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Verification Code Extension for the Extensible Provisioning Protocol (EPP)
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Abstract

This document describes an Extensible Provisioning Protocol (EPP) extension for including a verification code for marking the data for a transform command as being verified by a 3rd party, which is referred to as the Verification Service Provider (VSP). The verification code is digitally signed by the VSP using XML Signature and is "base64" encoded. The XML Signature includes the VSP signer certificate, so the server can verify that the verification code originated from the VSP.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on October 19, 2017.

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1. Introduction

This document describes an extension mapping for version 1.0 of the Extensible Provisioning Protocol (EPP) [RFC5730]. This mapping, an extension to EPP object mappings like the EPP domain name mapping [RFC5731], EPP host mapping [RFC5732], and EPP contact mapping

[RFC5733], can be used to pass a verification code to one of the EPP transform commands. The domain name object is used for examples in the document. The verification code is signed using XML Signature [W3C.CR-xmldsig-core2-20120124] and is "base64" encoded. The "base64" encoded text of the verification code MUST conform to [RFC2045]. The verification code demonstrates that verification was done by a Verification Service Provider (VSP).

The Verification Service Provider (VSP) is a certified party to verify that data is in compliance with the policies of a locality. A locality MAY require the client to have data verified in accordance with local regulations or laws utilizing data sources not available to the server. The VSP has access to the local data sources and is authorized to verify the data. Examples include verifying that the domain name is not prohibited and verifying that the domain name registrant is a valid individual, organization, or business in the locality. The data verified, and the objects and operations that require the verification code to be passed to the server is up to the policies of the locality. The verification code represents a marker that the verification was completed. The data verified by the VSP MUST be stored by the VSP along with the generated verification code to address any compliance issues. The signer certificate and the digital signature of the verification code MUST be verified by the server.

1.1. Conventions Used in This Document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

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

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 are provided only to illustrate element relationships and are not a REQUIRED feature of this protocol.

"verificationCode-1.0" is used as an abbreviation for "urn:ietf:params:xml:ns:verificationCode-1.0". The XML namespace prefix "verificationCode" is used, but implementations MUST NOT depend on it and instead employ a proper namespace-aware XML parser and serializer to interpret and output the XML documents.

2. Object Attributes

This extension adds additional elements to EPP object mappings like the EPP domain name mapping [RFC5731], EPP host mapping [RFC5732], and EPP contact mapping [RFC5733]. Only those new elements are described here.

2.1. Verification Code

The Verification Code is a formatted token, referred to as the Verification Code Token, that is digitally signed by a Verification Service Provider (VSP) using XML Signature [W3C.CR-xmldsig-core2-20120124], using the process described in Section 2.1.1, and is then "base64" encoded, as defined in Section 2.1.2. The Verification Code Token syntax is specified using Augmented Backus-Naur Form (ABNF) grammar [RFC5234] as follows:

Verification Code Token ABNF

```
token     = vsp-id "-" verification-id ; Verification Code Token
vsp-id    = 1*DIGIT                    ; VSP Identifier
verification-id = 1*(DIGIT / ALPHA)    ; Verification Identifier
```

For a VSP given VSP Identifier "1" and with a Verification Identifier of "abc123", the resulting Verification Code Token is "1-abc123". The Verification Identifier MUST be unique within a VSP and the VSP Identifier MUST be unique across supporting VSP's, so the Verification Code Token MUST be unique to an individual verification. The VSP Identifiers MAY require registration within an IANA registry.

2.1.1. Signed Code

The <verificationCode:signedCode> is the fragment of XML that is digitally signed using XML Signature [W3C.CR-xmldsig-core2-20120124]. The <verificationCode:signedCode> element includes a required "id" attribute of type XSD ID for use with an IDREF URI from the Signature element. The certificate of the issuer MUST be included with the Signature so it can be chained with the issuer's certificate by the validating client.

The <verificationCode:signedCode> element includes a REQUIRED "type" attribute for use in defining the type of the signed code. It is up to the VSP and the server to define the valid values for the "type" attribute. Examples of possible "type" attribute values include "domain" for verification of the domain name, "registrant" for verification of the registrant contact, or "domain-registrant" for verification of both the domain name and the registrant. The typed signed code is used to indicate the verifications that are done by

the VSP. The "type" attribute values MAY require registration within an IANA registry.

A <verificationCode:signedCode> element substitutes for the <verificationCode:abstractSignedCode> abstract element to define a concrete definition of a signed code. The <verificationCode:abstractSignedCode> element can be replaced by other signed code definitions using the XML schema substitution groups feature.

The child elements of the <verificationCode:signedCode> element include:

<verificationCode:code> Contains the Verification Code Token as defined by the ABNF in Section 2.1.
<Signature> XML Signature [W3C.CR-xmldsig-core2-20120124] for the <verificationCode:signedCode>. Use of a namespace prefix, like "dsig", is recommended for the XML Signature [W3C.CR-xmldsig-core2-20120124] elements.

Example of a "domain" typed signed code using the <verificationCode:signedCode> element and XML Signature [W3C.CR-xmldsig-core2-20120124]:

```
<verificationCode:signedCode
  xmlns:verificationCode=
  "urn:ietf:params:xml:ns:verificationCode-1.0"
  id="signedCode">
  <verificationCode:code type="domain">1-abc111
  </verificationCode:code>
  <Signature xmlns="http://www.w3.org/2000/09/xmldsig#">
   <SignedInfo>
    <CanonicalizationMethod
 Algorithm="http://www.w3.org/2001/10/xml-exc-c14n#"/>
    <SignatureMethod
 Algorithm="http://www.w3.org/2001/04/xmldsig-more#rsa-sha256"/>
    <Reference URI="#signedCode">
     <Transforms>
      <Transform
 Algorithm="http://www.w3.org/2000/09/xmldsig#enveloped-signature"/>
     </Transforms>
     <DigestMethod
 Algorithm="http://www.w3.org/2001/04/xmlenc#sha256"/>
 <DigestValue>wgyW3nZPoEfpptlhRILKnOQnbdtU6ArM7ShrAfHgDFg=
 </DigestValue>
    </Reference>
   </SignedInfo>
   <SignatureValue>
```

```
    jMu4PfyQGiJBF0GWSEPFCJjmywCEqR2h4LD+ge6XQ+JnmKFFCuCZS/3SLKAx0L1w
    QDFO2e0Y69k2G7/LGE37X3vOflobFM1oGwja8+GMVraoto5xAd4/AF7eHukgAymD
    o9toxoa2h0yV4A4PmXzsU6S86XtCcUE+S/WM72nyn47zoUCzzPKHZBRyeWehVFQ+
    jYRMIAMzM57HHQA+6eaXefRvtPETgUO4aVIVSugc4OUAZZwbYcZrC6wOaQqqqAZi
    30aPOBYbAvHMSmWSS+hFkbshomJfHxb97TD2grlYNrQIzqXk7WbHWy2SYdA+sI/Z
    ipJsXNa6osTUw1CzA7jfwA==
      </SignatureValue>
      <KeyInfo>
       <X509Data>
       <X509Certificate>
    MIIESTCCAzGgAwIBAgIBAjANBgkqhkiG9w0BAQsFADBiMQswCQYDVQQGEwJVUzEL
    MAkGA1UECBMCQ0ExFDASBgNVBAcTC0xvcyBBbmdlbGVzMRMwEQYDVQQKEwpJQ0FO
    TiBUTUNIMRswGQYDVQQDExJJQ0FOTiBUTUNIIFRFU1QgQ0EwHhcNMTMwMjA4MDAw
    MDAwWhcNMTgwMjA3MjM1OTU5WjBsMQswCQYDVQQGEwJVUzELMAkGA1UECBMCQ0Ex
    FDASBgNVBAcTC0xvcyBBbmdlbGVzMRcwFQYDVQQKEw5WYWxpZGF0b3IgVE1DSDEh
    MB8GA1UEAxMYVmFsaWRhdG9yIFRNQ0ggVEVTVCBDRVJUMIIBIjANBgkqhkiG9w0B
    AQEFAAOCAQ8AMIIBCgKCAQEAo/cwvXhbVYl0RDWWvoyeZpETVZVVcMCovUVNg/sw
    WinuMgEWgVQFrz0xA04pEhXCFVv4evbUpekJ5buqU1gmQyOsCKQlhOHTdPjvkC5u
    pDqa51Flk0TMaMkIQjs7aUKCmA4RG4tTTGK/EjR1ix8/D0gHYVRldy1YPrMP+ou7
    5bOVnIos+HifrAtrIv4qEqwLL4FTZAUpaCa2BmgXfy2CSRQbxD5Or1gcSa3vurh5
    sPMCNxqaXmIXmQipS+DuEBqMM8tldaN7RYojUEKrGVsNk5i9y2/7sjn1zyyUPf7v
    L4GgDYqhJYWV61DnXgx/Jd6CWxvsnDF6scscQzUTEl+hywIDAQABo4H/MIH8MAwG
    A1UdEwEB/wQCMAAwHQYDVR0OBBYEFPZEcIQcD/Bj2IFz/LERuo2ADJviMIGMBgNV
    HSMEgYQwgYGAFO0/7kEh3FuEKS+Q/kYHaD/W6wihoWakZDBiMQswCQYDVQQGEwJV
    UzELMAkGA1UECBMCQ0ExFDASBgNVBAcTC0xvcyBBbmdlbGVzMRMwEQYDVQQKEwpJ
    Q0FOTiBUTUNIMRswGQYDVQQDExJJQ0FOTiBUTUNIIFRFU1QgQ0GCAQEwDgYDVR0P
    AQH/BAQDAgeAMC4GA1UdHwQnMCUwI6AhoB+GHWh0dHA6Ly9jcmwuaWNhbm4ub3Jn
    L3RtY2guY3JsMA0GCSqGSIb3DQEBCwUAA4IBAQB2qSy7ui+43cebKUKwWPrzz9y/
    IkrMeJGKjo40n+9uekaw3DJ5EqiOf/qZ4pjBD++oR6BJCb6NQuQKwnoAz5lE4Ssu
    y5+i93oT3HfyVc4gNMIoHm1PS19l7DBKrbwbzAea/0jKWVzrvmV7TBfjxD3AQo1R
    bU5dBr6IjbdLFlnO5x0G0mrG7x5OUPuurihyiURpFDpwH8KAH1wMcCpXGXFRtGKk
    wydgyVYAty7otkl/z3bZkCVT34gPvF70sR6+QxUy8u0LzF5A/beYaZpxSYG31amL
    AdXitTWFipaIGea9lEGFM0L9+Bg7XzNn4nVLXokyEB3bgS4scG6QznX23FGk
      </X509Certificate>
      </X509Data>
      </KeyInfo>
     </Signature>
  </verificationCode:signedCode>
```

