfer> Command

Describe the object-specific mappings required to implement the EPP <transfer> query command. Include both sample commands and sample responses.

#### 3.2 EPP Transform Commands

##### 3.2.1 EPP <create> Command

Describe the object-specific mappings required to implement the EPP <create> command. Include both sample commands and sample responses. Describe the status of the object with respect to time, including expected client and server behavior if a validity period is used.

### 3.2.2 EPP <delete> Command

Describe the object-specific mappings required to implement the EPP <delete> command. Include both sample commands and sample responses.

### 3.2.3 EPP <renew> Command

Describe the object-specific mappings required to implement the EPP <renew> command. Include both sample commands and sample responses.

### 3.2.4 EPP <transfer> Command

Describe the object-specific mappings required to implement the EPP <transfer> command. Include both sample commands and sample responses.

### 3.2.5 EPP <update> Command

Describe the object-specific mappings required to implement the EPP <update> command. Include both sample commands and sample responses.

## 4. Formal Syntax

Provide the XML schema for the object mapping. An XML DTD MUST NOT be used as DTDs do not provide sufficient support for XML namespaces and strong data typing.

D: Media Type Registration: application/epp+xml

MIME media type name: application

MIME subtype name: epp+xml

Mandatory parameters: none

Optional parameters: Same as the charset parameter of application/xml as specified in [RFC3023].

Encoding considerations: Same as the encoding considerations of application/xml as specified in [RFC3023].

Security considerations: This type has all of the security considerations described in [RFC3023] plus the considerations specified in the Security Considerations section of this document.

Interoperability considerations: XML has proven to be interoperable across WebDAV clients and servers, and for import and export from multiple XML authoring tools. For maximum interoperability, validating processors are recommended. Although non-validating processors may be more efficient, they are not required to handle all features of XML. For further information, see sub-section 2.9 "Standalone Document Declaration" and section 5 "Conformance" of [XML].

Published specification: This document.

Applications which use this media type: EPP is device-, platform-, and vendor-neutral and is supported by multiple service providers.

Additional information: If used, magic numbers, fragment identifiers, base URIs, and use of the BOM should be as specified in [RFC3023].

Magic number(s): None. File extension(s): .xml Macintosh File Type Code(s): "TEXT"

Person and email address for further information: See the "Author's Address" section of this document.

Intended usage: COMMON

Author/Change controller: IETF



Internet Engineering Task Force  
Internet-Draft  
October 2, 2001

S. Hollenbeck  
VeriSign, Inc.  
Expires: April 2, 2002

Extensible Provisioning Protocol Domain Name Mapping  
<draft-ietf-provreg-epp-domain-03.txt>

Status of this Memo

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Abstract

This document describes an Extensible Provisioning Protocol (EPP) mapping for the provisioning and management of Internet domain names stored in a shared central repository. Specified in XML, the mapping defines EPP command syntax and semantics as applied to domain names.

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 [RFC2119].

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

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## 1. Introduction

This document describes an internet domain name mapping for version 1.0 of the Extensible Provisioning Protocol (EPP). This mapping is specified using the Extensible Markup Language (XML) 1.0 as described in [XML] and XML Schema notation as described in [XMLS-1] and [XMLS-2].

[EPP] 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.

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.

This document is being discussed on the "ietf-provreg" mailing list. To join the list, send a message to <majordomo@cafax.se> with the words "subscribe ietf-provreg" in the body of the message. There is a web site for the list archives at <http://www.cafax.se/ietf-provreg>.

## 2. Object Attributes

An EPP domain object has attributes and associated values that may be viewed and modified by the sponsoring client or the server. This section describes each attribute type in detail.

### 2.1 Domain and Host Names

The syntax for domain and host names described in this document MUST conform to [RFC952] as updated by [RFC1123]. These conformance requirements MAY change as a result of progressing work in developing standards for internationalized domain names. A server MAY restrict allowable domain names to a particular top level domain, second level domain, or other domain for which the server is authoritative.

### 2.2 Contact and Client Identifiers

All EPP contacts are identified by a server-unique identifier. Contact identifiers are character strings with a specified minimum length, a specified maximum length, and a specified format. Contact identifiers use the "clIDType" client identifier syntax described in [EPP].

### 2.3 Status Values

A domain object MUST always have at least one associated status value. Status values MAY be set only by the client that sponsors a domain object and by the server on which the object resides. A client MAY change the status of a domain object using the EPP <update> command. Each status value MAY be accompanied by a string of human-readable text that describes the rationale for the status applied to the object.

A client MUST NOT alter status values set by the server. A server MAY alter or override status values set by a client subject to local server policies.

Status values that may be added or removed by a client are prefixed with "client". Corresponding status values that may be added or removed by a server are prefixed with "server". Status values that do not begin with either "client" or "server" are server-managed.

Status Value Descriptions:

clientDeleteProhibited, serverDeleteProhibited

Requests to delete the object MUST be rejected.

clientHold, serverHold

Delegation information MUST be withheld from publication in the object's nominal zone.

clientRenewProhibited, serverRenewProhibited

Requests to renew the object MUST be rejected.

clientTransferProhibited, serverTransferProhibited

Requests to transfer the object MUST be rejected.

clientUpdateProhibited, serverUpdateProhibited

Requests to update the object (other than to remove this status) MUST be rejected.

inactive

Delegation information has not been associated with the object.

ok

This is the nominal status value for an object that has no pending operations or prohibitions.

pendingDelete

A delete request has been received for the object, but the object has not yet been purged from the server database.

pendingTransfer

A transfer request has been received for the object, and completion of the request is pending. Transform commands other than <transfer> MUST be rejected while an object is in this state.

pendingVerification

A create request has been received for the object, and completion of the request is pending.

"ok" status MUST NOT be combined with any other status.

"pendingDelete" status MUST NOT be combined with either

"clientDeleteProhibited" or "serverDeleteProhibited" status.

"pendingTransfer" status MUST NOT be combined with either

"clientTransferProhibited" or "serverTransferProhibited" status. All

other status value combinations are valid.

#### 2.4 Dates and Times

Date and time attribute values MUST be represented in Universal Coordinated Time (UTC) using the Gregorian calendar. The extended date-time form defined in [ISO8601] MUST be used to represent date-time values as XML Schema does not support truncated date-time forms.

#### 2.5 Validity Periods

A domain name object MAY have a specified validity period. If server policy supports domain object validity periods, the validity period is defined when a domain object is created, and it MAY be extended by the EPP <renew> or <transfer> commands. As a matter of server policy, this specification does not define actions to be taken upon expiration of a domain object's validity period.

Validity periods are measured in years or months with the appropriate units specified using the "unit" attribute. Valid values for the "unit" attribute are "y" for years and "m" for months. The minimum allowable period value is one decimal (1). The maximum allowable value is ninety-nine decimal (99). A server MAY support a lower maximum value.

#### 2.6 Authorization Information

Authorization information is associated with domain objects to facilitate transfer operations. Authorization information is assigned when a domain object is created, and it MAY be updated in the future. This specification describes password-based authorization information, though other mechanisms are possible.

### 3. EPP Command Mapping

A detailed description of the EPP syntax and semantics can be found in [EPP]. The command mappings described here are specifically for use in provisioning and managing internet domain names via EPP.

#### 3.1 EPP Query Commands

EPP provides three commands to retrieve domain information: <check> to determine if a domain object is available for provisioning, <info> to retrieve detailed information associated with a domain object, and <transfer> to retrieve domain object transfer status information.

##### 3.1.1 EPP <check> Command

The EPP <check> command is used to determine if an object may be provisioned within a repository. It provides a hint that allows a client to anticipate the success or failure of provisioning an object using the <check> command. Object availability and provisioning conditions are a matter of server policy.

In addition to the standard EPP command elements, the <check> command MUST contain a <domain:check> element that identifies the domain namespace and the location of the domain schema. The <domain:check> element contains the following child elements:

- One or more <domain:name> elements that contain the fully qualified names of the domain objects to be queried.

