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Filtering Location Notifications in the Session Initiation Protocol (SIP)

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This Internet-Draft will expire on April 29, 2010.

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ABSTRACT should start on 1st page

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).

Table of Contents

1. Introduction

Conveying location information encapsulated with a PIDF-LO [RFC4119] document within SIP is described in [I-D.ietf-sipcore-location-conveyance]. An alternative signaling approach, which uses asynchronous communication, is available with the SIP event notification mechanisms (see RFC 3265 [RFC3265]) and is used by this document. Unfortunately, it is more complex since many forms of location are measured as a continuous gradient. Unlike notifications using discreet quantities, it is difficult to know when a change in location is large enough to warrant a notification. SIP events [RFC3265] can be used with filters (see RFC 4661 [RFC4661]) that allows the number of notifications to be reduced. The mechanism described in this document defines an extension to RFC 4661 [RFC4661], which limits location notification to events that are of relevance to the subscriber. These filters persist until they are changed with a replacement filter.

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 having to issue a large number of notifications that are not important to the application.

This document defines a few new event filters and describes others using existing mechanisms that may be relevant to a subscriber in the context of location filtering:

1. the Device moves more than a specified distance since the last notification

2. the Device exceeds a specified speed

3. the Device enters or exits a region (described by a circle or a polygon)

4. one or more of the values of the specified address labels have changed for the location of the Device. For example, the value of the <A1> civic address element has changed from 'California' to 'Nevada'.

5. the type of location information being requested.

6. the rate at which location information delivery is desired.

This document builds on the presence event package [RFC3856], i.e. an existing event package for communicating location information inside the PIDF-LO.

Comment [JMP1]: "Alternative" makes it seem like Conveyance doesn't need to be used at all -- which is absolutely false. The only want a NOTIFY can contain a PIDF-LO is through understanding of SIP Location Conveyance. This forces Conveyance to be moved from an Informative reference to a Normative reference

If anything, this doc is a formal update to Location Conveyance because it specifies how to augment Conveyance by doing additional functions/capabilities not found in Conveyance.

Comment [JMP2]: What is "it" referring to?

Comment [JMP3]: What does "measured" have to do with anything yet?

What does "gradient" have to do with anything yet?

Deleted: discret

Comment [JMP4]: This sentence should be earlier in the paragraph.

Comment [JMP5]: New paragraph needs to start

Comment [JMP6]: Does this accurately describe an extension (to 4661)?

Comment [JMP7]: Or until the subscription expires right?

Comment [JMP8]: This ought to be the 1st paragraph

Comment [JMP9]: Need to change word

Comment [JMP10]: The subscriber doesn't issue notifications, as the sentence says it does. I get the meaning here, but needs to be rewritten.

Comment [JMP11]: Not very descriptive, should eliminate "a few"

Comment [JMP12]: 2119 language again?

Comment [JMP13]: What about leaving a room into a hallway? Neither are a circle or a polygon (that's been allowed into the Geopriv WG to date - though a couple of IDs have tried to have the WG include these).

This might be covered by #4, but want to be sure.

Comment [JMP14]: Don't understand what #5 is about?

2. Terminology

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].

This document reuses terminology from [I-D.ietf-geopriv-arch].

3. Filter Definitions

This specification builds on top of a number of other specifications, as noted in Section 1. In order to reduce the number of options (and thereby increase the chance of interoperability problems), only the functionality described in this document MUST be implemented. Only the functionality of [RFC4661] listed in the sub-sections below MUST be implemented, namely the <ns-bindings> (see Section 3.3 of [RFC4661]), the <filter> (Section 3.4 of [RFC4661]), and the <trigger> (Section 3.6 of [RFC4661] excluding the functionality of the <added> and <removed> element).

Comment [JMP15]: "increase" or "decrease"? I think _decrease_

Comment [JMP16]: s/only/all

Comment [JMP17]: this sentence part doesn't read well. In other words, "Only" perhaps isn't the best word to start any sentence with, especially this one.