2.1.2. Encoded Signed Code

The <verificationCode:encodedSignedCode> element contains one or more encoded form of the digitally signed <verificationCode:signedCode> element, described in Section 2.1.1.

The child elements of the <verificationCode:encodedSignedCode> element include:

<verificationCode:code> One or more <verificationCode:code> elements that is an encoded form of the digitally signed <verificationCode:signedCode> element, described in Section 2.1.1, with the encoding defined by the "encoding" attribute with the default "encoding" value of "base64". The "base64" encoded text of the <verificationCode:code> element MUST conform to [RFC2045].

Example <verificationCode:encodedSignedCode> element that contains one "base64" encoded <verificationCode:signedCode> contained in the <verificationCode:code> element:

```
<verificationCode:encodedSignedCode
  xmlns:verificationCode=
    "urn:ietf:params:xml:ns:verificationCode-1.0">
  <verificationCode:code>
ICAgICAgPHZlcmlmaWNhdGlvbkNvZGU6c2lnbmVkQ29kZQogICAgICAgIHhtbG5z
OnZlcmlmaWNhdGlvbkNvZGU9CiAgICAgICAgICAidXJuOmlldGY6cGFyYW1zOnht
bDpuczp2ZXJpZmljYXRpb25Db2RlLTEuMCIKICAgICAgICAgIGlkPSJzaWduZWRD
b2RlIj4KICAgCQk8dmVyaWZpY2F0aW9uQ29kZTpjb2RlPjEtYWJjMTIzPC92ZXJp
ZmljYXRpb25Db2RlOmNvZGU+CiAgPFNpZ25hdHVyZSB4bWxucz0iaHR0cDovL3d3
dy53My5vcmcvMjAwMC8wOS94bWxkc2lnIyI+CiAgIDxTaWduZWRJbmZvPgogICAg
PENhbm9uaWNhbGl6YXRpb25NZXRob2QKIEFsZ29yaXRobT0iaHR0cDovL3d3dy53
My5vcmcvMjAwMS8xMC94bWwtZXhjLWMxNG4jIi8+CiAgICA8U2lnbmF0dXJlTWV0
aG9kCiBBbGdvcml0aG09Imh0dHA6Ly93d3cudzMub3JnLzIwMDEvMDQveG1sZHNp
Zy1tb3JlI3JzYS1zaGEyNTYiLz4KICAgIDxSZWZlcmVuY2UgVVJJPSIjc2lnbmVk
Q29kZSI+CiAgICAgPFRyYW5zZm9ybXM+CiAgICAgIDxUcmFuc2Zvcm0KIEFsZ29y
aXRobT0iaHR0cDovL3d3dy53My5vcmcvMjAwMC8wOS94bWxkc2lnI2VudmVsb3Bl
ZC1zaWduYXR1cmUiLz4KICAgICA8L1RyYW5zZm9ybXM+CiAgICAgPERpZ2VzdE1l
dGhvZAogQWxnb3JpdGhtPSJodHRwOi8vd3d3LnczLm9yZy8yMDAxLzA0L3htbGVu
YyNzaGEyNTYiLz4KIDxEaWdlc3RWYWx1ZT53Z3lXM25aUG9FZnBwdGxoUklMS25P
UW5iZHRVNkFyTTdTaHJBZkhnREZnPTwvRGlnZXN0VmFsdWU+CiAgICA8L1JlZmVy
ZW5jZT4KICAgPC9TaWduZWRJbmZvPgogICA8U2lnbmF0dXJlVmFsdWU+CBqTXU0
UGZ5UUdpSkJGMEdXU0VQRkNKam15d0NFcVIyaDRMRCtnZTZYUStKbm1LRkZDdUNa
Uy8zU0xLQXgwTDF3CiBRREZPMmUwWTY5azJHNy9MR0UzN1gzdk9mbG9iRk0xb0d3
amE4K0dNVnJhb3RvNXhBZDQvQUY3ZUh1a2dBeW1ECiBvOXRveG9hMmgweVY0QTRQ
bVh6c1U2Uzg2WHRDY1VFK1MvV003Mm55bjQ3em9VQ3p6UEtIWkJSeWVXZWhWRlEr
CiBqWVJNSUFNek01N0hIUUErNmVhWGVmUnZ0UEVUZ1VPNGFWSVZTdWdjNE9VQVpa
d2JZY1pyQzZ3T2FRcXFxQVppCiAzMGFQT0JZYkF2SE1TbVdTUytoRmtic2hvbUpm
SHhiOTdURDJncmxZTnJRSXpxWGs3V2JIV3kyU1lkQStzSS9aCiBpcEpzWE5hNm9z
VFV3MUN6QTdqZndBPT0KICAgPC9TaWduYXR1cmVWYWx1ZT4KICAgPEtleUluZm8+
CiAgICA8WDUwOURhdGE+CiAgICA8WDUwOUNlcnRpZmljYXRlPgogTUlJRVNUQ0NB
ekdnQXdJQkFnSUJBakFOQmdrcWhraUc5dzBCQVFzRkFEQmlNUXN3Q1FZRFZRUUdF
d0pWVXpFTAogTUFrR0ExVUVDQk1DUTBFeEZEQVNCZ05WQkFjVEMweHZjeUJCYm1k
bGJHVnpNUk13RVFZRFZRUUtFd3BKUTBGTwogVGlCVVRVTklNUnN3R1FZRFZRUURF
eEpKUTBGT1RpQlVUVU5JSUZSRlUxUWdRMEV3SGhjTk1UTXdNakE0TURBdwogTURB
d1doY05NVGd3TWpBM01qTTFPVFU1V2pCc01Rc3dDUVlEVlFRR0V3SlZVekVMTUFr
R0ExVUVDQk1DUTBFeAogRkRBU0JnTlZCQWNUQzB4dmN5QkJibWRsYkdWek1SY3dG
```

```
UVlEVlFRS0V3NVdZV3hwWkdGMGIzSWdWRTFEU0RFaAogTUI4R0ExVUVBeE1ZVm1G
c2FXUmhkRzl5SUZSTlEwZ2dWRVZUVkNCRFJWSlVNSUlCSWpBTkJna3Foa2lHOXcw
QgogQVFFRkFBT0NBUThBTUlJQkNnS0NBUUVBby9jd3ZYaGJWWWwwUkRXV3ZveWVa
cEVUVlpWVmNNQ292VVZOZy9zdwogV2ludU1nRVdnVlFGcnoweEEwNHBFaFhDRlZ2
NGV2YlVwZWtKNWJ1cVUxZ21ReU9zQ0tRbGhPSFRkUGp2a0M1dQogcERxYTUxRmxr
MFRNYU1rSVFqczdhVUtDbUE0Ukc0dFRUR0svRWpSMWl4OC9EMGdIWVZSbGR5MVlQ
ck1QK291NwogNWJPVm5Jb3MrSGlmckF0ckl2NHFFcXdMTDRGVFpBVXBhQ2EyQm1n
WGZ5MkNTUlFieEQ1T3IxZ2NTYTN2dXJoNQogc1BNQ054cWFYbUlYbVFpcFMrRHVF
QnFNTTh0bGRhTjdSWW9qVUVLckdWc05rNWk5eTIvN3NqbjF6eXlVUGY3dgogTDRH
Z0RZcWhKWVdWNjFEblhneC9KZDZDV3h2c25ERjZzY3NjUXpVVEVsK2h5d0lEQVFB
Qm80SC9NSUg4TUF3RwogQTFVZEV3RUIvd1FDTUFBd0hRWURWUjBPQkJZRUZQWkVj
SVFjRC9CajJJRnovTEVSdW8yQURKdmlNSUdNQmdOVgogSFNNRWdZUXdnWUdBRk8w
LzdrRWgzRnVFS1MrUS9rWUhhRC9XNndpaG9XYWtaREJpTVFzd0NRWURWUVFHRXdK
VgogVXpFTE1Ba0dBMVVFQ0JNQ1EwRXhGREFTQmdOVkJBY1RDMHh2Y3lCQmJtZGxi
R1Z6TVJNd0VRWURWUVFLRXdwSgogUTBGT1RpQlVUVU5JTVJzd0dRWURWUVFERXhK
SlEwRk9UaUJVVFVOSUlGUkZVMVFnUTBHQ0FRRXdEZ1lEVlIwUAogQVFIL0JBUURB
Z2VBTUM0R0ExVWRId1FuTUNVd0k2QWhvQitHSFdoMGRIQTZMeTlqY213dWFXTmhi
bTR1YjNKbgogTDNSdFkyZ3VZM0pzTUEwR0NTcUdTSWIzRFFFQkN3VUFBNElCQVFC
MnFTeTd1aSs0M2NlYktVS3dXUHJ6ejl5LwogSWtyTWVKR0tqbzQwbis5dWVrYXcz
REo1RXFpT2YvcVo0cGpCRCsrb1I2QkpDYjZOUXVRS3dub0F6NWxFNFNzdQogeTUr
aTkzb1QzSGZ5VmM0Z05NSW9IbTFQUzE5bDdEQktyYndiekFlYS8waktXVnpydm1W
N1RCZmp4RDNBUW8xUgogYlU1ZEJyNklqYmRMRmxuTzV4MEcwbXJHN3g1T1VQdXVy
aWh5aVVScEZEcHdIOEtBSDF3TWNDcFhHWEZSdEdLawogd3lkZ3lWWUF0eTdvdGts
L3ozYlprQ1ZUMzRnUHZGNzBzUjYrUXhVeTh1MEx6RjVBL2JlWWFacHhTWUczMWFt
TAogQWRYaXRUV0ZpcGFJR2VhOWxFR0ZNMEw5K0JnN1h6Tm40blZMWG9reUVCM2Jn
UzRzY0c2UXpuWDIzRkdrCiAgIDwvWDUwOUNlcnRpZmljYXRlPgogICA8L1g1MDlE
YXRhPgogICA8L0tleUluZm8+CiAgPC9TaWduYXR1cmU+CgkJPC92ZXJpZmljYXRp
b25Db2RlOnNpZ25lZENvZGU+Cg==
  </verificationCode:code>
</verificationCode:encodedSignedCode>
```