Example <check> command:

```
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:  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>example1.com</domain:name>
C:          <domain:name>example2.com</domain:name>
C:          <domain:name>example3.com</domain:name>
C:        </domain:check>
C:      </check>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When a <check> command has been processed successfully, the EPP <resData> element MUST contain a child <domain:chkData> element that identifies the domain namespace and the location of the domain schema. The <domain:chkData> element contains one or more <domain:cd> elements that contain the following child elements:

- A <domain:name> element that contains the fully qualified name of the queried domain object. This element MUST contain an "avail" attribute whose value indicates object availability at the moment the <check> command was completed. A value of "1" or "true" means that the object is available. A value of "0" or "false" means that the object is not available.
- An OPTIONAL <domain:reason> element that MAY be provided when an object is not available for provisioning. If present, this element contains server-specific text to help explain why the object is unavailable. This text MUST be represented in the response language previously negotiated with the client; an OPTIONAL "lang" attribute MAY be present to identify the language if the negotiated value is something other than a default value of "en" (English).

Example <check> 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:chkData
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:cd>
S:          <domain:name avail="1">example1.com</domain:name>
S:        </domain:cd>
S:        <domain:cd>
S:          <domain:name avail="0">example2.com</domain:name>
S:          <domain:reason>In use</domain:reason>
S:        </domain:cd>
S:        <domain:cd>
S:          <domain:name avail="1">example3.com</domain:name>
S:        </domain:cd>
S:      </domain:chkData>
S:    </resData>
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 a <check> command can not be processed for any reason.

### 3.1.2 EPP <info> Command

The EPP <info> command is used to retrieve information associated with a domain object. In addition to the standard EPP command elements, the <info> command MUST contain a <domain:info> element that identifies the domain namespace and the location of the domain schema. The <domain:info> element contains the following child elements:

- A <domain:name> element that contains the fully qualified name of

the domain object to be queried. An OPTIONAL "hosts" attribute is available to control return of information describing hosts related to the domain object. A value of "all" (the default, which MAY be absent) returns information describing both subordinate and delegated hosts. A value of "del" returns information describing only delegated hosts. A value of "sub" returns information describing only subordinate hosts. A value of "none" returns no information describing delegated or subordinate hosts.

Example <info> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <info>
C:      <domain:info
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 hosts="all">example.com</domain:name>
C:        </domain:info>
C:      </info>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When an <info> command has been processed successfully, the EPP <resData> element MUST contain a child <domain:infData> element that identifies the domain namespace and the location of the domain schema. The <domain:infData> element contains the following child elements:

- A <domain:name> element that contains the fully qualified name of the domain object.
- A <domain:roid> element that contains the Repository Object Identifier assigned to the domain object when the object was created.
- One or more <domain:status> elements that contain the current status descriptors associated with the domain.
- If supported by the server, one <domain:registrant> element and one or more <domain:contact> elements that contain identifiers for the human or organizational social information objects associated with the domain object.

- Zero or more <domain:ns> elements that contain the fully qualified names of the delegated host objects (name servers) associated with the domain object.
- Zero or more <domain:host> elements that contain the fully qualified names of the subordinate host objects that exist under this superordinate domain object.
- A <domain:clID> element that contains the identifier of the sponsoring client.
- A <domain:crID> element that contains the identifier of the client that created the domain object.
- A <domain:crDate> element that contains the date and time of domain object creation.
- A <domain:exDate> element that contains the date and time identifying the end of the domain object's registration period.
- A <domain:upID> element that contains the identifier of the client that last updated the domain object. This element MUST NOT be present if the domain has never been modified.
- A <domain:upDate> element that contains the date and time of the most recent domain object modification. This element MUST NOT be present if the domain object has never been modified.
- A <domain:trDate> elements that contains the date and time of the most recent successful domain object transfer. This element MUST NOT be provided if the domain object has never been transferred.
- A <domain:authInfo> element that contains authorization information associated with the domain object. This element MUST NOT be provided if the querying client is not the current sponsoring client.

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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
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:        xsi:schemaLocation="urn:ietf:params:xml:ns:domain-1.0
S:          domain-1.0.xsd">
S:          <domain:name>example.com</domain:name>
S:          <domain:roid>EXAMPLE1-VRSN</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:ns>ns1.example.com</domain:ns>
S:          <domain:ns>ns2.example.com</domain:ns>
S:          <domain:host>ns1.example.com</domain:host>
S:          <domain:host>ns2.example.com</domain:host>
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 type="pw">2fooBAR</domain:authInfo>
S:        </domain:infData>
S:      </resData>
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 can not be processed for any reason.

### 3.1.3 EPP <transfer> Command

The EPP <transfer> command provides a query operation that allows a client to determine real-time status of pending and completed transfer requests. In addition to the standard EPP command elements, the <transfer> command MUST contain an "op" attribute with value "query", and a <domain:transfer> element that identifies the domain namespace and the location of the domain schema. The <domain:transfer> element contains the following child elements:

- A <domain:name> element that contains the fully qualified name of the domain object to be queried.

Example <transfer> query command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <transfer op="query">
C:      <domain:transfer
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>example.com</domain:name>
C:        </domain:transfer>
C:      </transfer>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When a <transfer> query command has been processed successfully, the EPP <resData> element MUST contain a child <domain:trnData> element that identifies the domain namespace and the location of the domain schema. The <domain:trnData> element contains the following child elements:

- A <domain:name> element that contains the fully qualified name of the domain object.

- A <domain:trStatus> element that contains the state of the most recent transfer request.

- A <domain:reID> element that contains the identifier of the client that requested the object transfer.

- A <domain:reDate> element that contains the date and time that the transfer was requested.

- A <domain:acID> element that contains the identifier of the client that SHOULD act upon the transfer request.
- A <domain:acDate> element that contains the date and time of a required or completed response. For a PENDING request, the value identifies the date and time by which a response is required before an automated response action MUST be taken by the server. For all other status types, the value identifies the date and time when the request was completed.
- An OPTIONAL <domain:exDate> element that contains the end of the domain object's validity period if the <transfer> command caused or causes a change in the validity period.

Example <transfer> query 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:trnData
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>example.com</domain:name>
S:          <domain:trStatus>pending</domain:trStatus>
S:          <domain:reID>ClientX</domain:reID>
S:          <domain:reDate>2000-06-06T22:00:00.0Z</domain:reDate>
S:          <domain:acID>ClientY</domain:acID>
S:          <domain:acDate>2000-06-11T22:00:00.0Z</domain:acDate>
S:          <domain:exDate>2002-09-08T22:00:00.0Z</domain:exDate>
S:        </domain:trnData>
S:      </resData>
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 a <transfer> query command can not be processed for any reason.

### 3.2 EPP Transform Commands

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

#### 3.2.1 EPP <create> Command

The EPP <create> command provides a transform operation that allows a client to create a domain object. In addition to the standard EPP command elements, the <create> command MUST contain a <domain:create> element that identifies the domain namespace and the location of the domain schema. The <domain:create> element contains the following child elements:

- A <domain:name> element that contains the fully qualified name of the domain object to be created.
- An OPTIONAL <domain:period> element that contains the initial registration period of the domain object. A server MAY define a default initial registration period if not specified by the client.
- Zero or more <domain:ns> elements that contain the fully qualified name of a known host object to provide resolution services for the domain. A host object MUST be known to the server before the host object can be associated with a domain object. A server MUST provide host object services to provide domain name services. The EPP mapping for host objects is described in [EPP-H].
- An OPTIONAL <domain:registrant> element that contains the identifier for the human or organizational social information (contact) object to be associated with the domain object as the object registrant. This object identifier MUST be known to the server before the contact object can be associated with the domain object. The EPP mapping for contact objects is described in [EPP-C].
- Zero or more OPTIONAL <domain:contact> elements that contain the identifiers for other contact objects to be associated with the domain object. Contact object identifiers MUST be known to the server before the contact object can be associated with the domain object.
- A <domain:authInfo> element that contains authorization information to be associated with the domain object.

Example <create> command:

```
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:  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
C:          domain-1.0.xsd">
C:          <domain:name>example.com</domain:name>
C:          <domain:period unit="y">2</domain:period>
C:          <domain:ns>ns1.example.com</domain:ns>
C:          <domain:ns>ns2.example.com</domain:ns>
C:          <domain:registrant>jdl1234</domain:registrant>
C:          <domain:contact type="admin">sh8013</domain:contact>
C:          <domain:contact type="tech">sh8013</domain:contact>
C:          <domain:authInfo type="pw">2fooBAR</domain:authInfo>
C:        </domain:create>
C:      </create>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When a <create> command has been processed successfully, the EPP <resData> element MUST contain a child <domain:creData> element that identifies the domain namespace and the location of the domain schema. The <domain:creData> element contains the following child elements:

- A <domain:name> element that contains the fully qualified name of the domain object.
- A <domain:crDate> element that contains the date and time of domain object creation.
- An OPTIONAL <domain:exDate> element that contains the date and time identifying the end of the domain object's registration period.

