The Internet Location Service Model Using HELD in IP access networks

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Topics

- Internet location service model
- LIS discovery
- HELD location request modes
- Location data – reference, value, and the PIDF-LO
- Integration with the presence model

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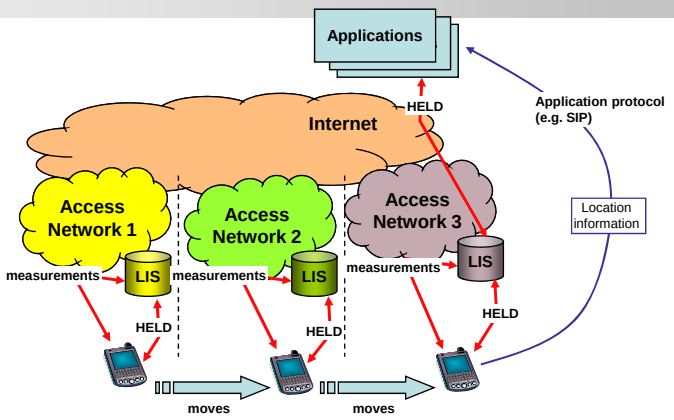
Internet location service model



The IP Location (Internet Location) services model does not assume the existence of any "home" network or any provider other than the one currently being used to access the Internet. The location service is assumed to be part of the access network functionality. When a device attaches to the access network, there are defined procedures for discovering the Location Information Server (LIS). Once discovered, the LIS provides direct support for acquiring location information. The LIS can harvest measurement information directly from the access network and it can also obtain measurement parameters from the device.

It is a device responsibility to convey the location information to applications. Presence type services, such as VoIP/IMS, can also query the LIS directly using OBO or location-by-reference models.

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LIS Discovery – general approach

Use DHCP

Or

Use DNS (U-NAPTR) based on your Domain name

Retrieved from a Reverse DNS lookup on an IP address

Obtained from local NIC, UPnP or STUN

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LIS discovery – Some gory details for future reference

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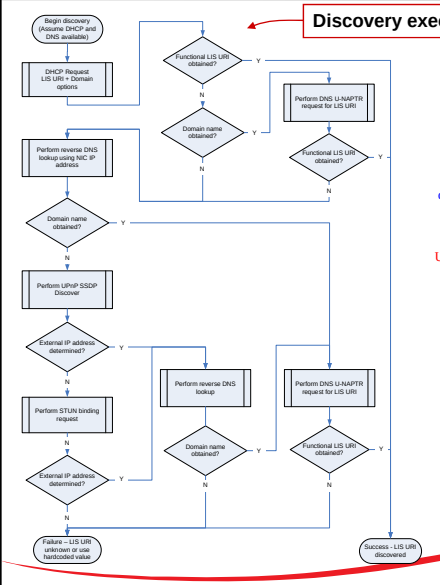
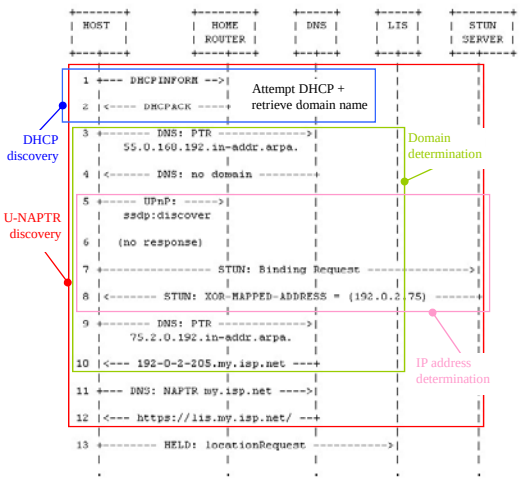
Discovery executed for each active NIC connection





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Location request modes

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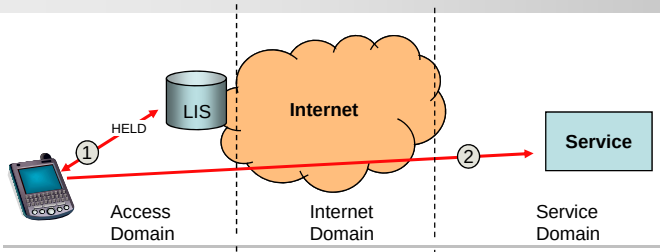
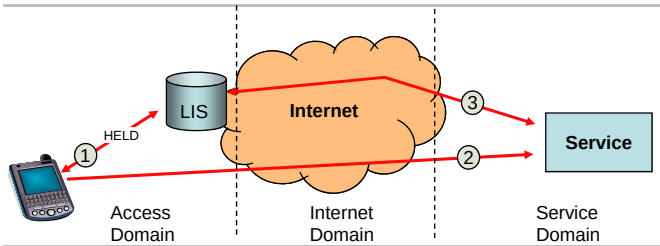


Location by value

1. Device obtains location from the location server in the access network
2. Device conveys location* to the service in the applicable application protocol.