Example <verificationCode:encodedSignedCode> element that contains two <verificationCode:code> elements ;.

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
  <command>
    <create>
      <domain:create
       xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
        <domain:name>domain.example</domain:name>
        <domain:registrant>jd1234</domain:registrant>
        <domain:contact type="admin">sh8013</domain:contact>
        <domain:contact type="tech">sh8013</domain:contact>
        <domain:authInfo>
          <domain:pw>2fooBAR</domain:pw>
        </domain:authInfo>
      </domain:create>
```

```
      </create>
      <extension>
        <verificationCode:encodedSignedCode
          xmlns:verificationCode=
            "urn:ietf:params:xml:ns:verificationCode-1.0">
          <verificationCode:code>
  ICAgICAgPHZlcmlmaWNhdGlvbkNvZGU6c2lnbmVkQ29kZQogICAgICAgIHhtbG5z
  OnZlcmlmaWNhdGlvbkNvZGU9CiAgICAgICAgICAidXJuOmlldGY6cGFyYW1zOnht
  bDpuczp2ZXJpZmljYXRpb25Db2RlLTEuMCIKICAgICAgICAgIGlkPSJzaWduZWRD
  b2RlIj4KICAgCQk8dmVyaWZpY2F0aW9uQ29kZTpjb2RlPjEtYWJjMTIzPC92ZXJp
  ZmljYXRpb25Db2RlOmNvZGU+CiAgPFNpZ25hdHVyZSB4bWxucz0iaHR0cDovL3d3
  dy53My5vcmcvMjAwMC8wOS94bWxkc2lnIyI+CiAgIDxTaWduZWRJbmZvPgogICAg
  PENhbm9uaWNhbGl6YXRpb25NZXRob2QKIEFsZ29yaXRobT0iaHR0cDovL3d3dy53
  My5vcmcvMjAwMS8xMC94bWwtZXhjLWMxNG4jIi8+CiAgICA8U2lnbmF0dXJlTWV0
  aG9kCiBBbGdvcml0aG09Imh0dHA6Ly93d3cudzMub3JnLzIwMDEvMDQveG1sZHNp
  Zy1tb3JlI3JzYS1zaGEyNTYiLz4KICAgIDxSZWZlcmVuY2UgVVJJPSIjc2lnbmVk
  Q29kZSI+CiAgICAgPFRyYW5zZm9ybXM+CiAgICAgIDxUcmFuc2Zvcm0KIEFsZ29y
  aXRobT0iaHR0cDovL3d3dy53My5vcmcvMjAwMC8wOS94bWxkc2lnI2VudmVsb3Bl
  ZC1zaWduYXR1cmUiLz4KICAgICA8L1RyYW5zZm9ybXM+CiAgICAgPERpZ2VzdE1l
  dGhvZAogQWxnb3JpdGhtPSJodHRwOi8vd3d3LnczLm9yZy8yMDAxLzA0L3htbGVu
  YyNzaGEyNTYiLz4KIDxEaWdlc3RWYWx1ZT53Z3lXM25aUG9FZnBwdGxoUklMS25P
  UW5iZHRVNkFyTTdTaHJBZkhnREZnPTwvRGlnZXN0VmFsdWU+CiAgICA8L1JlZmVy
  ZW5jZT4KICAgPC9TaWduZWRJbmZvPgogICA8U2lnbmF0dXJlVmFsdWU+CiBqTXU0
  UGZ5UUdpSkJGMEdXU0VQRkNKam15d0NFcVIyaDRMRCtnZTZYUStKbm1LRkZDdUNa
  Uy8zU0xLQXgwTDF3CiBRREZPMmUwWTY5azJHNy9MR0UzN1gzdk9mbG9iRk0xb0d3
  amE4K0dNVnJhb3RvNXhBZDQvQUY3ZUh1a2dBeW1ECiBvOXRveG9hMmgweVY0QTRQ
  bVh6c1U2Uzg2WHRDY1VFK1MvV003Mm55bjQ3em9VQ3p6UEtIWkJSeWVXZWhWRlEr
  CiBqWVJNSUFNek01N0hIUUErNmVhWGVmUnZ0UEVUZ1VPNGFWSVZTdWdjNE9VQVpa
  d2JZY1pyQzZ3T2FRcXFxQVppCiAzMGFQT0JZYkF2SE1TbVdTUytoRmtic2hvbUpm
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  ekdnQXdJQkFnSUJBakFOQmdrcWhraUc5dzBCQVFzRkFEQmlNUXN3Q1FZRFZRUUdF
  d0pWVXpFTAogTUFrR0ExVUVDQk1DUTBFeEZEQVNCZ05WQkFjVEMweHZjeUJCYm1k
  bGJHVnpNUk13RVFZRFZRUUtFd3BKUTBGTwogVGlCVVRVTklNUnN3R1FZRFZRUURF
  eEpKUTBGT1RpQlVUVU5JSUZSRlUxUWdRMEV3SGhjTk1UTXdNakE0TURBdwogTURB
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  UVlEVlFRS0V3NVdZV3hwWkdGMGIzSWdWRTFEU0RFaAogTUI4R0ExVUVBeE1ZVm1G
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  MFRNYU1rSVFqczdhVUtDbUE0Ukc0dFRUR0svRWpSMWl4OC9EMGdIWVZSbGR5MVlQ
  ck1QK291NwogNWJPVm5Jb3MrSGlmckF0ckl2NHFFcXdMTDRGVFpBVXBhQ2EyQm1n
  WGZ5MkNTUlFieEQ1T3IxZ2NTYTN2dXJoNQogc1BNQ054cWFYbUlYbVFpcFMrRHVF
  QnFNTTh0bGRhTjdSWW9qVUVLckdWc05rNWk5eTIvN3NqbjF6eXlVUGY3dgogTDRH
  Z0RZcWhKWVdWNjFEblhneC9KZDZDV3h2c25ERjZzY3NjUXpVVEVsK2h5d0lEQVFB
```

Qm80SC9NSUg4TUF3RwogQTFVZEV3RUIvd1FDTUFBd0hRWURWUjBPQkJZRUZQWkVj
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bTR1YjNKbgogTDNSdFkyZ3VZM0pzTUEwR0NTcUdTSWIzRFFFQkN3VUFBNElCQVFC
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N1RCZmp4RDNBUW8xUgogYlU1ZEJyNklqYmRMRmxuTzV4MEcwbXJHN3g1T1VQdXVy
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YXRhPgogICA8L0tleUluZm8+CiAgPC9TaWduYXR1cmU+CgkJPC92ZXJpZmljYXRp
b25Db2RlOnNpZ25lZENvZGU+Cg==
        </verificationCode:code>
        <verificationCode:code>
PD94bWwgdmVyc2lvbj0iMS4wIiBlbmNvZGluZz0iVVRGLTgiPz48dmVyaWZpY2F0
aW9uQ29kZTpzaWduZWRDb2RlIHhtbG5zOnZlcmlmaWNhdGlvbkNvZGU9InVybjpp
ZXRmOnBhcmFtczp4bWw6bnM6dmVyaWZpY2F0aW9uQ29kZS0xLjAiIGlkPSJzaWdu
ZWRDb2RlIiB0eXBlPSJyZWdpc3RyYW50Ij48dmVyaWZpY2F0aW9uQ29kZTpjb2Rl
PjEtYWJjMjIyPC92ZXJpZmljYXRpb25Db2RlOmNvZGU+PGRzaWc6U2lnbmF0dXJl
IHhtbG5zOmRzaWc9Imh0dHA6Ly93d3cudzMub3JnLzIwMDAvMDkveG1sZHNpZyMi