Example <create> 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:creData
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>example.com</domain:name>
S:          <domain:crDate>1999-04-03T22:00:00.0Z</domain:crDate>
S:          <domain:exDate>2001-04-03T22:00:00.0Z</domain:exDate>
S:        </domain:creData>
S:      </resData>
S:      <trID>
S:        <clTRID>ABC-12345</clTRID>
S:        <svTRID>54321-XYZ</svTRID>
S:      </trID>
S:    </response>
S:</epp>
```

An EPP error response MUST be returned if a <create> command can not be processed for any reason.

### 3.2.2 EPP <delete> Command

The EPP <delete> command provides a transform operation that allows a client to delete a domain object. In addition to the standard EPP command elements, the <delete> command MUST contain a <domain:delete> element that identifies the domain namespace and the location of the domain schema. The <domain:delete> element contains the following child elements:

- A <domain:name> element that contains the fully qualified name of the domain object to be deleted.

A domain object SHOULD NOT be deleted if subordinate host objects are associated with the domain object. For example, if domain "example.com" exists, and host object "ns1.example.com" also exists, then domain "example.com" SHOULD NOT be deleted until host

"nsl.example.com" has been either deleted or renamed to exist in a different superordinate domain.

Example <delete> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <delete>
C:      <domain:delete
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>example.com</domain:name>
C:        </domain:delete>
C:      </delete>
C:    </command>
C:  </epp>
```

When a <delete> command has been processed successfully, a server MUST respond with an EPP response with no <resData> element.

Example <delete> 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

An EPP error response MUST be returned if a <delete> command can not be processed for any reason.

### 3.2.3 EPP <renew> Command

The EPP <renew> command provides a transform operation that allows a client to extend the validity period of a domain object. In addition to the standard EPP command elements, the <renew> command MUST contain a <domain:renew> element that identifies the domain namespace and the location of the domain schema. The <domain:renew> element contains the following child elements:

- A <domain:name> element that contains the fully qualified name of the domain object whose validity period is to be extended.
- A <domain:curExpDate> element that contains the date on which the current validity period ends. This value ensures that repeated <renew> commands do not result in multiple unanticipated successful renewals.
- An OPTIONAL <domain:period> element that contains the number of units to be added to the registration period of the domain object.

Example <renew> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <renew>
C:      <domain:renew
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>example.com</domain:name>
C:          <domain:curExpDate>2000-04-03</domain:curExpDate>
C:          <domain:period unit="y">5</domain:period>
C:        </domain:renew>
C:      </renew>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When a <renew> command has been processed successfully, the EPP <resData> element MUST contain a child <domain:creData> element that identifies the domain namespace and the location of the domain schema. The <domain:creData> element contains the following child elements:

- A <domain:name> element that contains the fully qualified name of the domain object.

- A <domain:exDate> element that contains the date and time identifying the end of the domain object's registration period.

Example <renew> 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:renData
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>example.com</domain:name>
S:          <domain:exDate>2005-04-03T22:00:00.0Z</domain:exDate>
S:        </domain:renData>
S:      </resData>
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 a <renew> command can not be processed for any reason.

### 3.2.4 EPP <transfer> Command

The EPP <transfer> command provides a transform operation that allows a client to manage requests to transfer the sponsorship of a domain object. In addition to the standard EPP command elements, the <transfer> command MUST contain a <domain:transfer> element that identifies the domain namespace and the location of the domain schema. The <domain:transfer> element contains the following child elements:

- A <domain:name> element that contains the fully qualified name of the domain object for which a transfer request is to be created, approved, rejected, or cancelled.

- An OPTIONAL <domain:period> element that contains the number of units to be added to the registration period of the domain object at

completion of the transfer process. This element MAY only be used when a transfer is requested, and it MUST be ignored if used otherwise.

- A <domain:authInfo> element that contains authorization information associated with the domain object or authorization information associated with the domain object's registrant or associated contacts. This element is REQUIRED only when a transfer is requested, and it MUST be ignored if used otherwise.

Every EPP <transfer> command MUST contain an "op" attribute that identifies the transfer operation to be performed. Valid values, definitions, and authorizations for all attribute values are defined in [EPP].

Transfer of a domain object MUST implicitly transfer all host objects that are subordinate to the domain object. For example, if domain object "example.com" is transferred and host object "ns1.example.com" exists, the host object MUST be transferred as part of the "example.com" transfer process. Host objects that are subject to transfer when transferring a domain object are listed in the response to an EPP <info> command performed on the domain object.

Example <transfer> request command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <transfer op="request">
C:      <domain:transfer
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>example.com</domain:name>
C:          <domain:period unit="y">1</domain:period>
C:          <domain:authInfo type="pw" roid="JD1234-VRSN">
C:            2fooBAR
C:          </domain:authInfo>
C:        </domain:transfer>
C:      </transfer>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When a <transfer> command has been processed successfully, the EPP

<resData> element MUST contain a child <domain:trnData> element that identifies the domain namespace and the location of the domain schema. The <domain:trnData> element contains the same child elements defined for a transfer query response.

Example <transfer> 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:trnData
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>example.com</domain:name>
S:        <domain:trStatus>pending</domain:trStatus>
S:        <domain:reID>ClientX</domain:reID>
S:        <domain:reDate>2000-06-08T22:00:00.0Z</domain:reDate>
S:        <domain:acID>ClientY</domain:acID>
S:        <domain:acDate>2000-06-13T22:00:00.0Z</domain:acDate>
S:        <domain:exDate>2002-09-08T22:00:00.0Z</domain:exDate>
S:      </domain:trnData>
S:    </resData>
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 a <transfer> command can not be processed for any reason.

### 3.2.5 EPP <update> Command

The EPP <update> command provides a transform operation that allows a client to modify the attributes of a domain object. In addition to the standard EPP command elements, the <update> command MUST contain a <domain:update> element that identifies the domain namespace and the location of the domain schema. The <domain:update> element contains the following child elements:

- A <domain:name> element that contains the fully qualified name of the domain object to be updated.
- An OPTIONAL <domain:add> element that contains attribute values to be added to the object.
- An OPTIONAL <domain:rem> element that contains attribute values to be removed from the object.
- An OPTIONAL <domain:chg> element that contains object attribute values to be changed.

At least one <domain:add>, <domain:rem>, or <domain:chg> element MUST be provided. The <domain:add> and <domain:rem> elements contain the following child elements:

- Zero or more <domain:ns> elements that contain the fully qualified name of a known host object. A host object MUST be known to the server before a server attribute can be added or removed from a domain object. The EPP mapping for host objects is described in [EPP-H].
- Zero or more <domain:contact> elements that contain the identifiers for contact objects to be associated with or removed from the domain object. Contact object identifiers MUST be known to the server before the contact object can be associated with the domain object.
- Zero or more <domain:status> elements that contain status values to be applied to or removed from the object. When specifying a value to be removed, only the attribute value is significant; element text is not required to match a value for removal.

A <domain:chg> element contains the following child elements:

- A <domain:registrant> element that contains the identifier for the human or organizational social information (contact) object to be associated with the domain object as the object registrant. This object identifier MUST be known to the server before the contact object can be associated with the domain object.
- A <domain:authInfo> element that contains authorization information associated with the domain object.