* Location values are encoded as a PIDF-LO per RFC4119 etc



Location by reference

1. Device obtains reference from the location server in the access network
2. Device conveys reference to the service in the applicable application protocol.
3. Service queries location server directly for location value one or more times

The protocol used for 1 & 3 is HELD (HTTP Enabled Location Delivery). Step 2, location conveyance, is application protocol dependent (e.g. SIP supports location conveyance)

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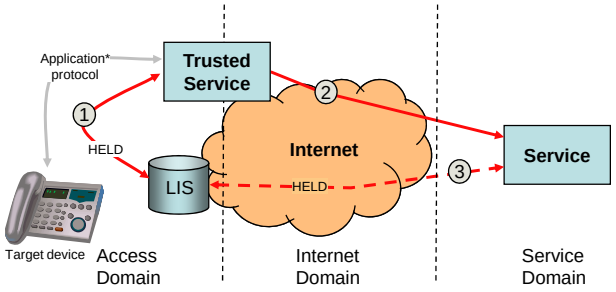
Internet location services model – OBO Requests



On-Behalf-Of (OBO)

1. Trusted third party application (service) queries for location of the device. A client identity which is understood by the LIS is used as a query parameter (e.g. IP address)
2. If applicable, third party provides location information to external service entities.
3. If location was requested and provided by-reference, the external entity queries back to the LIS for location value updates.

* OBO requests are typically applicable where the target device and/or application protocol do not have native support for the communication of location information. For example a large enterprise with legacy deployment of standard form factor VoIP phones using H.323 may need to provide location-based routing for emergency and other calls from geographically diverse sites. The IP PABX in this case may perform OBO queries to the LIS using the IP address of the phone(s) as the query parameter. The PABX may use SIP conveyance externally if the location needs to sent to an external service entity. OBO implies two important characteristics of the service making the query. The service needs to be trusted by the LIS such that it is authorized, by whatever mechanism is suitable to the situation, to query for the location of devices in the LIS' network. Where there are multiple possible LIS that the service could query, it needs to be able to ensure that it is associating the device with the correct LIS to provide the location.

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Location data – the HELD location response

HELD location response
Provides location-by-value and/or location-by-reference

```
<!-- Location Response -->
  <xs:complexType name="locationResponseType">
    <xs:complexContent>
      <xs:restriction base="xs:anyType">
        <xs:sequence>
          <xs:element name="locationUriSet"
                type="held:returnLocationType"
                minOccurs="0"/>
          <xs:any namespace="##other"
                processContents="lax"
                minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
      </xs:restriction>
    </xs:complexContent>
  </xs:complexType>
```

The locationUriSet element provides the slot to insert one or more URI values for location-by-reference results.

The flexible namespace element provides the slot to insert the PIDF-LO which contains the location-by-value information.

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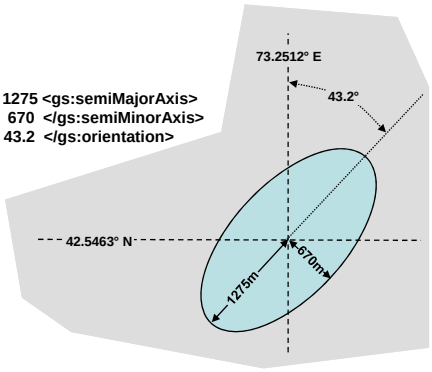
PIDF-LO data – Geodetic location

```
<?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:cl="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr"
   xmlns:gs="http://www.opengis.net/pidflo/1.0"
   xmlns:gml=http://www.opengis.net/gml entity="pres:Ellipse@somecell.example.com">
   <tuple id="sg89ab7">
     <status>
       <gp:geopriv>
        <gp:location-info>
          <gs:Ellipse srsName="urn:ogc:def:crs:EPSG::4326">
            <gml:pos> 42.5463 -73.2512 </gml:pos>
            <gs:semiMajorAxis uom="urn:ogc:def:uom:EPSG::9001"> 1275 <gs:semiMajorAxis>
            <gs:semiMinorAxis uom="urn:ogc:def:uom:EPSG::9001">  670  </gs:semiMinorAxis>
            <gs:orientation uom="urn:ogc:def:uom:EPSG::9102">       43.2  </gs:orientation>
          </gs:Ellipse>
        </gp:location-info>
        <gp:usage-rules/>
       </gp:geopriv>
     </status>
     <timestamp>2008-06-22T20:57:29Z</timestamp>
   </tuple>
  </presence>
```