Pjxkc2lnOlNpZ25lZEluZm8+PGRzaWc6Q2Fub25pY2FsaXphdGlvbk1ldGhvZCBB
bGdvcml0aG09Imh0dHA6Ly93d3cudzMub3JnL1RSLzIwMDEvUkVDLXhtbC1jMTRu
LTIwMDEwMzE1I1dpdGhDb21tZW50cyIvPjxkc2lnOlNpZ25hdHVyZU1ldGhvZCBB
bGdvcml0aG09Imh0dHA6Ly93d3cudzMub3JnLzIwMDAvMDkveG1sZHNpZyNyc2Et
c2hhMSIvPjxkc2lnOlJlZmVyZW5jZSBVUkk9IiNzaWduZWRDb2RlIj48ZHNpZzpU
cmFuc2Zvcm1zPjxkc2lnOlRyYW5zZm9ybSBBbGdvcml0aG09Imh0dHA6Ly93d3cu
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```
dwpEZ1lEVlFRSUV3ZFZibXR1YjNkdU1SQXdEZ1lEVlFRSEV3ZFZibXR1YjNkdU1S
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Umt3RndZRFZRUURFeEIyWlhKcFptbGpZWFJwYjI1RGIyUmxNQjRYRFRFMU1EWXhO
VEl4TURBeU1sb1gKRFRNMU1EWXhNREl4TURBeU1sb3dkVEVRTUE0R0ExVUVCaE1I
Vlc1cmJtOTNiakVRTUE0R0ExVUVDQk1IVlc1cmJtOTNiakVRTUE0RwpBMVVFQnhN
SFZXNXJibTkzYmpFUU1BNEdBMVVFQ2hNSFZXNXJibTkzYmpFUU1BNEdBMVVFQ3hN
SFZXNXJibTkzYmpFWk1CY0dBMVVFCkF4TVFkbVZ5YVdacFkyRjBhVzl1UTI5a1pU
Q0NBU0l3RFFZSktvWklodmNOQVFFQkJRQURnZ0VQQURDQ0FRb0NnZ0VCQUpjY2pY
cmsKUWFJL2lHUEZ3WmVITjFnRFVhcTltVnJmQis2eWR5Qmdoc2FHVFZoaERIOFNO
TmtpamxIMkxCQ3J3TjhjVjhQZ1BPOXRwbG9rR2F5UwpxNktFaHZtTk03b1dsZk5L
SkdSdGNidGMzTnJuYzhiUUJacU1xcFo0UlNRTmh5QWh6Ri85UmErd3RFc0JWeGF3
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WmxFa1lLcFlEU2dlc2lseFg2QkpTZVdCbXZLQzlTL2pBZDhNWmRHVUg2aHNHRXBl
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ZE43CmVGVXF2YzVVTUEwR0NTcUdTSWIzRFFFQkN3VUFBNElCQVFBVjB2cmlrSWRB
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Tms2Tnp0eDlSc1AwNWZndkxrZER1N0V5cnRzY3I1ZVdETG1WMGtKMWE1N1Z4bnJh
aEdLTnM2Wit1Ui9pSApMaTJXb3liWEpFT2N0NWtJSjFzL05CeUUrdkdGdjFoTmJz
dVVVUEVCYWVtaWpYUFROOWxxZE9uM1FIbktobXhsa1czYS9KbmhtT20vCkRWYTE0
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eUluZm8+PC9kc2lnOlNpZ25hdHVyZT48L3ZlcmlmaWNhdGlvbkNvZGU6c2lnbmVk
Q29kZT4=
        </verificationCode:code>
    </verificationCode:encodedSignedCode>
    </extension>
    <clTRID>ABC-12345</clTRID>
  </command>
</epp>
```

2.2. Verification Profile

A Verification Profile defines the set of verification code types, the commands that the verification code types are required, supported, or not supported, and the grace period by which the verification code types MUST be set. A server MAY support many verification profiles, each with a unique name and a unique verification policy that is implemented by the server. Each client MAY have zero or more server assigned verification profiles that will enforce the required verification policies. Most likely a client will be assigned zero or one server assigned verification profile, but overlapping profiles is possible. Overlapping verification profiles MUST be treated as a logical "and" of the policies by the

server. If no verification profile is assigned to the client, no additional verification is required by the client.

3. EPP Command Mapping

A detailed description of the EPP syntax and semantics can be found in the EPP core protocol specification [RFC5730].

3.1. EPP Query Commands

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

3.1.1. EPP <check> Command

This extension does not add any elements to the EPP <check> command or <check> response described in the [RFC5730].

3.1.2. EPP <info> Command

This extension defines additional elements to extend the EPP <info> command of an object mapping like the EPP domain name mapping [RFC5731], EPP host mapping [RFC5732], and EPP contact mapping [RFC5733].

The EPP <info> command is used to retrieve the verification information. The verification information is based on the verification profile, as defined in Section 2.2, set in the server for the client. The <verificationCode:info> element is an empty element that indicates that the client requests the verification information. The OPTIONAL "profile" attribute can be used by the client to explicitly specify a verification profile, as defined in Section 2.2, to base the verification information on. It is up to server policy on the set of verification profiles that the client is allowed to explicitly specify, and if the client is not allowed, the server MUST return the 2201 error response.

