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Filtering Location Notifications in the Session Initiation Protocol (SIP)

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Abstract

This document describes filters that limit asynchronous location notifications to compelling events, designed as an extension to RFC 4661, an XML-based format for event notification filtering, and based on RFC 3856, the SIP presence event package. The resulting location information is conveyed in existing location formats wrapped in the Presence Information Data Format Location Object (PIDF-LO).

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1. Introduction

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Conveying location information encapsulated with a [Presence Information Data Format Location Object \(PIDF-LO\)](#) (Peterson, J., "A Presence-based GEOPRIV Location Object Format," December 2005.) [RFC4119] document within SIP is described in [\[I-D.ietf-sipcore-location-conveyance\]](#) (Polk, J. and B. Rosen, "Location Conveyance for the Session Initiation Protocol," February 2010.). An alternative signaling approach to location conveyance, which uses asynchronous communication, is available with the SIP event notification mechanisms (see RFC 3265 [\[RFC3265\]](#) (Roach, A., "Session Initiation Protocol (SIP)-Specific Event

[Notification," June 2002.](#)). This document focuses on the event notification paradigm. Event notifications are technically more complex since location may be measured as a continuous gradient and unlike notifications using discrete-valued quantities, it is difficult to know when a change in location is large enough to warrant a notification. Event notifications [\[RFC3265\] \(Roach, A., "Session Initiation Protocol \(SIP\)-Specific Event Notification," June 2002.\)](#) can be used with filters (see RFC 4661 [\[RFC4661\] \(Khartabil, H., Leppanen, E., Lonnfors, M., and J. Costa-Requena, "An Extensible Markup Language \(XML\)-Based Format for Event Notification Filtering," September 2006.\)](#)) that allow the number of notifications to be reduced. The mechanism described in this document defines an extension to RFC 4661 [\[RFC4661\] \(Khartabil, H., Leppanen, E., Lonnfors, M., and J. Costa-Requena, "An Extensible Markup Language \(XML\)-Based Format for Event Notification Filtering," September 2006.\)](#), which limits location notification to events that are of relevance to the subscriber. These filters persist until they are changed with a replacement filter or when the subscription itself is terminated. The frequency of notifications necessary for various geographic location applications varies dramatically. The subscriber should be able to get asynchronous notifications with appropriate frequency and granularity, without being flooded with a large number of notifications that are not important to the application. This document defines a new event filters and describes others using existing mechanisms that may be relevant to a subscriber in the context of location filtering. Based on the functionality defined in this document notifications can be provided in the following cases:

1. the Device moves more than a specified distance since the last notification (see [Section 3.1 \(Movement\)](#)).
2. the Device exceeds a specified speed (see [Section 3.2 \(Speed Changes\)](#)).
3. the Device enters or exits a region, described by a circle or a polygon (see [Section 3.4 \(Entering or Exiting a Region\)](#)).
4. one or more of the values of the specified address labels have changed for the location of the Device (see [Section 3.3 \(Element Value Changes\)](#)). For example, the value of the <A1> civic address element has changed from 'California' to 'Nevada'.
5. the type of location information being requested (see [Section 3.5 \(Location Type\)](#)).
6. a certain amount of time passes (see [Section 3.6 \(Rate Control\)](#)).

This document builds on the presence event package [\[RFC3856\] \(Rosenberg, J., "A Presence Event Package for the Session Initiation Protocol](#)

(SIP),” [August 2004.](#)), i. e. an existing event package for communicating location information inside the PIDF-LO.

2. Terminology

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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 \(Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels," March 1997.\)](#) [RFC2119].

This document reuses terminology from [\[I-D.ietf-geopriv-arch\] \(Barnes, R., Lepinski, M., Cooper, A., Morris, J., Tschofenig, H., and H. Schulzrinne, "An Architecture for Location and Location Privacy in Internet Applications," October 2009.\)](#).