Example <update> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <update>
C:      <domain:update
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>example.com</domain:name>
C:        <domain:add>
C:          <domain:ns>ns1.example2.com</domain:ns>
C:          <domain:contact type="tech">mak21</domain:contact>
C:          <domain:status s="clientHold" lang="en">
C:            Payment overdue.
C:          </domain:status>
C:        </domain:add>
C:        <domain:rem>
C:          <domain:ns>ns2.example.com</domain:ns>
C:          <domain:contact type="tech">sh8013</domain:contact>
C:          <domain:status s="clientUpdateProhibited"/>
C:        </domain:rem>
C:        <domain:chg>
C:          <domain:registrant>sh8013</domain:registrant>
C:          <domain:authInfo type="pw">2BARfoo</domain:authInfo>
C:        </domain:chg>
C:      </domain:update>
C:    </update>
C:  <clTRID>ABC-12345</clTRID>
C: </command>
C:</epp>
```

When an <update> command has been processed successfully, a server MUST respond with an EPP response with no <resData> element.

Example <update> 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

An EPP error response MUST be returned if an <update> command can not be processed for any reason.

#### 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:domain-1.0"
  xmlns:domain="urn:ietf:params:xml:ns:domain-1.0"
  xmlns:epp="urn:ietf:params:xml:ns:epp-1.0"
  xmlns:eppcom="urn:ietf:params:xml:ns:eppcom-1.0"
  xmlns="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">

  <!--
  Import common element types.
  -->
  <import namespace="urn:ietf:params:xml:ns:eppcom-1.0"
    schemaLocation="eppcom-1.0.xsd"/>
  <import namespace="urn:ietf:params:xml:ns:epp-1.0"
    schemaLocation="epp-1.0.xsd"/>

  <annotation>
    <documentation>
      Extensible Provisioning Protocol v1.0
      domain provisioning schema.
    </documentation>
  </annotation>

  <!--
  Child elements found in EPP commands.
  -->
  <element name="check" type="domain:mNameType"/>
  <element name="create" type="domain:createType"/>
  <element name="delete" type="domain:sNameType"/>
  <element name="info" type="domain:infoType"/>
  <element name="renew" type="domain:renewType"/>
  <element name="transfer" type="domain:transferType"/>
  <element name="update" type="domain:updateType"/>

  <!--
  Child elements of the <create> command.
  -->
```

```
<complexType name="createType">
  <sequence>
    <element name="name" type="eppcom:labelType"/>
    <element name="period" type="domain:periodType"
      minOccurs="0"/>
    <element name="ns" type="eppcom:labelType"
      minOccurs="0" maxOccurs="unbounded"/>
    <element name="registrant" type="eppcom:clIDType"
      minOccurs="0"/>
    <element name="contact" type="domain:contactType"
      minOccurs="0" maxOccurs="unbounded"/>
    <element name="authInfo" type="eppcom:authInfoType"/>
  </sequence>
</complexType>

<complexType name="periodType">
  <simpleContent>
    <extension base="domain:pLimitType">
      <attribute name="unit" type="domain:pUnitType"
        use="required"/>
    </extension>
  </simpleContent>
</complexType>

<simpleType name="pLimitType">
  <restriction base="unsignedShort">
    <minInclusive value="1"/>
    <maxInclusive value="99"/>
  </restriction>
</simpleType>

<simpleType name="pUnitType">
  <restriction base="token">
    <enumeration value="y"/>
    <enumeration value="m"/>
  </restriction>
</simpleType>

<complexType name="contactType">
  <simpleContent>
    <extension base="eppcom:clIDType">
      <attribute name="type" type="domain:contactAttrType"/>
    </extension>
  </simpleContent>
</complexType>

<simpleType name="contactAttrType">
  <restriction base="token">
```

```
        <enumeration value="admin"/>
        <enumeration value="billing"/>
        <enumeration value="tech"/>
    </restriction>
</simpleType>

<!--
Child element of commands that require a single name.
-->
<complexType name="sNameType">
  <sequence>
    <element name="name" type="eppcom:labelType"/>
  </sequence>
</complexType>

<!--
Child element of commands that accept multiple names.
-->
<complexType name="mNameType">
  <sequence>
    <element name="name" type="eppcom:labelType"
      maxOccurs="unbounded"/>
  </sequence>
</complexType>

<!--
Child elements of the <info> command.
-->
<complexType name="infoType">
  <sequence>
    <element name="name" type="domain:infoNameType"/>
  </sequence>
</complexType>

<complexType name="infoNameType">
  <simpleContent>
    <extension base = "eppcom:labelType">
      <attribute name="hosts" type="domain:hostsType"
        default="all"/>
    </extension>
  </simpleContent>
</complexType>

<simpleType name="hostsType">
  <restriction base="token">
    <enumeration value="all"/>
    <enumeration value="del"/>
    <enumeration value="none"/>
  </restriction>
</simpleType>
```

```

    <enumeration value="sub"/>
  </restriction>
</simpleType>

<!--
Child elements of the <renew> command.
-->
  <complexType name="renewType">
    <sequence>
      <element name="name" type="eppcom:labelType"/>
      <element name="curExpDate" type="date"/>
      <element name="period" type="domain:periodType"
        minOccurs="0"/>
    </sequence>
  </complexType>

<!--
Child elements of the <transfer> command.
-->
  <complexType name="transferType">
    <sequence>
      <element name="name" type="eppcom:labelType"/>
      <element name="period" type="domain:periodType"
        minOccurs="0"/>
      <element name="authInfo" type="eppcom:authInfoType"
        minOccurs="0"/>
    </sequence>
  </complexType>

<!--
Child elements of the <update> command.
-->
  <complexType name="updateType">
    <sequence>
      <element name="name" type="eppcom:labelType"/>
      <choice minOccurs="0" maxOccurs="3">
        <element name="add" type="domain:addRemType"
          minOccurs="0"/>
        <element name="rem" type="domain:addRemType"
          minOccurs="0"/>
        <element name="chg" type="domain:chgType"
          minOccurs="0"/>
      </choice>
    </sequence>
  </complexType>

<!--
Data elements that can be added or removed.
```

```
-->
<complexType name="addRemType">
  <choice minOccurs="1" maxOccurs="3">
    <element name="ns" type="eppcom:labelType"
      minOccurs="0" maxOccurs="unbounded"/>
    <element name="contact" type="domain:contactType"
      minOccurs="0" maxOccurs="unbounded"/>
    <element name="status" type="domain:statusType"
      minOccurs="0" maxOccurs="14"/>
  </choice>
</complexType>

<!--
Data elements that can be changed.
-->
<complexType name="chgType">
  <sequence>
    <element name="registrant" type="eppcom:clIDType"
      minOccurs="0"/>
    <element name="authInfo" type="eppcom:authInfoType"
      minOccurs="0"/>
  </sequence>
</complexType>

<!--
Child response elements.
-->
<element name="chkData" type="domain:chkDataType"/>
<element name="creData" type="domain:creDataType"/>
<element name="infData" type="domain:infDataType"/>
<element name="renData" type="domain:renDataType"/>
<element name="trnData" type="domain:trnDataType"/>

<!--
<check> response elements.
-->
<complexType name="chkDataType">
  <sequence>
    <element name="cd" type="domain:checkType"
      maxOccurs="unbounded"/>
  </sequence>
</complexType>

<complexType name="checkType">
  <sequence>
    <element name="name" type="domain:checkNameType"/>
    <element name="reason" type="eppcom:reasonType"
      minOccurs="0"/>
  </sequence>
</complexType>
```

```
    </sequence>
  </complexType>

  <complexType name="checkNameType">
    <simpleContent>
      <extension base="eppcom:labelType">
        <attribute name="avail" type="boolean"
          use="required"/>
      </extension>
    </simpleContent>
  </complexType>

  <!--
  <create> response elements.
  -->
  <complexType name="creDataType">
    <sequence>
      <element name="name" type="eppcom:labelType"/>
      <element name="crDate" type="dateTime"/>
      <element name="exDate" type="dateTime"
        minOccurs="0"/>
    </sequence>
  </complexType>

  <!--
  <info> response elements.
  -->
  <complexType name="infDataType">
    <sequence>
      <element name="name" type="eppcom:labelType"/>
      <element name="roid" type="eppcom:roidType"/>
      <element name="status" type="domain:statusType"
        maxOccurs="14"/>
      <element name="registrant" type="domain:contactType"
        minOccurs="0"/>
      <element name="contact" type="domain:contactType"
        minOccurs="0" maxOccurs="unbounded"/>
      <element name="ns" type="eppcom:labelType"
        minOccurs="0" maxOccurs="unbounded"/>
      <element name="host" type="eppcom:labelType"
        minOccurs="0" maxOccurs="unbounded"/>
      <element name="clID" type="eppcom:clIDType"/>
      <element name="crID" type="eppcom:clIDType"/>
      <element name="crDate" type="dateTime"/>
      <element name="upID" type="eppcom:clIDType"
        minOccurs="0"/>
      <element name="upDate" type="dateTime"
        minOccurs="0"/>
    </sequence>
  </complexType>