Example <info> domain command with the <verificationCode:info> extension to retrieve the verification information for the domain "domain.example", using the profiles associated with the client:

```
C:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
C:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
C:  <command>
C:    <info>
C:      <domain:info
C:        xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
C:        <domain:name>domain.example</domain:name>
C:      </domain:info>
C:    </info>
C:    <extension>
C:      <verificationCode:info
C:        xmlns:verificationCode=
C:          "urn:ietf:params:xml:ns:verificationCode-1.0"/>
C:    </extension>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

Example <info> domain command with the <verificationCode:info> extension to retrieve the verification information for the domain "domain.example", using the profiles associated with the client and with the authorization information to retrieve the verification codes from the non-sponsoring client:

```
C:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
C:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
C:  <command>
C:    <info>
C:      <domain:info
C:        xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
C:        <domain:name>domain.example</domain:name>
C:        <domain:authInfo>
C:          <domain:pw>2fooBAR</domain:pw>
C:        </domain:authInfo>
C:      </domain:info>
C:    </info>
C:    <extension>
C:      <verificationCode:info
C:        xmlns:verificationCode=
C:          "urn:ietf:params:xml:ns:verificationCode-1.0"/>
C:    </extension>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

Example <info> domain command with the <verificationCode:info> extension to retrieve the verification information for the domain "domain.example", using the the "sample" profile:

```
C:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
C:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
C:  <command>
C:    <info>
C:      <domain:info
C:        xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
C:        <domain:name>domain.example</domain:name>
C:      </domain:info>
C:    </info>
C:    <extension>
C:      <verificationCode:info
C:        xmlns:verificationCode=
C:          "urn:ietf:params:xml:ns:verificationCode-1.0"
C:        profile="sample"/>
C:    </extension>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

If the query was successful, the server replies with a <verificationCode:infData> element along with the regular EPP <resData>. The <verificationCode:infData> element contains the following child elements:

<verificationCode:status> The status of the verification for the object, using all of the verification profiles assigned to the client. There are four possible values for the status:

notApplicable The status is not applicable to the client since there is no assigned verification profile.

nonCompliant The object is non-compliant according to the verification profiles. If at least one of the profiles is "nonCompliant", the object is "nonCompliant".

pendingCompliance The object is not in compliance with the verification profiles, but has a grace period to set the required set of verification codes, as reflected by the due date of the verification code type. If at least one of the profiles is "pendingCompliance" and none of the profiles is "nonCompliant", the object is "pendingCompliance".

compliant The object is compliant with the verification profiles. If All of the profiles for the object are "compliant" or if the object has no assignd profiles, the object is "compliant".

<verificationCode:profile> Zero or more OPTIONAL <verificationCode:profile> elements that defines the verification status of the object based on the profile. The required "name" attribute defines the name of the profile. The <verificationCode:profile> element contains the following child elements:

<verificationCode:status> The status of the verification for the object and the profile. There are four possible values for the status:

notApplicable The profile status is not applicable to the client based on the assigned verification profiles or the profile specified.

nonCompliant The object is non-compliant according to the verification profile.

pendingCompliance The object is not in compliance with the verification profile, but has a grace period to set the required set of verification codes, as reflected by the due date of the verification code type.

compliant The object is compliant with the verification profile.

<verificationCode:missing> OPTIONAL list of missing verification code types. The <verificationCode:missing> element is returned only if there is at least one missing verification code type and based on server policy. The <verificationCode:missing> element contains the following child elements:

<verificationCode:code> One or more <verificationCode:code> elements that is empty with the REQUIRED "type" attribute that indicates the verification code type and the REQUIRED "due" attribute that indicates when the verification code type was or is due. Past due verification code types will result in the <verificationCode:status> element being set to "nonCompliant".

<verificationCode:set> OPTIONAL list of set verification codes. The <verificationCode:set> element is returned only if there is at least one set verification code. The <verificationCode:set> element contains the following child elements:

<verificationCode:code> One or more <verificationCode:code> elements containing the verification code with a REQUIRED "type" attribute that indicates the code type and a REQUIRED "date" attribute that indicates when the verification code was set. The inclusion of the code value is up server policy, so if the server determines that the code value cannot be exposed to a non-sponsoring client, the <verificationCode:code> element MUST be empty.

Example <info> domain response using the <verificationCode:infData> extension for a compliant domain using the "sample" profile, and with the two verification codes, from the sponsoring or authorized client:

```
S:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
S:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:infData
S:        xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
S:        <domain:name>domain.example</domain:name>
S:        <domain:roid>DOMAIN-REP</domain:roid>
S:        <domain:status s="ok"/>
S:        <domain:clID>ClientX</domain:clID>
S:        <domain:crID>ClientY</domain:crID>
S:        <domain:crDate>2010-04-03T22:00:00.0Z
S:        </domain:crDate>
S:        <domain:exDate>2015-04-03T22:00:00.0Z
S:        </domain:exDate>
S:        <domain:authInfo>
S:          <domain:pw>2fooBAR</domain:pw>
S:        </domain:authInfo>
S:      </domain:infData>
S:    </resData>
S:    <extension>
S:      <verificationCode:infData
S:        xmlns:verificationCode=
S:        "urn:ietf:params:xml:ns:verificationCode-1.0">
S:        <verificationCode:status>compliant
S:        </verificationCode:status>
S:        <verificationCode:profile name="sample">
S:          <verificationCode:status>compliant
S:          </verificationCode:status>
S:          <verificationCode:set>
S:            <verificationCode:code type="domain"
```

```
S:              date="2010-04-03T22:00:00.0Z">1-abc333
S:            </verificationCode:code>
S:            <verificationCode:code type="registrant"
S:              date="2010-04-03T22:00:00.0Z">1-abc444
S:            </verificationCode:code>
S:          </verificationCode:set>
S:        </verificationCode:profile>
S:      </verificationCode:infData>
S:    </extension>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

Example <info> domain response using the <verificationCode:infData> extension for a compliant domain using the "sample" profile, and with the two verification codes, from the sponsoring or authorized client that also includes codes set for the "sample2" profile:

```
S:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
S:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:infData
S:        xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
S:        <domain:name>domain.example</domain:name>
S:        <domain:roid>DOMAIN-REP</domain:roid>
S:        <domain:status s="ok"/>
S:        <domain:clID>ClientX</domain:clID>
S:        <domain:crID>ClientY</domain:crID>
S:        <domain:crDate>2010-04-03T22:00:00.0Z
S:        </domain:crDate>
S:        <domain:exDate>2015-04-03T22:00:00.0Z
S:        </domain:exDate>
S:        <domain:authInfo>
S:          <domain:pw>2fooBAR</domain:pw>
S:        </domain:authInfo>
S:      </domain:infData>
S:    </resData>
S:    <extension>
S:      <verificationCode:infData
S:        xmlns:verificationCode=
S:        "urn:ietf:params:xml:ns:verificationCode-1.0">
```

```
S:        <verificationCode:status>compliant
S:        </verificationCode:status>
S:        <verificationCode:profile name="sample">
S:          <verificationCode:status>compliant
S:          </verificationCode:status>
S:          <verificationCode:set>
S:            <verificationCode:code type="domain"
S:              date="2010-04-03T22:00:00.0Z">1-abc333
S:            </verificationCode:code>
S:            <verificationCode:code type="registrant"
S:              date="2010-04-03T22:00:00.0Z">1-abc444
S:            </verificationCode:code>
S:          </verificationCode:set>
S:        </verificationCode:profile>
S:        <verificationCode:profile name="sample2">
S:          <verificationCode:status>notApplicable
S:          </verificationCode:status>
S:          <verificationCode:set>
S:            <verificationCode:code type="domain"
S:              date="2010-04-03T22:00:00.0Z">2-abc555
S:            </verificationCode:code>
S:          </verificationCode:set>
S:        </verificationCode:profile>
S:      </verificationCode:infData>
S:    </extension>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

Example <info> domain response using the <verificationCode:infData> extension for a compliant domain using the "sample" profile, and with the two verification code types, from the non-sponsoring client:

```
S:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
S:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:infData
S:        xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
S:        <domain:name>domain.example</domain:name>
S:        <domain:roid>DOMAIN-REP</domain:roid>
S:        <domain:status s="ok"/>
S:        <domain:clID>ClientX</domain:clID>
S:        <domain:crID>ClientY</domain:crID>
S:        <domain:crDate>2010-04-03T22:00:00.0Z
S:        </domain:crDate>
S:        <domain:exDate>2015-04-03T22:00:00.0Z
S:        </domain:exDate>
S:      </domain:infData>
S:    </resData>
S:    <extension>
S:      <verificationCode:infData
S:        xmlns:verificationCode=
S:        "urn:ietf:params:xml:ns:verificationCode-1.0">
S:        <verificationCode:status>compliant
S:        </verificationCode:status>
S:        <verificationCode:profile name="sample">
S:          <verificationCode:status>compliant
S:          </verificationCode:status>
S:          <verificationCode:set>
S:            <verificationCode:code type="domain"
S:              date="2010-04-03T22:00:00.0Z"/>
S:            <verificationCode:code type="registrant"
S:              date="2010-04-03T22:00:00.0Z"/>
S:          </verificationCode:set>
S:        </verificationCode:profile>
S:      </verificationCode:infData>
S:    </extension>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