3. Filter Definitions

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This specification builds on top of a number of other specifications, as noted in [Section 1 \(Introduction\)](#). In order to reduce the number of options (and thereby decrease the chance of interoperability problems), the functionality of [\[RFC4661\] \(Khartabil, H., Leppanen, E., Lonnfors, M., and J. Costa-Requena, "An Extensible Markup Language \(XML\)-Based Format for Event Notification Filtering," September 2006.\)](#) listed in the sub-sections below MUST be implemented, namely the <ns-bindings> (see Section 3.3 of [\[RFC4661\] \(Khartabil, H., Leppanen, E., Lonnfors, M., and J. Costa-Requena, "An Extensible Markup Language \(XML\)-Based Format for Event Notification Filtering," September 2006.\)](#)), the <filter> (Section 3.4 of [\[RFC4661\] \(Khartabil, H., Leppanen, E., Lonnfors, M., and J. Costa-Requena, "An Extensible Markup Language \(XML\)-Based Format for Event Notification Filtering," September 2006.\)](#)), and the <trigger> (Section 3.6 of [\[RFC4661\] \(Khartabil, H., Leppanen, E., Lonnfors, M., and J. Costa-Requena, "An Extensible Markup Language \(XML\)-Based Format for Event Notification Filtering," September 2006.\)](#) excluding the functionality of the <added> and <removed> element).

3.1. Movement

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The <moved> element MUST contain a value in meters indicates the minimum distance that the resource must have moved from the location of the resource since the last notification was sent in order to trigger this event. The distance MUST be measured in meters absolutely from the point

of last notification, and must include vertical movement. The <moved> element MUST NOT appear more than once as a child element of the <filter> element.

```
<?xml version="1.0" encoding="UTF-8"?>
<filter-set
  xmlns="urn:ietf:params:xml:ns:simple-filter"
  xmlns:lf="urn:ietf:params:xml:ns:location-filter">
  <filter id="123" uri="sip:presentity@example.com">
    <trigger>
      <lf:moved>300</lf:moved>
    </trigger>
  </filter>
</filter-set>
```

Figure 1: Movement Filter Example

3.2. Speed Changes

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Speed changes can be filtered by combining functionality from RFC 4661 with the PIDF-LO extensions for spatial orientation, speed, heading, and acceleration defined in [\[I-D.singh-geopriv-pidf-lo-dynamic\]](#) (Schulzrinne, H., Singh, V., Tschofenig, H., and M. Thomson, "Dynamic Extensions to the Presence Information Data Format Location Object (PIDF-LO)," March 2010.). The value of the <speed> element from [\[I-D.singh-geopriv-pidf-lo-dynamic\]](#) (Schulzrinne, H., Singh, V., Tschofenig, H., and M. Thomson, "Dynamic Extensions to the Presence Information Data Format Location Object (PIDF-LO)," March 2010.) MUST be defined in meters per second. Note that the condition could be met by a change in any axis including altitude. [Figure 2 \(Speed Change Example\)](#) shows an example for a trigger that fires when the speed of the Target changes by 3 meters per second.

```
<?xml version="1.0" encoding="UTF-8"?>
<filter-set xmlns="urn:ietf:params:xml:ns:simple-filter">
  <ns-bindings>
    <ns-binding prefix="dyn"
      urn="urn:ietf:params:xml:schema:pidf:dynamic"/>
  </ns-bindings>
  <filter id="123" uri="sip:presentity@example.com">
    <trigger>
      <changed by="3">
        //dyn:speed
      </changed>
    </trigger>
  </filter>
</filter-set>
```

Figure 2: Speed Change Example

An implementation MUST support <ns-bindings> to replace the namespace prefix. The XPath expression MUST start with a '/' followed by a single element. No other form of XPath expression is supported. The <changed> element comes with a few attributes but only the 'by' attribute MUST be implemented by this specification.

3.3. Element Value Changes

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Changes in values, for example related to civic location information, is provided by the base functionality offered with RFC 4661 utilizing the <changed> element.

