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Login Security Extension for the Extensible Provisioning Protocol (EPP)
[draft-ietf-regext-login-security-10](#)

Abstract

The Extensible Provisioning Protocol (EPP) includes a client authentication scheme that is based on a user identifier and password. The structure of the password field is defined by an XML Schema data type that specifies minimum and maximum password length values, but there are no other provisions for password management other than changing the password. This document describes an EPP extension that allows longer passwords to be created and adds additional security features to the EPP login command and response.

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1. Introduction

This document describes an Extensible Provisioning Protocol (EPP) extension for enhancing the security of the EPP login command in EPP [[RFC5730](#)]. EPP [[RFC5730](#)] includes a maximum password length of 16 characters that inhibits implementing stronger password security policies with higher entropy. The enhancements include supporting longer passwords (or passphrases) than the 16-character maximum and providing a list of security events in the login response. The password (current and new) in EPP [[RFC5730](#)] can be overridden by the password included in the extension to extend past the 16-character maximum. The security events supported include: password expiry, client certificate expiry, insecure cipher, insecure TLS protocol, new password complexity, login security statistical warning, and a custom event. The attributes supported by the security events include identifying the event type or sub-type, indicating the security level of warning or error, a future or past-due expiration date, the value that resulted in the event, the duration of the statistical event, and a free-form description with an optional language.

1.1. Conventions Used in This Document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [BCP 14](#) [[RFC2119](#)] [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

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.

"loginSec-1.0" is used as an abbreviation for "urn:ietf:params:xml:ns:epp:loginSec-1.0". The XML namespace prefix "loginSec" 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.

"whitespace" is defined by the XML schema whiteSpace datatype in [[W3C.REC-xmlschema-2-20041028](#)], which only includes the ASCII

whitespace characters #x9 (tab), #xA (linefeed), #xD (carriage return), and #x20 (space).

2. Migrating to Newer Versions of This Extension

Servers which implement this extension SHOULD provide a way for clients to progressively update their implementations when a new version of the extension is deployed. A newer version of the extension is expected to use an XML namespace with a higher version number than the prior versions.

Servers SHOULD (for a temporary migration period up to server policy) provide support for older versions of the extension in parallel to the newest version, and allow clients to select their preferred version via the <svcExtension> element of the <login> command.

If a client requests multiple versions of the extension at login, then, when preparing responses to commands which do not include extension elements, the server SHOULD only include extension elements in the namespace of the newest version of the extension requested by the client.

When preparing responses to commands which do include extension elements, the server SHOULD only include extension elements for the extension versions present in the command.

3. Object Attributes

This extension adds additional elements to [\[RFC5730\]](#) login command and response. Only those new elements are described here.

3.1. Event

A security event, using the <loginSec:event> element, represents either a warning or error identified by the server after the client has connected and submitted the login command. The <loginSec:event> element is contained in a list of one or more elements in the <loginSec:loginSecData> element, so there MAY be multiple events returned that provide information for the client to address. The <loginSec:event> MAY include a free-form description. All of the security events use a consistent set of attributes, where the exact set of applicable attributes is based on the event type. The supported set of <loginSec:event> element attributes include:

"type": A REQUIRED attribute that defines the type of security event. The enumerated list of "type" values includes:

- "password": Identifies a password expiry event, where the password expires in the future or has expired based on the "exDate" date and time. The "exDate" attribute MUST be set with the password expiry date and time.
- "certificate": Identifies a client certificate expiry event, where the client certificate will expire at the "exDate" date and time. The "exDate" attribute MUST be set with the certificate expiry date and time.
- "cipher": Identifies the use of an insecure or deprecated TLS cipher suite. The "name" attribute MUST be set with the name of the cipher suite, which is free-form and is not expected to be parsed and automatically addressed by the client. An example of cipher suite names can be found in the TLS Cipher Suites of the Transport Layer Security (TLS) Parameters IANA Registry [[1](#)].
- "tlsProtocol": Identifies the use of an insecure or deprecated TLS protocol. The "name" attribute MUST be set with the name of the TLS protocol, which is free-form and is not expected to be parsed and automatically addressed by the client.
- "newPW": The new password does not meet the server password complexity requirements.
- "stat": Provides a login security statistical warning that MUST set the "name" attribute to the name of the statistic sub-type.
- "custom": Custom event type that MUST set the "name" attribute with the custom event type name.
- "name": Used to define a sub-type when the "type" attribute is not "custom" or the full type name when the "type" attribute is "custom". The "name" attribute MUST be set when the "type" attribute is "stat" or "custom". The possible set of "name" values, by event type, can be discovered / negotiated out of band to EPP or using a separate EPP extension designed to provide server policy information to the client.
- "level": Defines the level of the event as either "warning" for a warning event that needs action, or "error" for an error event that requires immediate action.
- "exDate": Contains the date and time that a "warning" level has or will become an "error" level. At expiry there MAY be a connection failure or MAY be a login failure. An example is an expired certification that will result in a connection failure or an expired password that may result in a login failure.
- "value": Identifies the value that resulted in the login security event. An example is the negotiated insecure cipher suite or the negotiated insecure TLS protocol.
- "duration": Defines the duration that a statistical event is associated with, ending when the login command was received. The format of the duration is defined by the duration primitive datatype in section 3.2.6 of [[W3C.REC-xmlschema-2-20041028](#)].

