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Dynamic Feature Extensions to the Presence Information Data Format
Location Object (PIDF-LO)
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Abstract

The Geopriv Location Object introduced by the Presence Information Data Format - Location Object (PIDF-LO), [RFC 4119](#), defines a basic XML format for carrying geographical information of a present entity. The PIDF-LO specification made a subset of the functionality offered by the Geography Markup Language (GML) standard 3.0 mandatory to implement. This document defines child elements to the <location-info> element specified in [RFC 4119](#) to carry temporal feature elements useful for tracking moving objects. It defines five

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elements, namely speed, bearing, acceleration elevation and directionOfObject.

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1. Introduction

The Presence Information Data Format - Location Object (PIDF-LO) (see [RFC 4119](#) [[RFC4119](#)]) provides geographical location of the presentity. This corresponds to a physical location at a given instance of time. The PIDF-LO specification made a subset of the functionality offered by the Geography Markup Language (GML) standard 3.0 mandatory to implement. With the extensions defined in [[I-D.ietf-geopriv-pdif-lo-profile](#)] more guidelines to implementers are being provided with respect to a number of location shapes that have to be supported for usage within PIDF-LO. However, a number of applications benefit from having access to information about changes in location. Location change information is likely to be useful for logistics and public safety. For example, shipping companies or dispatch centers can use it to track whether vehicles are deviating from an established path or exceeding speed limits.

2. Terminology

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

3. XML Extensions

This document defines a location vector by adding child elements to the <location-info> element described in [RFC 4119](#) [[RFC4119](#)], to carry temporal feature elements. A receiver MAY ignore the temporal elements defined in this document if it does not understand this extension.

speed:

Speed is the rate of motion. (The terms speed and velocity are often used interchangeably, but speed is a scalar, having magnitude only, while velocity is a vector, having both magnitude and direction.)

This element contains a 'uom' (Units Of Measure) attribute, which is a reference to a reference system for the amount. The 'uom' attribute uses a URI to refer to a unit of measure definition. The GML document defines a set of convenience measure types and a further explanation is provided at the end of this section.

bearing:

Bearing is defined as the horizontal direction of one terrestrial point from another, expressed as the angular distance from a reference direction. It is usually measured from 000 degrees at the reference direction clockwise through 360 degrees.

The <bearing> element is of type `gml:DirectionPropertyType` and contains a `gml:DirectionVector`, `gml:CompassPoint`, `DirectionKeyword`, or a `DirectionString` element. This document profiles the usage of this GML element and mandates applications using this document to make use of the <DirectionVector> element only.

acceleration:

This element specifies the rate (usually rapid) at which something happens. The <acceleration> element also contains a 'uom' attribute.

directionOfObject:

The <directionOfObject> describes the instantaneous horizontal of the front of the object relative to true north and the vertical angle relative to the earth's spheroid. It uses the GML <directionVector> element.

GML permits a range of units of measure for the uom attribute. This document restricts this set to the #m/s (meters per second).

4. XML Schema

This document does not define a new schema but instead re-uses a subset of the dynamicFeature.xsd schema available with GML 3.1.1, namely <speed>, <bearing>, <acceleration>, and <directionOfObject>.

These four elements are conveyed inside the <location-info> element defined by [RFC 4119](#) [[RFC4119](#)].

5. Example

The following example shows a PIDF-LO document indicating geospatial location information using the gml:Point structure. Following the <gml:location> element the additional fields related to temporal characteristics are included.

```
<?xml version="1.0" encoding="UTF-8"?>
<presence xmlns="urn:ietf:params:xml:ns:pidf"
  xmlns:gp="urn:ietf:params:xml:ns:pidf:geopriv10"
  xmlns:gml="http://www.opengis.net/gml"
  entity="pres:geotarget@example.com">

  <device id="sg89ae">
    <gp:geopriv>
      <gp:location-info>
        <gml:location>
          <gml:Point srsName="urn:ogc:def:crs:EPSG::4326">
            <gml:pos>-34.407 150.883</gml:pos>
          </gml:Point>
        </gml:location>
        <gml:speed uom="#m/s">12</gml:speed>
        <gml:bearing>
          <gml:DirectionVector>
            <gml:vector> 270.0 -60.0</gml:vector>
          </gml:DirectionVector>
        </gml:bearing>
      </gp:location-info>
    <gp:usage-rules>
```

```
        <gp:retransmission-allowed>no</gp:retransmission-allowed>
        <gp:retention-expiry>2003-06-23T04:57:29Z
        </gp:retention-expiry>
    </gp:usage-rules>
</gp:geopriv>
    <timestamp>2008-06-22T20:57:29Z</timestamp>
</device>

</presence>
```

Figure 1: Example of a PIDF-LO with Speed Information

6. Security Considerations

This document defines additional location elements carried by PIDF-LO (see [[RFC4119](#)]). The security considerations of [RFC 4119](#) [[RFC4119](#)] are applicable to this document.