[Figure 3 \(Element Value Change Example\)](#) shows an example where a notification is sent when the civic address tokens A1, A2, A3, and PC change (all four must change in order to let the <trigger> element evaluate to TRUE).

(A change in ALL four tokens triggers an event.)

```
<?xml version="1.0" encoding="UTF-8"?>
<filter-set xmlns="urn:ietf:params:xml:ns:simple-filter">
  <ns-bindings>
    <ns-binding prefix="ca"
      urn="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr"/>
  </ns-bindings>
  <filter id="123" uri="sip:presentity@example.com">
    <trigger>
      <changed>//ca:country</changed>
      <changed>//ca:A1</changed>
      <changed>//ca:A2</changed>
      <changed>//ca:A3</changed>
      <changed>//ca:PC</changed>
    </trigger>
  </filter>
</filter-set>
```

Figure 3: Element Value Change Example

Note: The civic address tokens country, A1, A2, ..., A6 are hierarchical. It is likely that a change in one civic address token therefore leads to changes of tokens lower in the hierarchy, e.g., a change in A3 ('city or town') may cause a change in A4, A5, and A6.

In times where it is desirable to know if any one element of a list of CTypes changes, then they have to be put into separate <changes> filters to ensure you are notified when any of the element values change. [Figure 4 \(Element Value Change Example\)](#) shows such an example that illustrates the difference.

(A change in value of ANY of the four tokens triggers an event.)

```

<?xml version="1.0" encoding="UTF-8"?>
<filter-set xmlns="urn:ietf:params:xml:ns:simple-filter">
  <ns-bindings>
    <ns-binding prefix="ca"
      urn="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr"/>
  </ns-bindings>
  <filter id="123" uri="sip:presentity@example.com">
    <trigger>
      <changed>//ca:country</changed>
    </trigger>
    <trigger>
      <changed>//ca:A1</changed>
    </trigger>
    <trigger>
      <changed>//ca:A2</changed>
    </trigger>
    <trigger>
      <changed>//ca:A3</changed>
    </trigger>
    <trigger>
      <changed>//ca:PC</changed>
    </trigger>
  </filter>
</filter-set>

```

Figure 4: Element Value Change Example

The following example illustrates a filter that triggers when the Target's location changes from 'FR' (France) to some other country.

```

<?xml version="1.0" encoding="UTF-8"?>
<filter-set xmlns="urn:ietf:params:xml:ns:simple-filter">
  <ns-bindings>
    <ns-binding prefix="ca"
      urn="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr"/>
  </ns-bindings>
  <filter id="123" uri="sip:presentity@example.com">
    <trigger>
      <changed from="FR">//ca:country</changed>
    </trigger>
  </filter>
</filter-set>

```


Figure 5: Element Value Change Example (Country Change)

An implementation MUST support <ns-bindings> to replace the namespace prefix. The XPath expression MUST start with a '/' followed by a single element. No other form of XPath expression is supported. No other variant is supported. The <changed> element comes with a few attributes and the 'by', 'to' and 'from' attribute MUST be implemented to support this specification.

3.4. Entering or Exiting a Region

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The <enterOrExit> condition is satisfied when the Target enters or exits a named 2-dimensional region described by a polygon (as defined in Section 5.2.2 of [\[RFC5491\] \(Winterbottom, J., Thomson, M., and H. Tschofenig, "GEOPRIV Presence Information Data Format Location Object \(PIDF-LO\) Usage Clarification, Considerations, and Recommendations," March 2009.\)](#)), or a circle (as defined in Section 5.2.3 of [\[RFC5491\] \(Winterbottom, J., Thomson, M., and H. Tschofenig, "GEOPRIV Presence Information Data Format Location Object \(PIDF-LO\) Usage Clarification, Considerations, and Recommendations," March 2009.\)](#)). The <enterOrExit> element MUST contain either a polygon or a circle as a child element. The <enterOrExit> element MUST NOT have more than one polygon and/or circle.