"lang": Identifies the negotiated language of the free-form description. The format of the language is defined by the language primitive datatype in section 3.3.3 of [\[W3C.REC-xmlschema-2-20041028\]](#). The default is "en" (English).

Example login security event for password expiration, where the current date is 2020-03-25:

```
<loginSec:event
  type="password"
  level="warning"
  exDate="2020-04-01T22:00:00.0Z"
  lang="en">
  Password expiration soon
</loginSec:event>
```

Example login security event for identifying 100 failed logins over the last day, using the "stat" sub-type of "failedLogins":

```
<loginSec:event
  type="stat"
  name="failedLogins"
  level="warning"
  value="100"
  duration="P1D">
  Excessive invalid daily logins
</loginSec:event>
```

[3.2.](#) "[LOGIN-SECURITY]" Password

When the [\[RFC5730\]](#) <pw> element contains the predefined value of "[LOGIN-SECURITY]", the <loginSec:pw> element overrides the <pw> element, which is a constant value for the server to use the <loginSec:pw> element for the password. Similarly, when the [\[RFC5730\]](#) <newPw> element contains the predefined value of "[LOGIN-SECURITY]", the <loginSec:newPw> element overrides the <newPw> element, which is a constant value for the server to use the <loginSec:newPw> element for the new password. The "[LOGIN-SECURITY]" pre-defined string MUST be supported by the server for the client to explicitly indicate to the server whether to use <loginSec:pw> element in place of the [\[RFC5730\]](#) <pw> element or to use the <loginSec:newPw> in place of the [\[RFC5730\]](#) <newPw> element. The server MUST NOT allow the client to set the password to the value "[LOGIN-SECURITY]".

3.3. 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 using upper case "T" and "Z" characters defined in [[W3C.REC-xmlschema-2-20041028](#)] MUST be used to represent date-time values, as XML Schema does not support truncated date-time forms or lower case "t" and "z" characters.

4. EPP Command Mapping

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

4.1. EPP <login> Command

This extension defines additional elements to extend the EPP <login> command and response to be used in conjunction with [[RFC5730](#)].

The EPP <login> command is used to establish a session with an EPP server. This extension overrides the password that is passed with the [[RFC5730](#)] <pw> or the <newPW> element as defined in [Section 3.2](#). A <loginSec:loginSec> element is sent along with the [[RFC5730](#)] <login> command and MUST contain at least one of the following child elements:

<loginSec:userAgent>: OPTIONAL client user agent information that identifies the client application software, technology, and operating system used by the server to identify functional or security constraints, current security issues, and potential future functional or security issues for the client. The server may use the information for real-time identification and client notification of security issues, such as keying off of the client application software for executing security rule checks. The server may capture the information to identify future security policy issues, such as deprecating or removing TLS cipher suites or TLS protocols. The <loginSec:userAgent> element MUST contain at least one of the following child elements:

<loginSec:app>: OPTIONAL name of the client application software with version if available, such as the name of the client SDK "EPP SDK 1.0.0". The <loginSec:app> element value can be created by appending the version number to the name of the application software, such as the Augmented Backus-Naur Form (ABNF) grammar [[RFC5234](#)] format:

app = name SP version


```
    name = 1*VCHAR
    version = 1*VCHAR
<loginSec:tech>:  OPTIONAL technology used for the client
    software with version if available, such as "Vendor Java
    11.0.6".  The <loginSec:tech> element value can be created by
    including the technology vendor, technology name, and
    technology version, such as the Augmented Backus-Naur Form
    (ABNF) grammar [RFC5234] format:

    tech = vendor SP name SP version
    vendor = 1*VCHAR
    name = 1*VCHAR
    version = 1*VCHAR
<loginSec:os>:  OPTIONAL client operating system used with
    version if available, such as "x86_64 Mac OS X 10.15.2".  The
    <loginSec:os> element value can be created by including the
    operating system architecture, operating system name, and
    operating system version, such as the Augmented Backus-Naur
    Form (ABNF) grammar [RFC5234] format:

    os = arch SP name SP version
    arch = 1*VCHAR
    name = 1*VCHAR
    version = 1*VCHAR
<loginSec:pw>:  OPTIONAL plain text password that is case sensitive,
    has a minimum length of 6 characters, and has a maximum length
    that is up to server policy.  All leading and trailing whitespace
    is removed, and all internal contiguous whitespace that includes
    #x9 (tab), #xA (linefeed), #xD (carriage return), and #x20
    (space) is replaced with a single #x20 (space).  This element
    MUST only be set if the [RFC5730] <pw> element is set to the
    "[LOGIN-SECURITY]" value.
<loginSec:newPW>:  OPTIONAL plain text new password that is case
    sensitive, has a minimum length of 6 characters, and has a
    maximum length that is up to server policy.  All leading and
    trailing whitespace is removed, and all internal contiguous
    whitespace that includes #x9 (tab), #xA (linefeed), #xD (carriage
    return), and #x20 (space) is replaced with a single #x20 (space).
    This element MUST only be set if the [RFC5730] <newPW> element is
    set to the "[LOGIN-SECURITY]" value.
```