7. IANA Considerations

This document does not require actions by IANA.

8. Acknowledgements

We would like to thank Klaus Darilion, Cullen Jennings, Rohan Mahy, Carl Reed, Brian Rosen, and Martin Thomson for their comments.

9. References

9.1. Normative References

- [GML] "Geographic information - Geography Markup Language (GML), OpenGIS 03-105r1, available at: http://portal.opengeospatial.org/files/?artifact_id=4700", April 2004.

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [RFC 2119](#), [BCP 14](#), March 1997.
- [RFC4119] Peterson, J., "A Presence-based GEOPRIV Location Object Format", [RFC 4119](#), December 2005.
- [RFC4481] Schulzrinne, H., "Timed Presence Extensions to the Presence Information Data Format (PIDF) to Indicate Status Information for Past and Future Time Intervals", [RFC 4481](#), July 2006.

9.2. Informative References

- [I-D.ietf-geopriv-pdif-lo-profile] Winterbottom, J., Thomson, M., and H. Tschofenig, "GEOPRIV PIDF-LO Usage Clarification, Considerations and Recommendations", [draft-ietf-geopriv-pdif-lo-profile-13](#) (work in progress), September 2008.

[Appendix A](#). Transferring Multiple Location Objects within SIP

To show the path of an object, it may be useful to deliver multiple location vector objects in one PIDF-LO document to reduce the number of notifications. The <timed-presence> element [[RFC4481](#)] can contain multiple location objects, with the structure shown in Figure 2 and an example in Figure 3.

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

  <device>

    <gp:geopriv>
      .....
    </gp:geopriv>
```

```

    <timestamp>.....</timestamp>

    <timed-status from="start-time" until="end-time">
      <gp:geopriv>
        .....
      </gp:geopriv>

      <gp:geopriv>
        .....
      </gp:geopriv>

    </timed-status>
  </device>

  <tuple>
    .....
  </tuple>

  <person>
    .....
  </person>
</presence>

```

Figure 2: Structure of Handling Multiple Location Objects

The following example shows multiple PIDF-LO using <timed-status>.

```

<?xml version="1.0" encoding="UTF-8"?>
<presence xmlns="urn:ietf:params:xml:ns:pidf"
  xmlns:gp="urn:ietf:params:xml:ns:pidf:geopriv10"
  xmlns:gml="urn:opengis:specification:gml:schema-xsd:feature:v3.0"
  entity="pres:geotarget@example.com">
  <device id="sg89ae">
    <gp:geopriv>
      <gp:location-info>
        <gml:location>
          <gml:Point>

```



```

        </gml:Point>
    </gml:location>
    <gml:speed uom="#m/s">12</gml:speed>
</gp:location-info>
<gp:usage-rules>
    <gp:retransmission-allowed>no</gp:retransmission-allowed>
    <gp:retention-expiry>2003-06-23T04:57:29Z
    </gp:retention-expiry>
</gp:usage-rules>
</gp:geopriv>
<timestamp>2003-06-22T20:57:29Z</timestamp>

<timed-statusfrom="2005-08-15T10:20:00.000-05:00"
    until="2005-08-22T19:30:00.000-05:00">
    <gp:geopriv>
        <gp:location-info>
            <gml:location>
                <gml:Point>
                    <gml:pos>110. -35.</gml:pos>
                </gml:Point>
            </gml:location>
            <gml:speed uom="#m/s">10</gml:speed>
        </gp:location-info>
        <gp:usage-rules>
            <gp:retransmission-allowed>yes</gp:retransmission-allowed>
            <gp:retention-expiry>2003-06-23T04:55:29Z
            </gp:retention-expiry>
        </gp:usage-rules>
    </gp:geopriv>
    <gp:geopriv>
        <gp:location-info>
            <gml:location>
                <gml:Point>
                    <gml:pos>114. -35.</gml:pos>
                </gml:Point>
            </gml:location>
            <gml:speed uom="#m/s">18</gml:speed>
        </gp:location-info>
        <gp:usage-rules>
            <gp:retransmission-allowed>yes</gp:retransmission-allowed>
            <gp:retention-expiry>2003-06-23T04:53:29Z
            </gp:retention-expiry>
        </gp:usage-rules>
    </gp:geopriv>
</timed-status>

</device>

```

</presence>

Figure 3: Example showing multiple Location Vectors transmitted simultaneously.

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