If the Target was previously outside the region, the notifier sends a notification when the Target's location is within the region with at least 50% confidence. Similarly, when a Target starts within the region, a notification is sent when the Target's location moves outside the region with at least 50% confidence.

Note that having 50% confidence that the Target is inside the area does not correspond to 50% outside. The confidence that the location is within the region, plus the confidence that the location is outside the region is limited to the confidence of the location. The total confidence depends on the confidence in the location, which is always less than 100% (95% is recommended in [\[RFC5491\] \(Winterbottom, J., Thomson, M., and H. Tschofenig, "GEOPRIV Presence Information Data Format Location Object \(PIDF-LO\) Usage Clarification, Considerations, and Recommendations," March 2009.\)](#)). The benefit of this is that notifications are naturally limited: small movements (relative to the uncertainty of the location) at the borders of the region do not trigger notifications.

[Figure 6 \(<enterOrExit> Circle Filter Example\)](#) shows filter examples whereby a notification is sent when the Target enters or exits an area described by a circle and [Figure 7 \(<enterOrExit> Polygon Filter Example\)](#) describes an area using a polygon.

```
<?xml version="1.0" encoding="UTF-8"?>
<filter-set
  xmlns="urn:ietf:params:xml:ns:simple-filter"
  xmlns:lf="urn:ietf:params:xml:ns:location-filter"
  xmlns:gml="http://www.opengis.net/gml"
  xmlns:gs="http://www.opengis.net/pidflo/1.0">

  <filter id="123" uri="sip:presentity@example.com">
    <trigger>
      <lf:enterOrExit>
        <gs:Circle
          srsName="urn:ogc:def:crs:EPSG::4326">
            <gml:pos>42.5463 -73.2512</gml:pos>
            <gs:radius
              uom="urn:ogc:def:uom:EPSG::9001">
                850.24
            </gs:radius>
          </gs:Circle>
        </lf:enterOrExit>
      </trigger>
    </filter>
  </filter-set>
```

Figure 6: <enterOrExit> Circle Filter Example

```

<?xml version="1.0" encoding="UTF-8"?>
<filter-set
  xmlns="urn:ietf:params:xml:ns:simple-filter"
  xmlns:lf="urn:ietf:params:xml:ns:location-filter"
  xmlns:gml="http://www.opengis.net/gml">

  <filter id="123" uri="sip:presentity@example.com">
    <trigger>
      <lf:enterOrExit>
        <gml:Polygon srsName="urn:ogc:def:crs:EPSG::4326">
          <gml:exterior>
            <gml:LinearRing>
              <gml:pos>43.311 -73.422</gml:pos>
              <!--A-->
              <gml:pos>43.111 -73.322</gml:pos>
              <!--F-->
              <gml:pos>43.111 -73.222</gml:pos>
              <!--E-->
              <gml:pos>43.311 -73.122</gml:pos>
              <!--D-->
              <gml:pos>43.411 -73.222</gml:pos>
              <!--C-->
              <gml:pos>43.411 -73.322</gml:pos>
              <!--B-->
              <gml:pos>43.311 -73.422</gml:pos>
              <!--A-->
            </gml:LinearRing>
          </gml:exterior>
        </gml:Polygon>
      </lf:enterOrExit>
    </trigger>
  </filter>
</filter-set>

```

Figure 7: <enterOrExit> Polygon Filter Example

3.5. Location Type

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The <locationType> element MAY be included as a child element of the <what> element and it contains a list of location information types that are requested by the subscriber. The following list describes the possible values:

any:

The Notifier SHOULD attempt to provide LI in all forms available to it.

geodetic: The Notifier SHOULD return a location by value in the form of a geodetic location.

civic: The Notifier SHOULD return a location by value in the form of a civic address.

The Notifier SHOULD return the requested location type or types. The location types the Notifier returns also depends on the setting of the optional 'exact' attribute. If the 'exact' attribute is set to "true" then the Notifier MUST return either the requested location type or no location information. The 'exact' attribute does not apply (is ignored) for a request for a location type of "any".