```

```
<element name="exDate" type="dateTime"
  minOccurs="0"/>
<element name="trDate" type="dateTime"
  minOccurs="0"/>
<element name="authInfo" type="eppcom:authInfoType"
  minOccurs="0"/>
</sequence>
</complexType>

<!--
Status is a combination of attributes and an optional human-readable
message that may be expressed in languages other than English.
-->
<complexType name="statusType">
  <simpleContent>
    <extension base="normalizedString">
      <attribute name="s" type="domain:statusValueType"
        use="required"/>
      <attribute name="lang" type="language"
        default="en"/>
    </extension>
  </simpleContent>
</complexType>

<simpleType name="statusValueType">
  <restriction base="token">
    <enumeration value="clientDeleteProhibited"/>
    <enumeration value="clientHold"/>
    <enumeration value="clientRenewProhibited"/>
    <enumeration value="clientTransferProhibited"/>
    <enumeration value="clientUpdateProhibited"/>
    <enumeration value="inactive"/>
    <enumeration value="ok"/>
    <enumeration value="pendingDelete"/>
    <enumeration value="pendingTransfer"/>
    <enumeration value="pendingVerification"/>
    <enumeration value="serverDeleteProhibited"/>
    <enumeration value="serverHold"/>
    <enumeration value="serverRenewProhibited"/>
    <enumeration value="serverTransferProhibited"/>
    <enumeration value="serverUpdateProhibited"/>
  </restriction>
</simpleType>

<!--
<renew> response elements.
-->
<complexType name="renDataType">
```

```
<sequence>
  <element name="name" type="eppcom:labelType"/>
  <element name="exDate" type="dateTime"
    minOccurs="0"/>
</sequence>
</complexType>

<!--
<transfer> response elements.
-->
<complexType name="trnDataType">
  <sequence>
    <element name="name" type="eppcom:labelType"/>
    <element name="trStatus" type="eppcom:trStatusType"/>
    <element name="reID" type="eppcom:clIDType"/>
    <element name="reDate" type="dateTime"/>
    <element name="acID" type="eppcom:clIDType"/>
    <element name="acDate" type="dateTime"/>
    <element name="exDate" type="dateTime"
      minOccurs="0"/>
  </sequence>
</complexType>

<!--
End of schema.
-->
</schema>
END
```

## 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. Compliant XML processors are REQUIRED to understand both UTF-8 and UTF-16. Though XML includes provisions to identify other character set encodings through use of an "encoding" attribute in an <?xml?> declaration, EPP use with character sets other than UTF-8 is NOT RECOMMENDED.

All date-time values presented via EPP MUST be expressed in Universal Coordinated Time using the Gregorian calendar. XML Schema allows use of time zone identifiers to indicate offsets from the zero meridian, but this option MUST NOT be used with EPP. The extended date-time form defined in [ISO8601] MUST be used to represent date-time values as XML Schema does not support truncated date-time forms.

This document requires domain and host name syntax as specified in [RFC952] as updated by [RFC1123]. These conformance requirements MAY change as a result of progressing work in developing standards for internationalized domain names.

## 6. IANA Considerations

This document uses URNs to describe XML namespaces and XML schemas conforming to a registry mechanism described in [IETF-XML]. Two URI assignments are requested.

Registration request for the domain namespace:

URI: urn:ietf:params:xml:ns:domain-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 domain XML schema:

URI: urn:ietf:params:xml:schema:domain-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 object mapping described in this document does not provide any security services or introduce any additional considerations beyond those described by [EPP] and protocol layers used by EPP.

## 8. Acknowledgements

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## 9. References

- [EPP] S. Hollenbeck: "Extensible Provisioning Protocol", work in progress.
- [EPP-C] S. Hollenbeck: "Extensible Provisioning Protocol Contact Mapping", work in progress.
- [EPP-H] S. Hollenbeck: "Extensible Provisioning Protocol Host Mapping", work in progress.
- [IETF-XML] M. Mealling: "The IETF XML Registry", work in progress.
- [ISO8601] ISO 8601:1988 (E): "Data elements and interchange formats - Information interchange - Representation of dates and times - The International Organization for Standardization".
- [RFC952] K. Harrenstien et al.: "DOD Internet Host Table Specification", RFC 952, October 1985.
- [RFC1123] R. Braden: "Requirements for Internet Hosts -- Application and Support", RFC 1123, October 1989.
- [RFC2119] S. Bradner: "Key Words for Use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [XML] Editors T. Bray et al.: "Extensible Markup Language (XML) 1.0 (Second Edition)", W3C Recommendation 6 October 2000.
- [XMLS-1] Editors H. Thompson et al.: "XML Schema Part 1: Structures", W3C Recommendation 2 May 2001.
- [XMLS-2] Editors P. Biron, A. Malhotra: "XML Schema Part 2: Datatypes", W3C Recommendation 2 May 2001.

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## A. Revisions From Previous Version

-02 to -03:

Modified date-time descriptions to note required use of extended representation.

Modified <check> command description and response elements.

Added <crDate> element to <create> response. This necessitated a change in the <renew> response to define a separate response type.

Added "hosts" attribute to <info> command.

Made authInfo element OPTIONAL in <info> response.

Changed minOccurs of updateType choice to zero from one so that extension updates can be done without requiring an add, remove, or change element for the base object.

Changed namespace and schema URIs to conform to the most recent Mealling XML registration procedures I-D. Also changed the "IANA Considerations" section to adhere to the registration procedures described in the draft.

Added contributor names to the Acknowledgements section. Sorry if I missed anyone.

## B. Full Copyright Statement

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Status of this Memo

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Abstract

This document describes an Extensible Provisioning Protocol (EPP) mapping for the provisioning and management of Internet host names stored in a shared central repository. Specified in XML, the mapping defines EPP command syntax and semantics as applied to host names.

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 [RFC2119].

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

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## 1. Introduction

This document describes an Internet host name mapping for version 1.0 of the Extensible Provisioning Protocol (EPP). This mapping is specified using the Extensible Markup Language (XML) 1.0 as described in [XML] and XML Schema notation as described in [XMLS-1] and [XMLS-2].

[EPP] 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.

This document assumes that host name objects have a subordinate relationship to a superordinate domain name object. For example, host name "nsl.example.com" has a subordinate relationship to domain name "example.com". EPP actions (such as object transfers) that do not preserve this relationship MUST be explicitly disallowed.

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.

This document is being discussed on the "ietf-provreg" mailing list. To join the list, send a message to <majordomo@cafax.se> with the words "subscribe ietf-provreg" in the body of the message. There is a web site for the list archives at <http://www.cafax.se/ietf-provreg>.

## 2. Object Attributes

An EPP host object has attributes and associated values that may be viewed and modified by the sponsoring client or the server. This section describes each attribute type in detail.

### 2.1 Host Names

The syntax for host names described in this document MUST conform to [RFC952] as updated by [RFC1123]. These conformance requirements MAY change as a result of progressing work in developing standards for internationalized host names.

### 2.2 Client Identifiers

All EPP clients are identified by a server-unique identifier. Client identifiers conform to the "clIDType" syntax described in [EPP].

### 2.3 Status Values

A host object MUST always have at least one associated status value. Status values MAY be set only by the client that sponsors a host object and by the server on which the object resides. A client MAY change the status of a host object using the EPP <update> command. Each status value MAY be accompanied by a string of human-readable text that describes the rationale for the status applied to the object.