It is RECOMMENDED that the plain text password in the <loginSec:pw> and <loginSec:newPW> elements use printable ASCII characters #x20 (space) - #x7E (~), with high entropy, such as 128 bits. If non-ASCII characters are supported with the plain text password, then use a standard for passwords with international characters; the OpaqueString PRECIS profile in [[RFC8265](#)] is recommended in the absence of other considerations.

Example login command that uses the <loginSec:pw> element instead of the [\[RFC5730\]](#) <pw> element to establish the session and includes the <loginSec:userAgent> element:

```
C:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
C:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
C:  <command>
C:    <login>
C:      <clID>ClientX</clID>
C:      <pw>[LOGIN-SECURITY]</pw>
C:      <options>
C:        <version>1.0</version>
C:        <lang>en</lang>
C:      </options>
C:      <svcs>
C:        <objURI>urn:ietf:params:xml:ns:obj1</objURI>
C:        <objURI>urn:ietf:params:xml:ns:obj2</objURI>
C:        <objURI>urn:ietf:params:xml:ns:obj3</objURI>
C:      <svcExtension>
C:        <extURI>urn:ietf:params:xml:ns:epp:loginSec-1.0</extURI>
C:      </svcExtension>
C:    </login>
C:    <extension>
C:      <loginSec:loginSec
C:        xmlns:loginSec=
C:          "urn:ietf:params:xml:ns:epp:loginSec-1.0">
C:        <loginSec:userAgent>
C:          <loginSec:app>EPP SDK 1.0.0</loginSec:app>
C:          <loginSec:tech>Vendor Java 11.0.6</loginSec:tech>
C:          <loginSec:os>x86_64 Mac OS X 10.15.2</loginSec:os>
C:        </loginSec:userAgent>
C:        <loginSec:pw>this is a long password</loginSec:pw>
C:      </loginSec:loginSec>
C:    </extension>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```


Example login command that uses the <loginSec:pw> element instead of the [RFC5730] <pw> element to establish the session, and uses the <loginSec:newPW> element instead of the [RFC5730] <newPW> element to set the new password:

```
C:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
C:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
C:  <command>
C:    <login>
C:      <clID>ClientX</clID>
C:      <pw>[LOGIN-SECURITY]</pw>
C:      <newPW>[LOGIN-SECURITY]</newPW>
C:      <options>
C:        <version>1.0</version>
C:        <lang>en</lang>
C:      </options>
C:      <svcs>
C:        <objURI>urn:ietf:params:xml:ns:obj1</objURI>
C:        <objURI>urn:ietf:params:xml:ns:obj2</objURI>
C:        <objURI>urn:ietf:params:xml:ns:obj3</objURI>
C:        <svcExtension>
C:          <extURI>urn:ietf:params:xml:ns:epp:loginSec-1.0</extURI>
C:        </svcExtension>
C:      </svcs>
C:    </login>
C:    <extension>
C:      <loginSec:loginSec
C:        xmlns:loginSec=
C:          "urn:ietf:params:xml:ns:epp:loginSec-1.0">
C:        <loginSec:pw>this is a long password
C:      </loginSec:pw>
C:        <loginSec:newPW>new password that is still long
C:      </loginSec:newPW>
C:    </loginSec:loginSec>
C:  </extension>
C:  <clTRID>ABC-12345</clTRID>
C: </command>
C:</epp>
```


Example login command that uses the [RFC5730] <pw> element to establish the session, and uses the <loginSec:newPW> element instead of the [RFC5730] <newPW> element to set the new password:

```
C:<?xml version="1.0" encoding="UTF-8" standalone="no"?>
C:<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
C:  <command>
C:    <login>
C:      <clID>ClientX</clID>
C:      <pw>shortpassword</pw>
C:      <newPW>[LOGIN-SECURITY]</newPW>
C:      <options>
C:        <version>1.0</version>
C:        <lang>en</lang>
C:      </options>
C:      <svcs>
C:        <objURI>urn:ietf:params:xml:ns:obj1</objURI>
C:        <objURI>urn:ietf:params:xml:ns:obj2</objURI>
C:        <objURI>urn:ietf:params:xml:ns:obj3</objURI>
C:        <svcExtension>
C:          <extURI>urn:ietf:params:xml:ns:epp:loginSec-1.0</extURI>
C:        </svcExtension>
C:      </svcs>
C:    </login>
C:    <extension>
C:      <loginSec:loginSec
C:        xmlns:loginSec=
C:          "urn:ietf:params:xml:ns:epp:loginSec-1.0">
C:        <loginSec:newPW>new password that is still long
C:        </loginSec:newPW>
C:      </loginSec:loginSec>
C:    </extension>
C:    <clTRID>ABC-12345</clTRID>
C:  </command>
C:</epp>
```

Upon a completed login command (success or failed), the extension MUST be included in the response when both of the following conditions hold:

Client supports extension: The client supports the extension based on the <svcExtension> element of the <login> command.
At least one login security event: The server has identified at least one login security event to communicate to the client.

The extension to the EPP response uses the <loginSec:loginSecData> element that contains the following child elements:

<loginSec:event>: One or more <loginSec:event> elements defined in [Section 3.1](#).

Example EPP response to a successful login command on 2020-03-25, where the password will expire in a week:

```
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:    <extension>
S:      <loginSec:loginSecData
S:        xmlns:loginSec=
S:          "urn:ietf:params:xml:ns:epp:loginSec-1.0">
S:        <loginSec:event
S:          type="password"
S:          level="warning"
S:          exDate="2020-04-01T22:00:00.0Z"
S:          lang="en">
S:          Password expiring in a week
S:        </loginSec:event>
S:      </loginSec:loginSecData>
S:    </extension>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```


Example EPP response to a failed login command where the password has expired and the new password does not meet the server complexity requirements:

```
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="2200">
S:      <msg>Authentication error</msg>
S:    </result>
S:    <extension>
S:      <loginSec:loginSecData
S:        xmlns:loginSec=
S:          "urn:ietf:params:xml:ns:epp:loginSec-1.0">
S:        <loginSec:event
S:          type="password"
S:          level="error"
S:          exDate="2020-03-24T22:00:00.0Z">
S:          Password has expired
S:        </loginSec:event>
S:        <loginSec:event
S:          type="newPW"
S:          level="error">
S:          New password does not meet complexity requirements
S:        </loginSec:event>
S:      </loginSec:loginSecData>
S:    </extension>
S:    <trID>
S:      <clTRID>ABC-12345</clTRID>
S:      <svTRID>54321-XYZ</svTRID>
S:    </trID>
S:  </response>
S:</epp>
```

Example EPP response to a successful login command where there is a set of login security events:

```
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:    <extension>
S:      <loginSec:loginSecData
S:        xmlns:loginSec=
S:          "urn:ietf:params:xml:ns:epp:loginSec-1.0">
S:      <loginSec:event
```



```
S:      type="password"
S:      level="warning"
S:      exDate="2020-04-01T22:00:00.0Z"
S:      lang="en">
S:      Password expiration soon
S:    </loginSec:event>
S:    <loginSec:event
S:      type="certificate"
S:      level="warning"
S:      exDate="2020-04-02T22:00:00.0Z"/>
S:    <loginSec:event
S:      type="cipher"
S:      level="warning"
S:      value="TLS_RSA_WITH_AES_128_CBC_SHA">
S:      Non-PFS Cipher negotiated
S:    </loginSec:event>
S:    <loginSec:event
S:      type="tlsProtocol"
S:      level="warning"
S:      value="TLSv1.0">
S:      Insecure TLS protocol negotiated
S:    </loginSec:event>
S:    <loginSec:event
S:      type="stat"
S:      name="failedLogins"
S:      level="warning"
S:      value="100"
S:      duration="P1D">
S:      Excessive invalid daily logins
S:    </loginSec:event>
S:    <loginSec:event
S:      type="custom"
S:      name="myCustomEvent"
S:      level="warning">
S:      A custom login security event occurred
S:    </loginSec:event>
S:  </loginSec:loginSecData>
S: </extension>
S: <trID>
S:   <clTRID>ABC-12345</clTRID>
S:   <svTRID>54321-XYZ</svTRID>
S: </trID>
S: </response>
S: </epp>
```


5. Formal Syntax

The EPP Login Security Extension schema is presented here.