3.1. Movement

The <moved> element with a value in meters indicates the minimum distance that the resource must have moved from the location of the resource when the last notification was sent in order to trigger this event. The distance is measured in meters absolutely from the point of last notification rather than in terms of cumulative motion. The <moved> element MUST only appear once as a child element of <filter>.

Comment [JMP18]: Does this mean <moved> can only contain a unit of meters? If so, there needs to be a "…value MUST be in meters…" part of this paragraph.

Comment [JMP19]: s/when/since

Comment [JMP20]: does this mean "…absolute meters…" meaning in any direction? "…meters absolutely…" can have more than one meaning, or it just isn't phrased the right way.

Comment [JMP21]: Not sure I understand this -- is this saying that I don't code for additive movements totaling more than 300m and only movements of at least 300m all at once *or* if the distance adds up to at least 300m? The "rather" is the word that doesn't seem to belong.

```
<?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">
        <lf:moved>300</lf:moved>
    </filter>
</filter-set>
```

Figure 1: Movement Filter Example

Comment [JMP22]: Change

" The <moved> element MUST only appear once…"

To

"The <moved> element MUST NOT appear more than once…"

3.2. Speed Changes

Speed changes can be filtered with the help of RFC 4661 and the functionality provided in [I-D.singh-geopriv-pidf-lo-dynamic], which extends the PIDF-LO with support for spatial orientation, speed, heading, and acceleration. The value of <speed> in [I-D.singh-geopriv-pidf-lo-dynamic] is defined in meters per second. This is the only supported measure and hence the value in the 'by' attribute MUST be expressed in meters per second.

Comment [JMP23]: "This" doesn't fit the sentence. Consider only having this as the sentence here (and deleting the rest):

"The 'by' attribute MUST be expressed in meters per second, only."

Figure 2 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 the functionality as shown in Figure 2 with <ns-bindings> replacing the prefix. No other variant 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

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 shows an example where a notification is sent when the civic address tokens A1, A2, A3, or PC change (all 4 must change in order to let the <trigger> element evaluate to TRUE).

Comment [JMP24]: I get the XML, but I don't see what the speed now is of the device/target?

What if this device is moving at 200kmph, where would that be placed in the XML?

Of, is this left for the application at the subscriber to calculate?

If the latter is true, something needs to be said about this expectation.

Comment [JMP25]: This is the first place in this doc there are options allowed, yet earlier the doc said "everything MUST be implemented that's in this doc."…

Comment [JMP26]: Wow do I not want that limitation. I want to be able to tell when the device has crossed a city boundary (into another city) while still looking to see it the device has changed states/territories yet.

I understand that PC changes might be too often (but not always).

Is the alternative to have 4 separate <changes> filters to get what I'm describing here?

That seems clumbersome…

```
<?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:A1</changed>
            <changed>//ca:A2</changed>
            <changed>//ca:A3</changed>
            <changed>//ca:PC</changed>
        </trigger>
    </filter>
</filter-set>
```

Figure 3: Speed 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 4: Speed Change Example (Country Change)

An implementation MUST support the functionality as shown in Figure 3 with <ns-bindings> replacing the prefix. No other variant is supported. The <changed> element comes with a few attributes and the 'by', 'to' and 'from' attribute MUST be implemented by this specification.

Comment [JMP27]: "…by this specification." or "…to support this specification"? I think the latter.

3.4. Entering or Exiting a Region

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]), or a circle (as defined in Section

5.2.3 of [RFC5491]). The <enterOrExit> element MUST have contain either a polygon or a circle as a child element. More than one a polygon and/or a circle as a child element of <enterOrExit> MUST NOT occur.

Comment [JMP28]: "... element MUST have contain…"?

Remove the "have"

Comment [JMP29]: " More than one a..." is bad English.