A client MUST NOT alter status values set by the server. A server MAY alter or override status values set by a client subject to local server policies.

Status values that may be added or removed by a client are prefixed with "client". Corresponding status values that may be added or removed by a server are prefixed with "server". Status values that do not begin with either "client" or "server" are server-managed.

Status Value Descriptions:

clientDeleteProhibited, serverDeleteProhibited

Requests to delete the object MUST be rejected.

clientUpdateProhibited, serverUpdateProhibited

Requests to update the object (other than to remove this status) MUST be rejected.

linked

The host object has at least one active association with another object, such as a domain object. Servers SHOULD provide services to determine existing object associations.

ok

This is the nominal status value for an object that has no pending operations or prohibitions.

pendingDelete

A delete request has been received for the object, but the object has not yet been purged from the server database.

pendingTransfer

A transfer request has been received for the host object's superordinate domain object, and completion of the request is pending.

"ok" status MAY only be combined with "linked" status. "linked" status MAY be combined with any status. "pendingDelete" status MUST NOT be combined with either "clientDeleteProhibited" or "serverDeleteProhibited" status. All other status value combinations are valid.

## 2.4 Dates and Times

Date and time attribute values MUST be represented in Universal Coordinated Time (UTC) using the Gregorian calendar. The extended date-time form defined in [ISO8601] MUST be used to represent date-time values as XML Schema does not support truncated date-time forms.

## 2.5 IP Addresses

The syntax for IPv4 addresses described in this document MUST conform to [RFC791]. The syntax for IPv6 addresses described in this document MUST conform to [RFC1884]. Practical considerations for publishing IPv6 address information in zone files is documented in [RFC1886] and [RFC2874]. A server MAY reject IP addresses that have not been allocated for public use by IANA.

### 3. EPP Command Mapping

A detailed description of the EPP syntax and semantics can be found in [EPP]. The command mappings described here are specifically for use in provisioning and managing Internet host names via EPP.

#### 3.1 EPP Query Commands

EPP provides two commands to retrieve host information: <check> to determine if a host object is available for provisioning, and <info> to retrieve detailed information associated with a host object.

##### 3.1.1 EPP <check> Command

The EPP <check> command is used to determine if an object may be provisioned within a repository. It provides a hint that allows a client to anticipate the success or failure of provisioning an object using the <check> command. Object availability and provisioning conditions are a matter of server policy.

In addition to the standard EPP command elements, the <check> command MUST contain a <host:check> element that identifies the host namespace and the location of the host schema. The <host:check> element contains the following child elements:

- One or more <host:name> elements that contain the fully qualified names of the host objects to be queried.

Example <check> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <check>
C:      <host:check
C:        xmlns:host="urn:ietf:params:xml:ns:host-1.0"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:host-1.0
C:          host-1.0.xsd">
C:          <host:name>ns1.example.com</host:name>
C:          <host:name>ns2.example.com</host:name>
C:          <host:name>ns3.example.com</host:name>
C:        </host:check>
C:      </check>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When a <check> command has been processed successfully, the EPP <resData> element MUST contain a child <host:chkData> element that identifies the host namespace and the location of the host schema. The <host:chkData> element contains one or more <host:cd> elements that contain the following child elements:

- A <host:name> element that contains the fully qualified name of the queried host object. This element MUST contain an "avail" attribute whose value indicates object availability at the moment the <check> command was completed. A value of "1" or "true" means that the object is available. A value of "0" or "false" means that the object is not available.
- An OPTIONAL <host:reason> element that MAY be provided when an object is not available for provisioning. If present, this element contains server-specific text to help explain why the object is unavailable. This text MUST be represented in the response language previously negotiated with the client; an OPTIONAL "lang" attribute MAY be present to identify the language if the negotiated value is something other than a default value of "en" (English).

Example <check> 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <host:chkData
S:        xmlns:host="urn:ietf:params:xml:ns:host-1.0"
S:        xsi:schemaLocation="urn:ietf:params:xml:ns:host-1.0
S:          host-1.0.xsd">
S:        <host:cd>
S:          <host:name avail="1">ns1.example.com</host:name>
S:        </host:cd>
S:        <host:cd>
S:          <host:name avail="0">ns2.example2.com</host:name>
S:          <host:reason>In use</host:reason>
S:        </host:cd>
S:        <host:cd>
S:          <host:name avail="1">ns3.example3.com</host:name>
S:        </host:cd>
S:      </host:chkData>
S:    </resData>
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 a <check> command can not be processed for any reason.

### 3.1.2 EPP <info> Command

The EPP <info> command is used to retrieve information associated with a host object. In addition to the standard EPP command elements, the <info> command MUST contain a <host:info> element that identifies the host namespace and the location of the host schema. The <host:info> element contains the following child elements:

- A <host:name> element that contains the fully qualified name of the

host object for which information is requested.

Example `<info>` command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <info>
C:      <host:info
C:        xmlns:host="urn:ietf:params:xml:ns:host-1.0"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:host-1.0
C:          host-1.0.xsd">
C:          <host:name>ns1.example.com</host:name>
C:        </host:info>
C:      </info>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When an `<info>` command has been processed successfully, the EPP `<resData>` element MUST contain a child `<host:infData>` element that identifies the host namespace and the location of the host schema. The `<host:infData>` element contains the following child elements:

- A `<host:name>` element that contains the fully qualified name of the host object to be queried.
- A `<host:roid>` element that contains the Repository Object Identifier assigned to the host object when the object was created.
- One or more `<host:status>` elements that describe the status of the host object.
- Zero or more `<host:addr>` elements that contain the IP addresses associated with the host object.
- A `<host:clID>` element that contains the identifier of the sponsoring client.
- A `<host:crID>` element that contains the identifier of the client that created the host object.
- A `<host:crDate>` element that contains the date and time of host object creation.

- A <host:upID> element that contains the identifier of the client that last updated the host object. This element MUST NOT be present if the host object has never been modified.
- A <host:upDate> element that contains the date and time of the most recent host object modification. This element MUST NOT be present if the host object has never been modified.
- A <host:trDate> element that contains the date and time of the most recent successful host object transfer. This element MUST NOT be provided if the host object has never been transferred. Note that host objects MUST NOT be transferred directly; host objects MUST be transferred implicitly when the host object's superordinate domain object is transferred. Host objects that are subject to transfer when transferring a domain object are listed in the response to an EPP <info> command performed on the domain object.

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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <host:infData
S:        xmlns:host="urn:ietf:params:xml:ns:host-1.0"
S:        xsi:schemaLocation="urn:ietf:params:xml:ns:host-1.0
S:          host-1.0.xsd">
S:        <host:name>ns1.example.com</host:name>
S:        <host:roid>NS1EXAMPLE1-VRSN</host:roid>
S:        <host:status s="linked"/>
S:        <host:status s="clientUpdateProhibited"/>
S:        <host:addr ip="v4">192.1.2.3</host:addr>
S:        <host:addr ip="v6">1080:0:0:0:8:800:200C:417A</host:addr>
S:        <host:clID>ClientY</host:clID>
S:        <host:crID>ClientX</host:crID>
S:        <host:crDate>1999-04-03T22:00:00.0Z</host:crDate>
S:        <host:upID>ClientX</host:upID>
S:        <host:upDate>1999-12-03T09:00:00.0Z</host:upDate>
S:        <host:trDate>2000-04-08T09:00:00.0Z</host:trDate>
S:      </host:infData>
S:    </resData>
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 can not be processed for any reason.

### 3.1.3 EPP <transfer> Command

Transfer semantics do not directly apply to host objects, so there is no mapping defined for the EPP <transfer> query command.

## 3.2 EPP Transform Commands

EPP provides three commands to transform host objects: <create> to create an instance of a host object, <delete> to delete an instance of a host object, and <update> to change information associated with a host object. This document does not define host object mappings for the EPP <renew> and <transfer> commands.

### 3.2.1 EPP <create> Command

The EPP <create> command provides a transform operation that allows a client to create a host object. In addition to the standard EPP command elements, the <create> command MUST contain a <host:create> element that identifies the host namespace and the location of the host schema. The <host:create> element contains the following child elements:

- A <host:name> element that contains the fully qualified name of the host object to be created.