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

5.1. Login Security Extension Schema

BEGIN

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:epp="urn:ietf:params:xml:ns:epp-1.0"
  xmlns:eppcom="urn:ietf:params:xml:ns:eppcom-1.0"
  xmlns:loginSec="urn:ietf:params:xml:ns:epp:loginSec-1.0"
  targetNamespace="urn:ietf:params:xml:ns:epp:loginSec-1.0"
  elementFormDefault="qualified">
  <!--
  Import common element types.
  -->
  <import namespace="urn:ietf:params:xml:ns:eppcom-1.0" />
  <import namespace="urn:ietf:params:xml:ns:epp-1.0" />
  <annotation>
    <documentation>Extensible Provisioning Protocol v1.0
      Login Security Extension Schema.</documentation>
  </annotation>
  <!-- Login command extension elements -->
  <element name="loginSec" type="loginSec:loginSecType" />
  <!--
  Attributes associated with the login command extension.
  -->
  <complexType name="loginSecType">
    <sequence>
      <element name="userAgent"
        type="loginSec:userAgentType" minOccurs="0" />
      <element name="pw"
        type="loginSec:pwType" minOccurs="0" />
      <element name="newPW"
        type="loginSec:pwType" minOccurs="0" />
    </sequence>
  </complexType>
  <simpleType name="pwType">
    <restriction base="token">
      <minLength value="6" />
    </restriction>
```



```
</simpleType>
<complexType name="userAgentType">
  <choice>
    <sequence>
      <element name="app"
        type="token" />
      <element name="tech"
        type="token" minOccurs="0" />
      <element name="os"
        type="token" minOccurs="0" />
    </sequence>
    <sequence>
      <element name="tech"
        type="token" />
      <element name="os"
        type="token" minOccurs="0" />
    </sequence>
    <element name="os"
      type="token" />
  </choice>
</complexType>
<!-- Login response extension elements -->
<element name="loginSecData"
  type="loginSec:loginSecDataType" />
<complexType name="loginSecDataType">
  <sequence>
    <element name="event"
      type="loginSec:eventType"
      minOccurs="1" maxOccurs="unbounded" />
  </sequence>
</complexType>
<!-- Security event element -->
<complexType name="eventType">
  <simpleContent>
    <extension base="normalizedString">
      <attribute name="type"
        type="loginSec:typeEnum" use="required" />
      <attribute name="name"
        type="token" />
      <attribute name="level"
        type="loginSec:levelEnum" use="required" />
      <attribute name="exDate"
        type="dateTime" />
      <attribute name="value"
        type="token" />
      <attribute name="duration"
        type="duration" />
      <attribute name="lang"
```