Example <info> domain response using the <verificationCode:infData> extension for a non-compliant domain using the "sample" profile, and with the verification code types missing along with their due dates:

```
S:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
S:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:infData
S:        xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
S:        <domain:name>domain.example</domain:name>
S:        <domain:roid>DOMAIN-REP</domain:roid>
S:        <domain:status s="serverHold"/>
S:        <domain:clID>ClientX</domain:clID>
S:        <domain:crID>ClientY</domain:crID>
S:        <domain:crDate>2010-04-03T22:00:00.0Z
S:        </domain:crDate>
S:        <domain:exDate>2015-04-03T22:00:00.0Z
S:        </domain:exDate>
S:      </domain:infData>
S:    </resData>
S:    <extension>
S:      <verificationCode:infData
S:        xmlns:verificationCode=
S:        "urn:ietf:params:xml:ns:verificationCode-1.0">
S:        <verificationCode:status>nonCompliant
S:        </verificationCode:status>
S:        <verificationCode:profile name="sample">
S:          <verificationCode:status>nonCompliant
S:          </verificationCode:status>
S:          <verificationCode:missing>
S:            <verificationCode:code
S:              type="domain"
S:              due="2010-04-03T22:00:00.0Z"/>
S:            <verificationCode:code
S:              type="registrant"
S:              due="2010-04-08T22:00:00.0Z"/>
S:          </verificationCode:missing>
S:        </verificationCode:profile>
S:      </verificationCode:infData>
S:    </extension>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

Example <info> domain response using the <verificationCode:infData>

extension for a pending compliance domain using the "sample" profile, with the verification code type missing along with the due date, and with set verification code:

```
S:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
S:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:infData
S:        xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
S:        <domain:name>domain.example</domain:name>
S:        <domain:roid>DOMAIN-REP</domain:roid>
S:        <domain:status s="ok"/>
S:        <domain:clID>ClientX</domain:clID>
S:        <domain:crID>ClientY</domain:crID>
S:        <domain:crDate>2010-04-03T22:00:00.0Z
S:        </domain:crDate>
S:        <domain:exDate>2015-04-03T22:00:00.0Z
S:        </domain:exDate>
S:      </domain:infData>
S:    </resData>
S:    <extension>
S:      <verificationCode:infData
S:        xmlns:verificationCode=
S:        "urn:ietf:params:xml:ns:verificationCode-1.0">
S:        <verificationCode:status>pendingCompliance
S:        </verificationCode:status>
S:        <verificationCode:profile name="sample">
S:          <verificationCode:status>pendingCompliance
S:          </verificationCode:status>
S:          <verificationCode:missing>
S:            <verificationCode:code
S:              type="registrant"
S:              due="2010-04-08T22:00:00.0Z"/>
S:          </verificationCode:missing>
S:          <verificationCode:set>
S:            <verificationCode:code type="domain"
S:              date="2010-04-03T22:00:00.0Z">1-abc333
S:            </verificationCode:code>
S:          </verificationCode:set>
S:        </verificationCode:profile>
S:      </verificationCode:infData>
S:    </extension>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

Example <info> domain response using the <verificationCode:infData> extension for a client that does not have a verification profile assigned:

```
S:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
S:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
S:  <response>
S:    <result code="1000">
S:      <msg>Command completed successfully</msg>
S:    </result>
S:    <resData>
S:      <domain:infData
S:        xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
S:        <domain:name>domain.example</domain:name>
S:        <domain:roid>DOMAIN-REP</domain:roid>
S:        <domain:status s="ok"/>
S:        <domain:clID>ClientX</domain:clID>
S:        <domain:crID>ClientY</domain:crID>
S:        <domain:crDate>2010-04-03T22:00:00.0Z
S:        </domain:crDate>
S:        <domain:exDate>2015-04-03T22:00:00.0Z
S:        </domain:exDate>
S:      </domain:infData>
S:    </resData>
S:    <extension>
S:      <verificationCode:infData
S:        xmlns:verificationCode=
S:        "urn:ietf:params:xml:ns:verificationCode-1.0">
S:        <verificationCode:status>notApplicable
S:        </verificationCode:status>
S:      </verificationCode:infData>
S:    </extension>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54322-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

3.1.3. EPP <transfer> Command

This extension does not add any elements to the EPP <transfer> query command or <transfer> response described in the [RFC5730].

3.2. EPP Transform Commands

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

3.2.1. EPP <create> Command

This extension defines additional elements to extend the EPP <create> command of an object mapping like the EPP domain name mapping [RFC5731], EPP host mapping [RFC5732], and EPP contact mapping [RFC5733].

The EPP <create> command provides a transform operation that allows a client to create an object. In addition to the EPP command elements described in an object mapping like [RFC5731], the command MAY contain a child <verificationCode:encodedSignedCode> element, as defined in Section 2.1.2, that identifies the extension namespace for the client to provide proof of verification by a Verification Service Provider (VSP). The server MAY support multiple policies for the passing of the <verificationCode:encodedSignedCode> element based on the client profile, which include:

required The client MUST pass a valid <verificationCode:encodedSignedCode> element containing the required set of verification codes. If a <verificationCode:encodedSignedCode> element is not passed or the required set of verification codes is not included, the server MUST return an EPP error result code of 2306. If an invalid <verificationCode:encodedSignedCode> element is passed, the server MUST return an EPP error result code of 2005.

optional The client MAY pass a valid <verificationCode:encodedSignedCode> element. If an invalid <verificationCode:encodedSignedCode> element is passed, the server MUST return an EPP error result code of 2005.

not supported The client MUST NOT pass a <verificationCode:encodedSignedCode> element. If a <verificationCode:encodedSignedCode> element is passed, the server MUST return an EPP error result code of 2102.

Example <create> command to create a domain object with a verification code:

```
C:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
C:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
C:  <command>
```