Comment [JMP30]: Remove the "a"

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. Confidence that the location is within the region, plus confidence that the location is outside the region cannot be 100%. The total confidence depends on the confidence in the original location, which is always less than 100% (95% is recommended in [RFC5491]). The benefit of this is that notifications are naturally limited: small movements at the borders of the region do not trigger notifications.

Figure 5 shows filter examples whereby a notification is sent when the Target enters or exits an area described by a circle and Figure 6 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">
        <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>
    </filter>
</filter-set>
```

Figure 5: <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">
        <lf:enterOrExit>
            <gml:Polygon srsName="urn:ogc:def:crs:EPSG::4326">
                <gml:lferior>
                    <gml:LinearRing>
                        <gml:posList>
                        43.311 -73.422 43.111 -73.322
                        43.111 -73.222 43.311 -73.122
                        43.411 -73.222 43.411 -73.322
                        43.311 -73.422
                        </gml:posList>
                    </gml:LinearRing>
                </gml:exterior>
            </gml:Polygon>
        </lf:enterOrExit>
    </filter>
</filter-set>
```

Comment [JMP31]: Shouldn't <gml:lferior> be <gml:exterior> here?

Comment [JMP32]: Shouldn't this list of points be labeled A, B, C, D, E, F and A?

Comment [JMP33]: Isn't this 3 space characters to the right of where it should be?

Figure 6: <enterOrExit> Polygon Filter Example

3.5. Location Type

Comment [JMP34]: I "LOVE" seeing this section added to this doc.

The <locationType> element MAY be included as a child element of the <filter> 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 LIS returns also depend 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".

Comment [JMP35]: Not sure this acronym has bee exploded yet?

Also, why is this whole document expected to be only to and from a LIS?

Why can't a UAS (i.e., phone or PDA or wifi chip on a box) receive a SUBSCRIBE with a set of Location Filters?

If it can, this says it can't - which is wrong.

Comment [JMP36]: It should be possible for the subscriber to be told - if the 'exact' attribute is set - that is has location, but not in the format the subscriber wants it in.

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. The "SHOULD"-strength requirements on this parameter for specific location types are included to allow for soft-failover.

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)

For the example above, if the 'exact' attribute was "true", then the only possible response is either a "civic" location or an error message.

As stated above, the <locationType> element MAY carry the 'exact' attribute. When the 'exact' attribute is set to "true", it indicates to the Notifier that the contents of the <locationType> element MUST be strictly followed. The default value of "false" 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. A value of "true" indicates that the Notifier MUST provide a location of the requested type or types or MUST provide an error.

An example is shown in Figure 7 that utilizes the <locationType> element with the 'exact' and the 'responseTime' attribute.

Comment [JMP37]: This "SHOULD"-strength sentence is what's said between humans -- it's not ever written. This sentence should therefore be deleted.

Comment [JMP38]: This isn't necessary to have here

Comment [JMP39]: What error message? This needs to be explained.

Is it an error to the SUBSCRIBE (i.e., a 488)? Or some other error?

Comment [JMP40]: Not sure what this redundant sentence is here. The point is already made, and even admits so.

```
<?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">
        <lf:locationType exact="true">
              geodetic
        </lf:locationType>
    </filter>
</filter-set>
```

Figure 7: <locationType> Filter Example

3.6. Rate Control

[I-D.ietf-sipcore-event-rate-control] defines an extension to the SIP events framework 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 document makes use of two of the parameters to accomplish functionality equivalent to the 'responseTime' attribute used in HELD [I-D.ietf-geopriv-http-location-delivery], 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.). This specification only defines the semantic for these two attributes and requires implementation of these two from the set of attributes defined in [I-D.ietf-sipcore-event-rate-control]. Whenever the time since the most recent notification exceeds the value in the "max-interval" parameter, then the current state would be sent in its entirety, just like after a subscription refresh.