In the case of a request for specific locationType(s) and the 'exact' attribute is "false", the Notifier MAY provide additional location types, or it MAY provide alternative types if the request cannot be satisfied for a requested location type.

If the <locationType> element is absent, a value of "any" MUST be assumed as the default.

The Notifier SHOULD provide location in the response in the same order in which they were included in the "locationType" element in the request. Indeed, the primary advantage of including specific location types in a request when the 'exact' attribute is set to "false" is to ensure that one receives the available locations in a specific order. For example, a subscription for "civic" (with the 'exact' attribute set to "false") could yield any of the following location types in the response:

*civic

*civic, geodetic

*geodetic (only if civic is not available)

The default value of "false" for the 'exact' attribute allows the Notifier the option of returning something beyond what is specified, such as a set of location URIs when only a civic location was requested. An example is shown in [Figure 8 \(<locationType> Filter Example\)](#) that utilizes the <locationType> element with the 'exact' and the 'responseTime' attribute.

```
<?xml version="1.0" encoding="UTF-8"?>
<filter-set
  xmlns="urn:ietf:params:xml:ns:simple-filter"
  xmlns:lf="urn:ietf:params:xml:ns:location-filter">
  <filter id="123" uri="sip:presentity@example.com">
    <what>
      <lf:locationType exact="true">
        geodetic
      </lf:locationType>
    </what>
  </filter>
</filter-set>
```

Figure 8: <locationType> Filter Example

3.6. Rate Control

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[\[I-D.ietf-sipcore-event-rate-control\]](#) (Niemi, A., Kiss, K., and S. Loreto, "Session Initiation Protocol (SIP) Event Notification Extension for Notification Rate Control," February 2010.) extends the SIP events framework by defining the following three "Event" header field parameters that allow a subscriber to set a minimum, a maximum and an average rate of event notifications generated by the notifier. This allows a subscriber to have overall control over the stream of notifications, for example to avoid being flooded. Two of the parameters, namely "min-interval" (which specifies a minimum notification time period between two notifications, in seconds) and "max-interval" (which specifies a maximum notification time period between two notifications, in seconds.) are used by this document. Only the implementation of these two attributes is required from the attributes defined in [\[I-D.ietf-sipcore-event-rate-control\]](#) (Niemi, A., Kiss, K., and S. Loreto, "Session Initiation Protocol (SIP) Event Notification Extension for Notification Rate Control," February 2010.). Whenever the time since the most recent notification exceeds the value in the "max-interval" parameter, the current state would be sent in its entirety, just like after a subscription refresh. A notifier is required to send a NOTIFY request immediately after creation of a subscription. If state is not available at that time, then the NOTIFY request may be sent with no content. A separate NOTIFY containing location is subsequently generated some time between the time included in 'min-interval' and the time in 'max-interval'. An important use case for location based applications focuses on the behavior of the initial NOTIFY message(s) and the information it returns, for example in

case of emergency call routing. When an initial NOTIFY is transmitted it might not include complete state.

Subscriber	Notifier
---SUBSCRIBE(1)--->	Create subscription (w/small value
<-----200-----	for min-interval and max-interval)
<-----NOTIFY(2)----	Return initial notify with no state
-----200----->	
<-----NOTIFY(3)----	Return full state (between min-interval
-----200----->	and max-interval)
---SUBSCRIBE(4)--->	Update subscription (to update
<-----200-----	min-interval and max-interval)

Figure 9: SUBSCRIBE/NOTIFY with Rate Control

[Figure 9 \(SUBSCRIBE/NOTIFY with Rate Control\)](#) shows a SUBSCRIBE/NOTIFY exchange. The initial SUBSCRIBE message (1) has filters attached and contains a 'max-interval' rate control parameter. In certain situations it is important to obtain some amount of location information within a relatively short and pre-defined period of time even if the obtained location information contains a high amount of uncertainty and location information with less uncertainty at a later point in time. An example is emergency call routing where a emergency services routing proxy may need to obtain location information suitable for routing rather quickly and subsequently a Public Safety Answering Point requests location information for dispatch.