```
        type="language" default="en" />
    </extension>
</simpleContent>
</complexType>
<!--
    Enumerated list of event types, with extensibility via "custom".
-->
<simpleType name="typeEnum">
    <restriction base="token">
        <enumeration value="password" />
        <enumeration value="certificate" />
        <enumeration value="cipher" />
        <enumeration value="tlsProtocol" />
        <enumeration value="newPW" />
        <enumeration value="stat" />
        <enumeration value="custom" />
    </restriction>
</simpleType>
<!--
    Enumerated list of levels.
-->
<simpleType name="levelEnum">
    <restriction base="token">
        <enumeration value="warning" />
        <enumeration value="error" />
    </restriction>
</simpleType>
<!--
End of schema.
-->
</schema>
END
```

6. IANA Considerations

6.1. XML Namespace

This document uses URNs to describe XML namespaces and XML schemas conforming to a registry mechanism described in [[RFC3688](#)]. The following URI assignment is requested of IANA:

Registration request for the loginSec namespace:

URI: urn:ietf:params:xml:ns:epp:loginSec-1.0

Registrant Contact: IESG

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

Registration request for the loginSec XML schema:

URI: urn:ietf:params:xml:schema:epp:loginSec-1.0
Registrant Contact: IESG
XML: See the "Formal Syntax" section of this document.

6.2. 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: "Login Security 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

7. Implementation Status

Note to RFC Editor: Please remove this section and the reference to [RFC 7942](#) [[RFC7942](#)] before publication.

This section records the status of known implementations of the protocol defined by this specification at the time of posting of this Internet-Draft, and is based on a proposal described in [RFC 7942](#) [[RFC7942](#)]. The description of implementations in this section is intended to assist the IETF in its decision processes in progressing drafts to RFCs. Please note that the listing of any individual implementation here does not imply endorsement by the IETF. Furthermore, no effort has been spent to verify the information presented here that was supplied by IETF contributors. This is not intended as, and must not be construed to be, a catalog of available implementations or their features. Readers are advised to note that other implementations may exist.

According to [RFC 7942](#) [[RFC7942](#)], "this will allow reviewers and working groups to assign due consideration to documents that have the benefit of running code, which may serve as evidence of valuable

experimentation and feedback that have made the implemented protocols more mature. It is up to the individual working groups to use this information as they see fit".

7.1. Verisign EPP SDK

Organization: Verisign Inc.

Name: Verisign EPP SDK

Description: The Verisign EPP SDK includes both a full client implementation and a full server stub implementation of [draft-ietf-regext-login-security](#).

Level of maturity: Development

Coverage: All aspects of the protocol are implemented.

Licensing: GNU Lesser General Public License

Contact: jgould@verisign.com

URL: https://www.verisign.com/en_US/channel-resources/domain-registry-products/epp-sdks

8. Security Considerations

The Security Considerations of [\[RFC5730\]](#) apply in this document, and this document enhances these considerations.

The extension leaves the password (<pw> element) and new password (<newPW> element) minimum length greater than 6 characters and the maximum length up to server policy. The server SHOULD enforce minimum and maximum length requirements that are appropriate for their operating environment. One example of a guideline for password length policies can be found in [section 5](#) of NIST Special Publication 800-63B [\[2\]](#).

The client SHOULD NOT decrease the security of a new password by decreasing the length of the current password. For example, a client with a 20 character password set using the extension, should not use the login command in [\[RFC5730\]](#) without using the extension, to set a new password that is less than or equal to 16 characters.

The extension provides an extensible list of login security events to inform clients of connection and login warnings and errors. The server returning of security events to unauthenticated users needs to

take into account the security/privacy issues of returning information to potential attackers.

The user agent information represents the client system of a system-to-system interface, so the user agent information MUST NOT provide any ability to track individual users or classes of users.

9. Acknowledgements

The authors wish to thank the following persons for their feedback and suggestions:

- o Martin Casanova
- o Scott Hollenbeck
- o Barry Leiba
- o Patrick Mevzek
- o Joseph Yee

10. References

10.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/info/rfc2119>>.
- [RFC3688] Mealling, M., "The IETF XML Registry", [BCP 81](#), [RFC 3688](#), DOI 10.17487/RFC3688, January 2004, <<https://www.rfc-editor.org/info/rfc3688>>.
- [RFC5730] Hollenbeck, S., "Extensible Provisioning Protocol (EPP)", STD 69, [RFC 5730](#), DOI 10.17487/RFC5730, August 2009, <<https://www.rfc-editor.org/info/rfc5730>>.
- [RFC7942] Sheffer, Y. and A. Farrel, "Improving Awareness of Running Code: The Implementation Status Section", [BCP 205](#), [RFC 7942](#), DOI 10.17487/RFC7942, July 2016, <<https://www.rfc-editor.org/info/rfc7942>>.
- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in [RFC 2119](#) Key Words", [BCP 14](#), [RFC 8174](#), DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/info/rfc8174>>.

[W3C.REC-xmlschema-2-20041028]

Biron, P. and A. Malhotra, "XML Schema Part 2: Datatypes Second Edition", World Wide Web Consortium Recommendation REC-xmlschema-2-20041028, October 2004, <<http://www.w3.org/TR/2004/REC-xmlschema-2-20041028>>.

10.2. Informative References

[RFC5234] Crocker, D., Ed. and P. Overell, "Augmented BNF for Syntax Specifications: ABNF", STD 68, [RFC 5234](#), DOI 10.17487/RFC5234, January 2008, <<https://www.rfc-editor.org/info/rfc5234>>.