- Zero or more <host:addr> elements that contain the IP addresses to be associated with the host. Each element MAY contain an "ip" attribute to identify the IP address format. Attribute value "v4" is used to note IPv4 address format. Attribute value "v6" is used to note IPv6 address format. If the "ip" attribute is not specified, "v4" is the default attribute value.

Hosts may be provisioned for use as name servers in the Domain Name System (DNS), described in [RFC1034] and [RFC1035]. Hosts provisioned as name servers MAY be subject to server operator policies that require or prohibit specification of IP addresses depending on the name of the host and the name space in which the server will be used as a name server. When provisioned for use as a name server, IP addresses are REQUIRED only as needed to produce DNS glue records. For example, if the server is authoritative for the ".com" name space and the name of the server is "ns1.example.com.au", the server is not required to produce DNS glue records for the name server and IP addresses for the server are not required by the DNS.

If the host name exists in a name space for which the server is authoritative, then the superordinate domain of the host MUST be known to the server before the host object can be created.

Example <create> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <create>
C:      <host:create
C:        xmlns:host="urn:ietf:params:xml:ns:host-1.0"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:host-1.0
C:          host-1.0.xsd">
C:          <host:name>ns1.example.com</host:name>
C:          <host:addr ip="v4">192.1.2.3</host:addr>
C:          <host:addr ip="v4">198.1.2.3</host:addr>
C:          <host:addr ip="v6">1080:0:0:0:8:800:200C:417A</host:addr>
C:          <host:addr ip="v6">::FFFF:129.144.52.38</host:addr>
C:        </host:create>
C:      </create>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When a <create> command has been processed successfully, the EPP <resData> element MUST contain a child <host:creData> element that identifies the host namespace and the location of the host schema. The <host:creData> element contains the following child elements:

- A <host:name> element that contains the fully qualified name of the host object.
- A <host:crDate> element that contains the date and time of host object creation.

Example <create> 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <host:creData
S:        xmlns:host="urn:ietf:params:xml:ns:host-1.0"
S:        xsi:schemaLocation="urn:ietf:params:xml:ns:host-1.0
S:          host-1.0.xsd">
S:          <host:name>ns1.example.com</host:name>
S:          <host:crDate>1999-04-03T22:00:00.0Z</host:crDate>
S:        </host:creData>
S:      </resData>
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 a <create> command can not be processed for any reason.

### 3.2.2 EPP <delete> Command

The EPP <delete> command provides a transform operation that allows a client to delete a host object. In addition to the standard EPP command elements, the <delete> command MUST contain a <host:delete> element that identifies the host namespace and the location of the host schema. The <host:delete> element contains the following child elements:

- A <host:name> element that contains the fully qualified name of the host object to be deleted.

A host name object MUST NOT be deleted if the host object is associated with any other object. For example, if the host object is associated with a domain object, the host object MUST NOT be deleted until the existing association has been broken.

Example <delete> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <delete>
C:      <host:delete
C:        xmlns:host="urn:ietf:params:xml:ns:host-1.0"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:host-1.0
C:          host-1.0.xsd">
C:          <host:name>ns1.example.com</host:name>
C:        </host:delete>
C:      </delete>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When a <delete> command has been processed successfully, a server MUST respond with an EPP response with no <resData> element.

Example <delete> 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

An EPP error response MUST be returned if a <delete> command can not be processed for any reason.

### 3.2.3 EPP <renew> Command

Renewal semantics do not apply to host objects, so there is no mapping

defined for the EPP <renew> command.

### 3.2.4 EPP <transfer> Command

Transfer semantics do not directly apply to host objects, so there is no mapping defined for the EPP <transfer> command. Host objects are subordinate to an existing superordinate domain object, and as such they are subject to transfer when a domain object is transferred.

### 3.2.5 EPP <update> Command

The EPP <update> command provides a transform operation that allows a client to modify the attributes of a host object. In addition to the standard EPP command elements, the <update> command MUST contain a <host:update> element that identifies the host namespace and the location of the host schema. The <host:update> element contains the following child elements:

- A <host:name> element that contains the fully qualified name of the host object to be updated.
- An OPTIONAL <host:add> element that contains attribute values to be added to the object.
- An OPTIONAL <host:rem> element that contains attribute values to be removed from the object.
- An OPTIONAL <host:chg> element that contains object attribute values to be changed.

At least one <host:add>, <host:rem>, or <host:chg> element MUST be provided. The <host:add> and <host:rem> elements contain the following child elements:

- One or more <host:addr> elements that contain IP addresses to be associated with or removed from the host object. IP address restrictions explained in the <create> command mapping apply here as well.
- One or more <host:status> elements that contain status values to be associated with or removed from the object. When specifying a value to be removed, only the attribute value is significant; element text is not required to match a value for removal.

A <host:chg> element contains the following child elements:

- A <host:name> element that contains a new fully qualified host name by which the host object will be known.

Host name changes MAY require the addition or removal of IP addresses to be accepted by the server. IP address association MAY be subject to server policies for provisioning hosts as name servers.

Host name changes MAY have an impact on associated objects that refer to the host object. A host name change SHOULD not require additional updates of associated objects to preserve existing associations.