To obtain location information in a timely fashion using the SUBSCRIBE/NOTIFY mechanism, it is RECOMMENDED that the initial SUBSCRIBE contains a 'max-interval' rate control parameter (with a small value) that is in a later message updated to a more sensible value. This provides equivalent functionality to the 'responseTime' attribute in Section 6.1 of [\[I-D.ietf-geopriv-http-location-delivery\] \(Barnes, M., Winterbottom, J., Thomson, M., and B. Stark, "HTTP Enabled Location Delivery \(HELD\)," August 2009.\)](#). The 'max-interval' for this first request is therefore much lower than thereafter. Updating the 'max-interval' for the subscription can be performed in the 200 response (see message 3) to the NOTIFY that contains state. Depending on the value in the 'max-interval' parameter the Notifier may create a NOTIFY message (see message 2) immediately in response to the SUBSCRIBE that might be empty in case no location information is available at this point in time. The desired location information may then arrive in the subsequent NOTIFY message (see message 4).

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema
  targetNamespace="urn:ietf:params:xml:ns:location-filter"
  xmlns:filter="urn:ietf:params:xml:ns:location-filter"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:gml="http://www.opengis.net/gml">

  <xs:element name="enterOrExit" type="gml:GeometryPropertyType"/>

  <xs:element name="moved" type="filter:movedType"/>

  <xs:complexType name="movedType">
    <xs:simpleContent>
      <xs:extension base="xs:double">
        <xs:anyAttribute namespace="##any" processContents="lax"/>
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>

  <xs:element name="locationType" type="filter:locationTypeType"/>

  <xs:simpleType name="locationTypeBase">
    <xs:union>
      <xs:simpleType>
        <xs:restriction base="xs:token">
          <xs:enumeration value="any"/>
        </xs:restriction>
      </xs:simpleType>
      <xs:simpleType>
        <xs:restriction base="filter:locationTypeList">
          <xs:minLength value="1"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:union>
  </xs:simpleType>

  <xs:simpleType name="locationTypeList">
    <xs:list>
      <xs:simpleType>
        <xs:restriction base="xs:token">
          <xs:enumeration value="civic"/>
          <xs:enumeration value="geodetic"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:list>
  </xs:simpleType>