```
C:    <create>
C:      <domain:create
C:       xmlns:domain="urn:ietf:params:xml:ns:domain-1.0">
C:        <domain:name>domain.example</domain:name>
C:        <domain:registrant>jd1234</domain:registrant>
C:        <domain:contact type="admin">sh8013</domain:contact>
C:        <domain:contact type="tech">sh8013</domain:contact>
C:        <domain:authInfo>
C:          <domain:pw>2fooBAR</domain:pw>
C:        </domain:authInfo>
C:      </domain:create>
C:    </create>
C:    <extension>
C:      <verificationCode:encodedSignedCode
C:        xmlns:verificationCode=
C:          "urn:ietf:params:xml:ns:verificationCode-1.0">
C:        <verificationCode:code>
C:ICAgICAgPHZlcmlmaWNhdGlvbkNvZGU6c2lnbmVkQ29kZQogICAgICAgIHhtbG5z
C:OnZlcmlmaWNhdGlvbkNvZGU9CiAgICAgICAgICAidXJuOmlldGY6cGFyYW1zOnht
C:bDpuczp2ZXJpZmljYXRpb25Db2RlLTEuMCIKICAgICAgICAgIGlkPSJzaWduZWRD
C:b2RlIj4KICAgCQk8dmVyaWZpY2F0aW9uQ29kZTpjb2RlPjEtYWJjMTIzPC92ZXJp
C:ZmljYXRpb25Db2RlOmNvZGU+CiAgPFNpZ25hdHVyZSB4bWxucz0iaHR0cDovL3d3
C:dy53My5vcmcvMjAwMC8wOS94bWxkc2lnIyI+CiAgIDxTaWduZWRJbmZvPgogICAg
C:PENhbm9uaWNhbGl6YXRpb25NZXRob2QKIEFsZ29yaXRobT0iaHR0cDovL3d3dy53
C:My5vcmcvMjAwMS8xMC94bWwtZXhjLWMxNG4jIi8+CiAgICA8U2lnbmF0dXJlTWV0
C:aG9kCiBBbGdvcml0aG09Imh0dHA6Ly93d3cudzMub3JnLzIwMDEvMDQveG1sZHNp
C:Zy1tb3JlI3JzYS1zaGEyNTYiLz4KICAgIDxSZWZlcmVuY2UgVVJJPSIjc2lnbmVk
C:Q29kZSI+CiAgICAgPFRyYW5zZm9ybXM+CiAgICAgIDxUcmFuc2Zvcm0KIEFsZ29y
C:aXRobT0iaHR0cDovL3d3dy53My5vcmcvMjAwMC8wOS94bWxkc2lnI2VudmVsb3Bl
C:ZC1zaWduYXR1cmUiLz4KICAgICA8L1RyYW5zZm9ybXM+CiAgICAgPERpZ2VzdE1l
C:dGhvZAogQWxnb3JpdGhtPSJodHRwOi8vd3d3LnczLm9yZy8yMDAxLzA0L3htbGVu
C:YyNzaGEyNTYiLz4KIDxEaWdlc3RWYWx1ZT53Z3lXM25aUG9FZnBwdGxoUklMS25P
C:UW5iZHRVNkFyTTdTaHJBZkhnREZnPTwvRGlnZXN0VmFsdWU+CiAgICA8L1JlZmVy
C:ZW5jZT4KICAgPC9TaWduZWRJbmZvPgogICA8U2lnbmF0dXJlVmFsdWU+CiBqTXU0
C:UGZ5UUdpSkJGMEdXU0VQRkNKam15d0NFcVIyaDRMRCtnZTZYUStKbm1LRkZDdUNa
C:Uy8zU0xLQXgwTDF3CiBRREZPMmUwWTY5azJHNy9MR0UzN1gzdk9mbG9iRk0xb0d3
C:amE4K0dNVnJhb3RvNXhBZDQvQUY3ZUh1a2dBeW1ECiBvOXRveG9hMmgweVY0QTRQ
C:bVh6c1U2Uzg2WHRDY1VFK1MvV003Mm55bjQ3em9VQ3p6UEtIWkJSeWVXZWhWRlEr
C:CiBqWVJNSUFNek01N0hIUUErNmVhWGVmUnZ0UEVUZ1VPNGFWSVZTdWdjNE9VQVpa
C:d2JZY1pyQzZ3T2FRcXFxQVppCiAzMGFQT0JZYkF2SE1TbVdTUytoRmtic2hvbUpm
C:SHhiOTdURDJncmxZTnJRSXpxWGs3V2JIV3kyU1lkQStzSS9aCiBpcEpzWE5hNm9z
C:VFV3MUN6QTdqZndBPT0KICAgPC9TaWduYXR1cmVWYWx1ZT4KICAgPEtleUluZm8+
C:CiAgICA8WDUwOURhdGE+CiAgICA8WDUwOUNlcnRpZmljYXRlPgogTUlJRVNUQ0NB
C:ekdnQXdJQkFnSUJBakFOQmdrcWhraUc5dzBCQVFzRkFEQmlNUXN3Q1FZRFZRUUdF
C:d0pWVXpFTAogTUFrR0ExVUVDQk1DUTBFeEZEQVNCZ05WQkFjVEMweHZjeUJCYm1k
C:bGJHVnpNUk13RVFZRFZRUUtFd3BKUTBGTwogVGlCVVRVTklNUnN3R1FZRFZRUURF
C:eEpKUTBGT1RpQlVUVU5JSUZSRlUxUWdRMEV3SGhjTk1UTXdNakE0TURBdwogTURB
C:d1doY05NVGd3TWpBM01qTTFPVFU1V2pCc01Rc3dDUVlEVlFRR0V3SlZVekVMTUFr
```

```
C:R0ExVUVDQk1DUTBFeAogRkRBU0JnTlZCQWNUQzB4dmN5QkJibWRsYkdWek1SY3dG
C:UVlEVlFRS0V3NVdZV3hwWkdGMGIzSWdWRTFEU0RFaAogTUI4R0ExVUVBeE1ZVm1G
C:c2FXUmhkRzl5SUZSTlEwZ2dWRVZUVkNCRFJWSlVNSUlCSWpBTkJna3Foa2lHOXcw
C:QgogQVFFRkFBT0NBUThBTUlJQkNnS0NBUUVBby9jd3ZYaGJWWWwwUkRXV3ZveWVa
C:cEVUVlpWVmNNQ292VVZOZy9zdwogV2ludU1nRVdnVlFGcnoweEEwNHBFaFhDRlZ2
C:NGV2YlVwZWtKNWJ1cVUxZ21ReU9zQ0tRbGhPSFRkUGp2a0M1dQogcERxYTUxRmxr
C:MFRNYU1rSVFqczdhVUtDbUE0Ukc0dFRUR0svRWpSMWl4OC9EMGdIWVZSbGR5MVlQ
C:ck1QK291NwogNWJPVm5Jb3MrSGlmckF0ckl2NHFFcXdMTDRGVFpBVXBhQ2EyQm1n
C:WGZ5MkNTUlFieEQ1T3IxZ2NTYTN2dXJoNQogc1BNQ054cWFYbUlYbVFpcFMrRHVF
C:QnFNTTh0bGRhTjdSWW9qVUVLckdWc05rNWk5eTIvN3NqbjF6eXlVUGY3dgogTDRH
C:Z0RZcWhKWVdWNjFEblhneC9KZDZDV3h2c25ERjZzY3NjUXpVVEVsK2h5d0lEQVFB
C:Qm80SC9NSUg4TUF3RwogQTFVZEV3RUIvd1FDTUFBd0hRWURWUjBPQkJZRUZQWkVj
C:SVFjRC9CajJJRnovTEVSdW8yQURKdmlNSUdNQmdOVgogSFNNRWdZUXdnWUdBRk8w
C:LzdrRWgzRnVFS1MrUS9rWUhhRC9XNndpaG9XYWtaREJpTVFzd0NRWURWUVFHRXdK
C:VgogVXpFTE1Ba0dBMVVFQ0JNQ1EwRXhGREFTQmdOVkJBY1RDMHh2Y3lCQmJtZGxi
C:R1Z6TVJNd0VRWURWUVFLRXdwSgogUTBGT1RpQlVUVU5JTVJzd0dRWURWUVFERXhK
C:SlEwRk9UaUJVVFVOSUlGUkZVMVFnUTBHQ0FRRXdEZ1lEVlIwUAogQVFIL0JBUURB
C:Z2VBTUM0R0ExVWRId1FuTUNVd0k2QWhvQitHSFdoMGRIQTZMeTlqY213dWFXTmhi
C:bTR1YjNKbgogTDNSdFkyZ3VZM0pzTUEwR0NTcUdTSWIzRFFFQkN3VUFBNElCQVFC
C:MnFTeTd1aSs0M2NlYktVS3dXUHJ6ejl5LwogSWtyTWVKR0tqbzQwbis5dWVrYXcz
C:REo1RXFpT2YvcVo0cGpCRCsrb1I2QkpDYjZOUXVRS3dub0F6NWxFNFNzdQogeTUr
C:aTkzb1QzSGZ5VmM0Z05NSW9IbTFQUzE5bDdEQktyYndiekFlYS8waktXVnpydm1W
C:N1RCZmp4RDNBUW8xUgogYlU1ZEJyNklqYmRMRmxuTzV4MEcwbXJHN3g1T1VQdXVy
C:aWh5aVVScEZEcHdIOEtBSDF3TWNDcFhHWEZSdEdLawogd3lkZ3lWWUF0eTdvdGts
C:L3ozYlprQ1ZUMzRnUHZGNzBzUjYrUXhVeTh1MEx6RjVBL2JlWWFacHhTWUczMWFt
C:TAogQWRYaXRUV0ZpcGFJR2VhOWxFR0ZNMEw5K0JnN1h6Tm40blZMWG9reUVCM2Jn
C:UzRzY0c2UXpuWDIzRkdrCiAgIDwvWDUwOUNlcnRpZmljYXRlPgogICA8L1g1MDlE
C:YXRhPgogICA8L0tleUluZm8+CiAgPC9TaWduYXR1cmU+CgkJPC92ZXJpZmljYXRp
C:b25Db2RlOnNpZ25lZENvZGU+Cg==
C:        </verificationCode:code>
C:      </verificationCode:encodedSignedCode>
C:    </extension>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

This extension does not add any elements to the EPP <create> response described in the [RFC5730].

3.2.2. EPP <delete> Command

This extension defines additional elements to extend the EPP <delete> command and response in the same fashion as defined for the EPP <create> Command (Section 3.2.1).