If complete state is not immediately available, a NOTIFY containing state (i.e. location) is 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.

Comment [JMP41]: I'm not anti-HELD with this comment, but I don't' understand why this is called out. Why not just say that there will be a min-interval and a max-interval used in this doc?

Comment [JMP42]: Delete "then"

Comment [JMP43]: This is changing normal SIP behavior, which states that immediately upon agreeing to a SUBSCRIBE request, and sending the 200 OK to it, the notifier generates a NOTIFY request with "the current state of the notifier".

If this is the only purpose of the min- and max-interval attributes, then is this really a good enough justification for this change in how SIP has operated since RFC 3265 (May of 2002)?

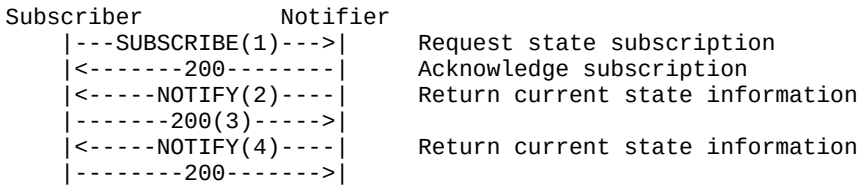

Figure 8: SUBSCRIBE/NOTIFY with Rate Control

Figure 8 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. 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).

Comment [JMP44]: "with a small value" is highly relative, and not good enough to a specification. Something more concrete needs to be given as guidance here.

Comment [JMP45]: "…a more sensible value" is highly subjective without guidance - which is lacking here. More details need to be given for what this means.

Comment [JMP46]: This sentence doesn't make any sense. It sounds like the max-interval is not the same between notifications. Where is that specified in this doc?

Where does this doc say that getting location for the emergency case MUST NOT have a one-time only subscription (because of just what is in the paragraph above?

Comment [JMP47]: This is normal SIP behavior, so it shouldn't depend on the value in the max-interval attribute.

4. XML Schema

```
<?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">

    <!-- These elements are child elements of the RFC 4661
         <filter> element.
    -->

    <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 9: XML Schema

5. Security Considerations

This document builds on a number of specifications, namely

- the SIP event notification mechanism, described in RFC 3265 [RFC3265], defining the SUBSCRIBE/NOTIFY messages.
- the presence event package, described in RFC 3856 [RFC3856], which is a concrete instantiation of the general event notification framework.
- the filter framework, described in RFC 4661 [RFC4661], 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], 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], and with the GEOPRIV architectural description found in [I-D.ietf-geopriv-arch]. The functionality for uploading authorization policies and other information that limit access to location information are provided by other protocols, such Common Policy [RFC4745], Geolocation Policy [I-D.ietf-geopriv-policy] or more recent work around HELD context [I-D.winterbottom-geopriv-held-context]. 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.

Although [I-D.ietf-geopriv-policy] defines a standardized format for authorization policies but it does not define specific policies for controlling filters specifically.

Comment [JMP48]: I find it curious why these references work for this document - knowing there is no defined transport for loading such policies - but the ID creating a DHCP Option for Location URIs requires a policy transport defined… why is that?

Comment [JMP49]: This "but" is misplaced in this sentence.

Comment [JMP50]: "…specific policies…specifically" if bad wording.

6. IANA Considerations

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

This section registers a new XML namespace, as per the guidelines in [RFC3688].

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

This specification registers a schema, as per the guidelines in [RFC3688].

URI: urn:ietf:params:xml:schema: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.

7. Contributors

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

8. Acknowledgments

Thanks to Richard Barnes and Alissa Cooper, Carl Reed, Adam Roach, Allan Thomson, James Winterbottom for their comments.

9. References

9.1. Normative References

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Comment [JMP51]: This MUST be moved up to being a Normative reference, because without Location Conveyance, an implementer cannot understand how to send location (i.e., a PIDF-LO) in a NOTIFY request - which this document discusses.

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