  <xs:complexType name="locationTypeType">
    <xs:simpleContent>

```



```
<xs:extension base="filter:locationTypeBase">
  <xs:attribute name="exact" type="xs:boolean"
    use="optional" default="false"/>
</xs:extension>
</xs:simpleContent>
</xs:complexType>
</xs:schema>
```

Figure 10: XML Schema

5. Security Considerations

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This document specifies one piece, namely filters, utilized in larger system. As such, this document builds on a number of specifications for the security of the complete solution, namely

- *the SIP event notification mechanism, described in RFC 3265 [\[RFC3265\]](#) (Roach, A., "Session Initiation Protocol (SIP)-Specific Event Notification," June 2002.), defining the SUBSCRIBE/NOTIFY messages.
- *the presence event package, described in RFC 3856 [\[RFC3856\]](#) (Rosenberg, J., "A Presence Event Package for the Session Initiation Protocol (SIP)," August 2004.), which is a concrete instantiation of the general event notification framework.
- *the filter framework, described in RFC 4661 [\[RFC4661\]](#) (Khartabil, H., Leppanen, E., Lonnfors, M., and J. Costa-Requena, "An Extensible Markup Language (XML)-Based Format for Event Notification Filtering," September 2006.), to offer the ability to reduce the amount of notifications being sent.

Finally, this document indirectly (via the SIP presence event package) relies on PIDF-LO, described in RFC 4119 [\[RFC4119\]](#) (Peterson, J., "A Presence-based GEOPRIV Location Object Format," December 2005.), as the XML container that carries location information.

Each of these documents listed above comes with a security consideration section but the security and privacy aspects are best covered by the SIP presence event package, see Section 9 of [\[RFC3856\]](#) (Rosenberg, J., "A Presence Event Package for the Session Initiation Protocol (SIP)," August 2004.), and with the GEOPRIV architectural description found in [\[I-D.ietf-geopriv-arch\]](#) (Barnes, R., Lepinski, M., Cooper, A., Morris, J., Tschofenig, H., and H. Schulzrinne, "An Architecture for Location and Location Privacy in Internet Applications," October 2009.).

The functionality offered by authorization policies to limit access to location information are provided by other protocols, such as Common Policy [RFC4745] (Schulzrinne, H., Tschofenig, H., Morris, J., Cuellar, J., Polk, J., and J. Rosenberg, "Common Policy: A Document Format for Expressing Privacy Preferences," February 2007.), Geolocation Policy [I-D.ietf-geopriv-policy] (Schulzrinne, H., Tschofenig, H., Morris, J., Cuellar, J., and J. Polk, "Geolocation Policy: A Document Format for Expressing Privacy Preferences for Location Information," January 2010.) or more recent work around HELD context [I-D.winterbottom-geopriv-held-context] (Winterbottom, J., Tschofenig, H., and M. Thomson, "Location URI Contexts in HTTP-Enabled Location Delivery (HELD)," October 2009.). Although [I-D.ietf-geopriv-policy] (Schulzrinne, H., Tschofenig, H., Morris, J., Cuellar, J., and J. Polk, "Geolocation Policy: A Document Format for Expressing Privacy Preferences for Location Information," January 2010.) defines a standardized format for geolocation authorization policies it does not define specific policies for controlling filters. The functionality described in this document extends the filter framework with location specific filters. Local policies might be associated with the usage of certain filter constructs and with the amount of notifications specific filter settings might cause. Uploading filters have a significant effect on the ways in which the request is handled at a server. As a result, it is especially important that messages containing this extension be authenticated and authorized. RFC 4661 [RFC4661] (Khartabil, H., Leppanen, E., Lonnfors, M., and J. Costa-Requena, "An Extensible Markup Language (XML)-Based Format for Event Notification Filtering," September 2006.) discusses this security threat and proposed authentication and authorization solutions applicable by this specification.

6. IANA Considerations

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6.1. URN Sub-Namespace Registration for `urn:ietf:params:xml:ns:location-filter`

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This section registers a new XML namespace, as per the guidelines in [RFC3688] (Mealling, M., "The IETF XML Registry," January 2004.).

URI: `urn:ietf:params:xml:ns:location-filter`

Registrant Contact: IETF, GEOPRIV working group,
<geopriv@ietf.org>, as delegated by the IESG <iesg@ietf.org>.

XML:

```
BEGIN
<?xml version="1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML Basic 1.0//EN"
    "http://www.w3.org/TR/xhtml-basic/xhtml-basic10.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
  <meta http-equiv="content-type"
    content="text/html; charset=iso-8859-1"/>
  <title>Location Filter Namespace</title>
</head>
<body>
  <h1>Namespace for PIDF-LO Location Filters</h1>
  <h2>urn:ietf:params:xml:ns:location-filter</h2>
  <p>See <a href="[[[URL of published RFC]]]">RFCXXXX</a>.</p>
</body>
</html>
END
```

6.2. Schema Registration For location-filter

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This specification registers a schema, as per the guidelines in [\[RFC3688\]](#) (Mealling, M., "The IETF XML Registry," January 2004.).

URI: urn:ietf:params:xml:ns:location-filter

Registrant Contact: IETF, GEOPRIV Working Group
(geopriv@ietf.org), as delegated by the IESG (iesg@ietf.org).

XML: The XML can be found as the sole content of [Section 4 \(XML Schema\)](#).

7. Contributors

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We would like to thank Martin Thomson and James Polk for their contributions to this document.

8. Acknowledgments

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9. References

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[RFC4661]	

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