3.2.3. EPP <renew> Command

This extension defines additional elements to extend the EPP <renew> command and response in the same fashion as defined for the EPP <create> Command (Section 3.2.1).

3.2.4. EPP <transfer> Command

This extension defines additional elements to extend the EPP <transfer> command and response in the same fashion as defined for the EPP <create> Command (Section 3.2.1).

3.2.5. EPP <update> Command

This extension defines additional elements to extend the EPP <update> command and response in the same fashion as defined for the EPP <create> Command (Section 3.2.1).

4. Formal Syntax

One schema is presented here that is the EPP Verification Code Extension schema.

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.

4.1. Verification Code Extension Schema

```
BEGIN
<?xml version="1.0" encoding="UTF-8"?>
<schema
  targetNamespace=
    "urn:ietf:params:xml:ns:verificationCode-1.0"
  xmlns:verificationCode=
    "urn:ietf:params:xml:ns:verificationCode-1.0"
  xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
  xmlns="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">

  <annotation>
    <documentation>
      Extensible Provisioning Protocol v1.0
      Verification Code Extension.
    </documentation>
  </annotation>
```

```
    <import namespace="http://www.w3.org/2000/09/xmldsig#"
      schemaLocation="xmldsig-core-schema.xsd"/>

    <!-- Abstract signed code for substitution -->
    <element name="abstractSignedCode"
      type="verificationCode:abstractSignedCodeType"
      abstract="true"/>

    <!-- Empty type for use in extending for a signed code -->
    <complexType name="abstractSignedCodeType"/>

    <!-- Definition of concrete signed code -->
    <element name="signedCode"
      type="verificationCode:signedCodeType"
      substitutionGroup="verificationCode:abstractSignedCode"/>

    <complexType name="signedCodeType">
      <complexContent>
        <extension base="verificationCode:abstractSignedCodeType">
          <sequence>
            <element name="code"
              type="verificationCode:verificationCodeType"/>
            <element ref="dsig:Signature"/>
          </sequence>
          <attribute name="id" type="ID" use="required"/>
        </extension>
      </complexContent>
    </complexType>

    <simpleType name="verificationCodeValueType">
      <restriction base="token">
          <pattern value="\d+-[A-Za-z0-9]+"/>
      </restriction>
    </simpleType>

    <complexType name="verificationCodeType">
      <simpleContent>
        <extension base=
          "verificationCode:verificationCodeValueType">
          <attribute name="type" type="token"
            use="required"/>
        </extension>
      </simpleContent>
    </complexType>

    <!-- Definition of an encoded signed code -->
    <element name="encodedSignedCode"
      type="verificationCode:encodedSignedCodeListType"/>
```

```
    <complexType name="encodedSignedCodeListType">
      <sequence>
         <element name="code"
            type="verificationCode:encodedSignedCodeType"
            minOccurs="1" maxOccurs="unbounded"/>
      </sequence>
    </complexType>

    <complexType name="encodedSignedCodeType">
      <simpleContent>
        <extension base="token">
          <attribute name="encoding"
            type="token" default="base64"/>
        </extension>
      </simpleContent>
    </complexType>

    <!-- info command extension elements -->
    <element name="info" type="verificationCode:infoType"/>

    <complexType name="infoType">
      <simpleContent>
        <extension base="token">
           <attribute name="profile" type="token"/>
        </extension>
      </simpleContent>
    </complexType>


    <!-- info response extension elements -->
    <element name="infData" type="verificationCode:infDataType"/>

    <complexType name="infDataType">
      <sequence>
        <element name="status"
          type="verificationCode:statusEnum"/>
        <element name="profile"
          type="verificationCode:profileDataType"
          minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
    </complexType>

    <complexType name="profileDataType">
      <sequence>
        <element name="status"
          type="verificationCode:statusEnum"/>
        <element name="missing"
          type="verificationCode:missingCodes"
```

```
          minOccurs="0"/>
        <element name="set"
          type="verificationCode:codesType"
          minOccurs="0"/>
      </sequence>
      <attribute name="name" type="token"/>
    </complexType>

    <simpleType name="statusEnum">
      <restriction base="token">
        <enumeration value="notApplicable"/>
        <enumeration value="nonCompliant"/>
        <enumeration value="pendingCompliance"/>
        <enumeration value="compliant"/>
      </restriction>
    </simpleType>

    <complexType name="missingVerificationCode">
      <simpleContent>
        <extension base="token">
          <attribute name="type" type="token"
            use="required"/>
          <attribute name="due" type="dateTime"
            use="required"/>
        </extension>
      </simpleContent>
    </complexType>

    <complexType name="missingCodes">
      <sequence>
        <element name="code"
          type="verificationCode:missingVerificationCode"
          minOccurs="1" maxOccurs="unbounded"/>
      </sequence>
    </complexType>

    <complexType name="infoVerificationCodeType">
      <simpleContent>
        <extension base="token">
          <attribute name="type" type="token"
            use="required"/>
          <attribute name="date" type="dateTime"
            use="required"/>
        </extension>
      </simpleContent>
    </complexType>

    <complexType name="codesType">
```

```
      <sequence>
        <element name="code"
          type="verificationCode:infoVerificationCodeType"
          minOccurs="1" maxOccurs="unbounded"/>
      </sequence>
    </complexType>

</schema>
END
```

5. IANA Considerations

5.1. XML Namespace

This document uses URNs to describe XML namespaces and XML schemas conforming to a registry mechanism described in [RFC3688].

Registration request for the verificationCode namespace:

URI: ietf:params:xml:ns:verificationCode-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 verificationCode XML schema:

URI: ietf:params:xml:ns:verificationCode-1.0
Registrant Contact: See the "Author's Address" section of this document.
XML: See the "Formal Syntax" section of this document.

5.2. EPP Extension Registry

The EPP extension described in this document should be registered by the IANA in the EPP Extension Registry described in [RFC7451]. The details of the registration are as follows:

Name of Extension: "Verification Code Extension for the Extensible Provisioning Protocol (EPP)"

Document status: Standards Track

Reference: (insert reference to RFC version of this document)

Registrant Name and Email Address: IESG, <iesg@ietf.org>

TLDs: Any

IPR Disclosure: None

Status: Active

Notes: None

6. Security Considerations

The mapping extension described in this document is based on the security services described by EPP [RFC5730] and protocol layers used by EPP. The security considerations described in these other specifications apply to this specification as well.

XML Signature [W3C.CR-xmldsig-core2-20120124] is used in this extension to verify that the Verification Code originated from a trusted Verification Service Provider (VSP) and that it wasn't tampered with in transit from the VSP to the client to the server. To support multiple VSP keys, the VSP certificate chain MUST be included in the <X509Certificate> elements of the Signed Code (Section 2.1.1) and MUST chain up and be verified by the server against a set of trusted certificates.

It is RECOMMENDED that signed codes do not include white-spaces between the XML elements in order to mitigate risks of invalidating the digital signature when transferring of signed codes between applications takes place.

Use of XML canonicalization SHOULD be used when generating the signed code. SHA256/RSA-SHA256 SHOULD be used for digesting and signing. The size of the RSA key SHOULD be at least 2048 bits.

7. Normative References

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[RFC5731] Hollenbeck, S., "Extensible Provisioning Protocol (EPP) Domain Name Mapping", STD 69, RFC 5731, DOI 10.17487/RFC5731, August 2009, <http://www.rfc-editor.org/info/rfc5731>.

[RFC5732] Hollenbeck, S., "Extensible Provisioning Protocol (EPP) Host Mapping", STD 69, RFC 5732, DOI 10.17487/RFC5732, August 2009, <http://www.rfc-editor.org/info/rfc5732>.

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[RFC7451] Hollenbeck, S., "Extension Registry for the Extensible Provisioning Protocol", RFC 7451, DOI 10.17487/RFC7451, February 2015, <http://www.rfc-editor.org/info/rfc7451>.

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Appendix A. Acknowledgements

Appendix B. Change History

B.1. Change from 00 to 01

1. Fixed pendingComplaince and complaint to pendingCompliance and compliant in text.
2. Fixed verificaton to verification.

B.2. Change from 01 to 02

1. Added support for the notApplicable status value.

B.3. Change from 02 to 03

1. Added regular expression pattern for the format of the verification code token value in the XML schema.

B.4. Change from 03 to 04

1. Ping update.

B.5. Change from 04 to REGEXT 00

1. Changed to regext working group draft by changing draft-gould-eppext-verificationcode to draft-ietf-regext-verificationcode.

B.6. Change from REGEXT 00 to REGEXT 01

1. Ping update.

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