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

[RFC8265] Saint-Andre, P. and A. Melnikov, "Preparation, Enforcement, and Comparison of Internationalized Strings Representing Usernames and Passwords", [RFC 8265](#), DOI 10.17487/RFC8265, October 2017, <<https://www.rfc-editor.org/info/rfc8265>>.

10.3. URIs

- [1] <https://www.iana.org/assignments/tls-parameters/tls-parameters.xhtml#tls-parameters-4>
- [2] <https://pages.nist.gov/800-63-3/sp800-63b.html>

Appendix A. Change History

[[RFC Editor: Please remove this section.]]

A.1. Change from 00 to 01

1. Based on the feedback from Patrick Mevzek and a proposal from Scott Hollenbeck, changed the minimum length of the password from 8 to 6, revised the description of the password, and added text in the Security Considerations section for the server password length policy.

A.2. Change from 01 to 02

1. Changed the XML namespace from urn:ietf:params:xml:ns:loginSec-0.3 to urn:ietf:params:xml:ns:epp:loginSec-0.3, and changed the XML schema registration from urn:ietf:params:xml:ns:loginSec-0.3

to urn:ietf:params:xml:schema:epp:loginSec-0.3 based on a request from IANA with [draft-ietf-regext-allocation-token](#).

[A.3.](#) Change from 02 to 03

1. Updates based on the review by Patrick Mevzek, that include:
 1. Fix the inconsistent case for newPW, that required a global change in the draft text and an update to the XML schema to "urn:ietf:params:xml:ns:loginSec-0.3".
 2. Changed "contains the following child elements" to "MUST contain at least one of the following child elements", section "EPP <login> Command" to ensure that an empty <loginSec:loginSec> element is not passed.
 3. Add "The client SHOULD NOT decrease the security of a new password by decreasing the length of the current password." along with an example to the "Security Considerations" section.

[A.4.](#) Change from 03 to REGEXT 00

1. Changed to regext working group draft by changing [draft-gould-regext-login-security](#) to [draft-ietf-regext-login-security](#).

[A.5.](#) Change from REGEXT 00 to REGEXT 01

1. Changed the <loginSec:userAgent> element to be structured with the <loginSec:app>, <loginSec:tech>, and <loginSec:os> sub-elements. This was based on the feedback from Martin Casanova. This resulted in the need to change the XML namespace from urn:ietf:params:xml:ns:epp:loginSec-0.3 to urn:ietf:params:xml:ns:epp:loginSec-0.4.

[A.6.](#) Change from REGEXT 01 to REGEXT 02

1. Updated the Implementation Status section from "TBD" to include the Verisign EPP SDK implementation.

[A.7.](#) Change from REGEXT 02 to REGEXT 03

1. Revised the description of the "duration" attribute to clarify that it ends when the login command was received and to clarify the format, based on the feedback from Martin Casanova.
2. Revised the sentence 'Upon a completed login command (success or failed), the extension MUST be included in the response based on the following conditions:' to 'Upon a completed login command (success or failed), the extension MUST be included in the

response based on both of the following conditions:' based on the feedback from Patrick Mevzek.

3. Updates based on the review by Joseph Yee, that include:
 1. Revised the description of the <loginSec:event> "name" attribute read 'Used to define a sub-type when the "type" attribute is not "custom" or the full type name when the "type" attribute is "custom"'. The definition of the "stat" type was updated to 'Provides a login security statistical warning that MUST set the "name" attribute to the name of the statistic.'
 2. Added the following sentence 'The server MUST NOT allow the client to set the password to the value "[LOGIN-SECURITY]".' to address the corner case where the constant is used as the password.
 3. Revised the description of the <loginSec:userAgent> element to read 'The <loginSec:userAgent> element MUST contain at least one of the following child elements:'.
 4. Revised the description of the <loginSec:userAgent> to match the child elements that can be passed, by changing "client software" to "client application software" and change "language" to "technology".
 5. Changed the XML namespace from urn:ietf:params:xml:ns:epp:loginSec-0.4 to urn:ietf:params:xml:ns:epp:loginSec-1.0.

[A.8.](#) Change from REGEXT 03 to REGEXT 04

Updates based on the review by Joseph Yee, that include:

1. Update the definition of the "stat" security event type to reference sub-type to match the language for the "name" attribute.
2. Added the sentence 'The "name" attribute MUST be set when the "type" attribute is "stat" or "custom".' to the definition of the "name" attribute for clarity.
3. Update the definition of the "userAgentType" in the XML schema to require at least one sub-element using a <choice> element.

[A.9.](#) Change from REGEXT 04 to REGEXT 05

Updates based on the review by Barry Leiba, that include:

1. In [section 1.1](#), updated to use [BCP 14](#) boilerplate and references as defined in [RFC 8174](#).
2. In [section 1.1](#), change "REQUIRED" to "required".
3. Keep the "Migration to Newer Versions of This Extension" section by removing the note for removal to the RFC Editor.

4. In [section 3.1](#), change "MAY be multiple events returned that provides information" to "MAY be multiple events returned that provide information".
5. In [section 3.1](#), change "free form" to "free-form".
6. In [section 3.1](#), change "The enumerated list of "type" values include:" to "The enumerated list of "type" values includes:".
7. In [section 3.1](#), change "Identifies the language of the free-form description if the negotiated language is something other than the default value of "en" (English)." to "Identifies the negotiated language of the free-form description. The default is "en" (English)."
8. In [section 3.1](#), change example description from "Example login security event for a password expiring in a week:" to "Example login security event for password expiration, where the current date is 2018-03-25:".
9. In [section 4.1](#), change "Example EPP response to a successful login command where the password will expire in a week:" to "Example EPP response to a successful login command on 2018-03-25, where the password will expire in a week:".