Example <update> command:

```
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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
C:    epp-1.0.xsd">
C:  <command>
C:    <update>
C:      <host:update
C:        xmlns:host="urn:ietf:params:xml:ns:host-1.0"
C:        xsi:schemaLocation="urn:ietf:params:xml:ns:host-1.0
C:          host-1.0.xsd">
C:        <host:name>ns1.example.com</host:name>
C:        <host:add>
C:          <host:addr ip="v4">192.1.2.3</host:addr>
C:          <host:status s="clientUpdateProhibited"/>
C:        </host:add>
C:        <host:rem>
C:          <host:addr ip="v6">1080:0:0:0:8:800:200C:417A</host:addr>
C:        </host:rem>
C:        <host:chg>
C:          <host:name>ns2.example.com</host:name>
C:        </host:chg>
C:      </host:update>
C:    </update>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

When an <update> command has been processed successfully, a server MUST respond with an EPP response with no <resData> element.

Example <update> 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:  xsi:schemaLocation="urn:ietf:params:xml:ns:epp-1.0
S:    epp-1.0.xsd">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

An EPP error response MUST be returned if an <update> command could not be processed for any reason.

#### 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:host-1.0"
  xmlns:host="urn:ietf:params:xml:ns:host-1.0"
  xmlns:epp="urn:ietf:params:xml:ns:epp-1.0"
  xmlns:eppcom="urn:ietf:params:xml:ns:eppcom-1.0"
  xmlns="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">

  <!--
  Import common element types.
  -->
  <import namespace="urn:ietf:params:xml:ns:eppcom-1.0"
    schemaLocation="eppcom-1.0.xsd"/>
  <import namespace="urn:ietf:params:xml:ns:epp-1.0"
    schemaLocation="epp-1.0.xsd"/>

  <annotation>
    <documentation>
      Extensible Provisioning Protocol v1.0
      host provisioning schema.
    </documentation>
  </annotation>

  <!--
  Child elements found in EPP commands.
  -->
  <element name="check" type="host:mNameType"/>
  <element name="create" type="host:createType"/>
  <element name="delete" type="host:sNameType"/>
  <element name="info" type="host:sNameType"/>
  <element name="update" type="host:updateType"/>

  <!--
  Child elements of the <create> command.
  -->
  <complexType name="createType">
    <sequence>
```

```
    <element name="name" type="eppcom:labelType"/>
    <element name="addr" type="host:addrType"
      minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>

<complexType name="addrType">
  <simpleContent>
    <extension base="host:addrStringType">
      <attribute name="ip" type="host:ipType"
        default="v4"/>
    </extension>
  </simpleContent>
</complexType>

<simpleType name="addrStringType">
  <restriction base="token">
    <minLength value="3"/>
    <maxLength value="45"/>
  </restriction>
</simpleType>

<simpleType name="ipType">
  <restriction base="token">
    <enumeration value="v4"/>
    <enumeration value="v6"/>
  </restriction>
</simpleType>

<!--
Child elements of the <delete> and <info> commands.
-->
<complexType name="sNameType">
  <sequence>
    <element name="name" type="eppcom:labelType"/>
  </sequence>
</complexType>

<!--
Child element of commands that accept multiple names.
-->
<complexType name="mNameType">
  <sequence>
    <element name="name" type="eppcom:labelType"
      maxOccurs="unbounded"/>
  </sequence>
</complexType>
```

```
<!--
Child elements of the <update> command.
-->
<complexType name="updateType">
  <sequence>
    <element name="name" type="eppcom:labelType"/>
    <choice minOccurs="0" maxOccurs="3">
      <element name="add" type="host:addRemType"
        minOccurs="0"/>
      <element name="rem" type="host:addRemType"
        minOccurs="0"/>
      <element name="chg" type="host:chgType"
        minOccurs="0"/>
    </choice>
  </sequence>
</complexType>
```

```
<!--
Data elements that can be added or removed.
-->
<complexType name="addRemType">
  <choice minOccurs="1" maxOccurs="2">
    <element name="addr" type="host:addrType"
      minOccurs="0" maxOccurs="unbounded"/>
    <element name="status" type="host:statusType"
      minOccurs="0" maxOccurs="7"/>
  </choice>
</complexType>
```

```
<!--
Data elements that can be changed.
-->
<complexType name="chgType">
  <sequence>
    <element name="name" type="eppcom:labelType"/>
  </sequence>
</complexType>
```

```
<!--
Child response elements.
-->
<element name="chkData" type="host:chkDataType"/>
<element name="creData" type="host:creDataType"/>
<element name="infData" type="host:infDataType"/>
```

```
<!--
<check> response elements.
-->
```

```
<complexType name="chkDataType">
  <sequence>
    <element name="cd" type="host:checkType"
      maxOccurs="unbounded"/>
  </sequence>
</complexType>

<complexType name="checkType">
  <sequence>
    <element name="name" type="host:checkNameType"/>
    <element name="reason" type="eppcom:reasonType"
      minOccurs="0"/>
  </sequence>
</complexType>

<complexType name="checkNameType">
  <simpleContent>
    <extension base="eppcom:labelType">
      <attribute name="avail" type="boolean"
        use="required"/>
    </extension>
  </simpleContent>
</complexType>

<!--
<create> response elements.
-->
<complexType name="creDataType">
  <sequence>
    <element name="name" type="eppcom:labelType"/>
    <element name="crDate" type="dateTime"/>
  </sequence>
</complexType>

<!--
<info> response elements.
-->
<complexType name="infDataType">
  <sequence>
    <element name="name" type="eppcom:labelType"/>
    <element name="roid" type="eppcom:roidType"/>
    <element name="status" type="host:statusType"
      maxOccurs="7"/>
    <element name="addr" type="host:addrType"
      minOccurs="0" maxOccurs="unbounded"/>
    <element name="clID" type="eppcom:clIDType"/>
    <element name="crID" type="eppcom:clIDType"/>
    <element name="crDate" type="dateTime"/>
  </sequence>
</complexType>
```

```
<element name="upID" type="eppcom:clIDType"
  minOccurs="0"/>
<element name="upDate" type="dateTime"
  minOccurs="0"/>
<element name="trDate" type="dateTime"
  minOccurs="0"/>
</sequence>
</complexType>

<!--
Status is a combination of attributes and an optional human-readable
message that may be expressed in languages other than English.
-->
<complexType name="statusType">
  <simpleContent>
    <extension base="normalizedString">
      <attribute name="s" type="host:statusValueType"
        use="required"/>
      <attribute name="lang" type="language"
        default="en"/>
    </extension>
  </simpleContent>
</complexType>

<simpleType name="statusValueType">
  <restriction base="token">
    <enumeration value="clientDeleteProhibited"/>
    <enumeration value="clientUpdateProhibited"/>
    <enumeration value="linked"/>
    <enumeration value="ok"/>
    <enumeration value="pendingDelete"/>
    <enumeration value="pendingTransfer"/>
    <enumeration value="serverDeleteProhibited"/>
    <enumeration value="serverUpdateProhibited"/>
  </restriction>
</simpleType>

<!--
End of schema.
-->
</schema>
END
```

## 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. Compliant XML processors are REQUIRED to understand both UTF-8 and UTF-16. Though XML includes provisions to identify other character set encodings through use of an "encoding" attribute in an <?xml?> declaration, EPP use with character sets other than UTF-8 is NOT RECOMMENDED.

All date-time values presented via EPP MUST be expressed in Universal Coordinated Time using the Gregorian calendar. XML Schema allows use of time zone identifiers to indicate offsets from the zero meridian, but this option MUST NOT be used with EPP. The extended date-time form defined in [ISO8601] MUST be used to represent date-time values as XML Schema does not support truncated date-time forms.

This document requires host name syntax as specified in [RFC952] as updated by [RFC1123]. These conformance requirements MAY change as a result of progressing work in developing standards for internationalized host names.

## 6. IANA Considerations

This document uses URNs to describe XML namespaces and XML schemas conforming to a registry mechanism described in [IETF-XML]. Two URI assignments are requested.

Registration request for the host namespace:

URI: urn:ietf:params:xml:ns:host-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 host XML schema:

URI: urn:ietf:params:xml:schema:host-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 object mapping described in this document does not provide any security services or introduce any additional considerations beyond those described by [EPP] and protocol layers used by EPP.

## 8. Acknowledgements

This document was originally written as an individual submission Internet-Draft. The provreg working group later adopted it as a working group document and provided many invaluable comments and suggested improvements.

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## 9. References

- [EPP] S. Hollenbeck: "Extensible Provisioning Protocol", work in progress.
- [IETF-XML] M. Mealling: "The IETF XML Registry", work in progress.
- [ISO8601] ISO 8601:1988 (E): "Data elements and interchange formats - Information interchange - Representation of dates and times - The International Organization for Standardization".
- [RFC791] J. Postel: "Internet Protocol", RFC 791, September 1981.
- [RFC952] K. Harrenstien et al.: "DOD Internet Host Table Specification", RFC 952, October 1985.
- [RFC1034] P. Mockapetris: "DOMAIN NAMES - CONCEPTS AND FACILITIES", RFC 1034, STD 13, November 1987.
- [RFC1035] P. Mockapetris: "DOMAIN NAMES - IMPLEMENTATION AND SPECIFICATION", RFC 1035, STD 13, November 1987.
- [RFC1123] R. Braden: "Requirements for Internet Hosts -- Application and Support", RFC 1123, October 1989.
- [RFC1884] R. Hinden, S. Deering: "IP Version 6 Addressing Architecture", RFC 1884, December 1995.
- [RFC1886] S. Thomson, C. Huitema: "DNS Extensions to support IP version 6", RFC 1886, December 1995.
- [RFC2119] S. Bradner: "Key Words for Use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [RFC2874] M. Crawford, C. Huitema: "DNS Extensions to Support IPv6 Address Aggregation and Renumbering", RFC 2874, July 2000.
- [XML] Editor T. Bray et al.: "Extensible Markup Language (XML) 1.0 (Second Edition)", W3C Recommendation 6 October 2000.
- [XMLS-1] Editors H. Thompson et al.: "XML Schema Part 1: Structures", W3C Recommendation 2 May 2001.
- [XMLS-2] Editors P. Biron, A. Malhotra: "XML Schema Part 2: Datatypes", W3C Recommendation 2 May 2001.

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## A. Revisions From Previous Version

-02 to -03:

Modified date-time descriptions to note required use of extended representation.

Modified <check> command description and response elements.

Added text to section 3.2.1 to note that this host mapping is not limited to describing name servers, and that provisioning of hosts for use as name servers may be subject to server operator policies that require or prohibit IP addresses in certain situations.

Added <crDate> element to <create> response.

Changed "TLD" to "name space" where used to describe server authority.

Changed minOccurs of updateType choice to zero from one so that extension updates can be done without requiring an add, remove, or change element for the base object.

Changed namespace and schema URIs to conform to the most recent Mealling XML registration procedures I-D. Also changed the "IANA Considerations" section to adhere to the registration procedures described in the draft.

Added contributor names to the Acknowledgements section. Sorry if I missed anyone.

## B. Full Copyright Statement

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