[A.10.](#) Change from REGEXT 05 to REGEXT 06

Updates based on the review by Brian Carpenter, that include:

1. In [section 1](#), change the references to [RFC 5730](#) to use links.
2. In [section 2](#), change "(for a temporary migration period)" to "(for a temporary migration period up to server policy)".

[A.11.](#) Change from REGEXT 06 to REGEXT 07

1. Updates based on feedback from Barry Leiba, added recommendations on the characters used for the plain text password. Recommended the use of printable ASCII passwords and if non-ASCII characters are supported, to use a standard for passwords with international characters, such as the OpaqueString PRECIS profile in [[RFC8265](#)].
2. Based on the feedback from Carlos Pignataro, added "[[RFC Editor: Please remove this section.]]" to the "Change History" section.

[A.12.](#) Change from REGEXT 07 to REGEXT 08

1. Based on feedback from Eric Vyncke during the IESG review, changed [[RFC8174](#)] from the informative references into the normative references.
2. Based on feedback from Alissa Cooper during the IESG review, changed the sentence "One schema is presented here that is the EPP Login Security Extension schema." in [section 5](#) to "The EPP Login Security Extension schema is presented here.".
3. Changed "sever policy" to "server policy" in [section 8](#).

4. Updates based on feedback from Roman Danyliw during the IESG review:
 1. Changed "pasword" to "password" in [section 1](#).
 2. In [section 3.1](#), added a reference to section 3.3.3 of [W3C.REC-xmlschema-2-20041028] for the format of the "lang" attribute. Added the corresponding section (3.2.6) for the "duration" attribute.
 3. Added the "XML" prefix for each reference to "schema" in the introduction of [section 5](#).
 4. Added the leading sentence "The Security Considerations of [RFC5730] apply in this document, and this document enhances these considerations." to [section 8](#).
 5. Added the sentence 'The possible set of "name" values, by event type, can be discovered / negotiated out of band to EPP or using a separate EPP extension designed to provide server policy information to the client.' to the description of the "name" attribute.
 6. Added a description of how to create the <loginSec:app>, <loginSec:tech>, and <loginSec:os> values using ABNF.
5. Updates based on feedback from Alexey Melnikov during the IESG review:
 1. Added a description of "whitespace" to [section 1.1](#).
 2. Added a description of the usage of the user agent information in [section 4.1](#).
6. Updates based on feedback from Benjamin Kaduk during the IESG review:
 1. Added "A newer version of the extension is expected to use an XML namespace with a higher version number than the prior versions." to the first paragraph of [section 2](#).
 2. In [section 3.1](#), replace the sentence "There MAY be multiple events returned that provide information for the client to address." with "The <loginSec:event> element is contained in a list of one or more elements in the <loginSec:loginSecData> element, so there MAY be multiple events returned that provide information for the client to address."
 3. In [section 3.1](#), for the "exDate" attribute, replace the sentence "At expiry there MAY be an error to connect or MAY be an error to login." with "At expiry there MAY be a connection failure or MAY be a login failure." and a similar change to the following sentence.
 4. In [section 3.1](#), replace the description of the "cipher" type and the "tlsProtocol" type.

5. In [section 3.1](#), add a sentence that the "exDate" attribute MUST be set for the "password" type and the "certificate" type.
6. Updates the dates by replacing 2018 with 2020.
7. In [section 3.2](#), update the MUST override sentences for the <loginSec:pw> and the <loginSec:newPw> elements.
8. In [section 4.1](#), update "OPTIONAL client user agent" with "OPTIONAL client user agent information" for the description of the <loginSec:userAgent> element.
9. In [section 4.1](#), replace "MUST only be used" to "MUST only be set" for the <loginSec:pw> and <loginSec:newPw> elements.
10. Updated references of "x86_64 Mac OS X 10.11.6" to "x86_64 Mac OS X 10.15.2".
11. In [section 4.1](#), replace "MUST be included in the response based on both of the following conditions" with "MUST be included in the response when both of the following conditions hold".
12. In [section 4.1](#), update the "exDate" for the "password" security event error to be "2020-03-24T22:00:00.0Z" so that it's prior to the date 2020-03-25 reference previously.
13. In [section 8](#), add the sentence "The server returning of security events to unauthenticated users needs to take into account the security/privacy issues of returning information to potential attackers." to the end of the last paragraph.
14. In [section 8](#), change "minimum length beyond 6 characters" to "minimum length greater than 6 characters".
15. In [section 8](#), add the sentence "The user agent information represents the client system of a system-to-system interface, so the user agent information MUST NOT provide any ability to track individual users or classes of users."

[A.13.](#) Change from REGEXT 08 to REGEXT 09

1. Based on feedback from Barry Leiba in responding to Benjamin Kaduk's discuss item, changed "It is recommended that the plain text..." to "It is RECOMMENDED that the plain text..." and "If non-ASCII characters are supported with the plain text password, then use a standard for passwords with international characters, such as the OpaqueString PRECIS profile in [[RFC8265](#)]." to "If non-ASCII characters are supported with the plain text password, then use a standard for passwords with international characters; the OpaqueString PRECIS profile in [[RFC8265](#)] is recommended in the absence of other considerations."

A.14. Change from REGEXT 09 to REGEXT 10

1. Based on feedback from Benjamin Kaduk, added the sentence "EPP [[RFC5730](#)] includes a maximum password length of 16 characters that inhibits implementing stronger password security policies with higher entropy." to the Introduction.

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