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PIDF-LO data – Civic location

Label	Description	Example
country	country, identified by the two-letter ISO 3166 code	US
A1	National subdivisions (state, region, province, prefecture)	New York
A2	County, parish, gun (JP), district (IN)	King's County
A3	City, township, shi (JP)	New York
A4	City division, borough, city district, ward, chou (JP)	Manhattan
A5	Neighborhood, block	Morningside Heights
A6	Street	Broadway
PRD	Leading street direction	N, W
POD	Trailing street suffix	SW
STS	Street suffix	Avenue, Platz, Street
HNO	House number, numeric part only	123
HNS	House number suffix	A, 1/2
LMK	Landmark or vanity address	Low Library
LOC	Additional location information	Room 543
FLR	Floor	5
NAM	Name (residence, business or office occupant)	Joe's Barbershop
PC	Postal code	10027-0401
BLD	Building (structure)	Hope Theatre
UNIT	Unit(apartment, suite)	12a
ROOM	Room	450F
PLC	Place-type	office
PCN	Postal community name	Leonia
POBOX	Post office box	U40
ADDCODE	Additional code	13203000003
SEAT	Seat (desk, cubicle, workstation)	WS 181
RD	Primary road or street	Broadway
RDSEC	Road section	14
RDBR	Road branch	Lane 7
RDSUBBR	Road sub-branch	Alley 8
PRM	Road pre-modifier	Old
POM	Road post-modifier	Extended

e.g.

```
<?xml version="1.0"?>
  <civicAddress xml:lang="en-AU"
    xmlns="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr">
    <country> AU </country>
    <A1> NSW </A1>
    <A3> Wollongong </A3>
    <A4> North Wollongong </A4>
    <RD> Flinders </RD>
    <STS> Street </STS>
    <RDBR> Campbell Street </RDBR>
    <LMK>
        Gilligan's Island roundabout
    </LMK>
    <LOC> Corner </LOC>
    <NAM> Video Pleazy Rental Store </NAM>
    <PC> 2500 </PC>
    <ROOM> Westerns and Classics </ROOM>
    <PLC> store </PLC>
    <POBOX> Private Box 15 </POBOX>
  </civicAddress>
```

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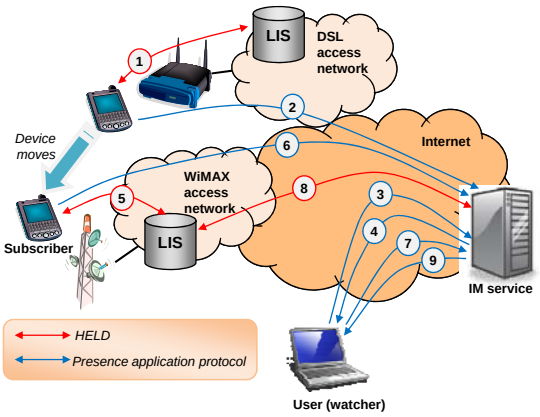
Internet location as it applies to presence services (e.g. Instant Messaging friend finder service)



1. Subscriber device attaches to a DSL broadband connection, discovers the LIS associated with the DSL access network and acquires location (by value in this instance).
2. IM client software on the subscriber device conveys the location value to the presence server using an application-specific protocol.
3. User invokes the "friend finder" function requesting the location of the subscriber. The IM service invokes privacy rules prescribed by the subscriber and determines the user is authorized to obtain the location information.
4. IM service responds to the user, providing the location previously conveyed by the subscriber's client.
5. Subscriber device detaches from the DSL broadband connection and connects to a WiMAX mobile network connection. The device discovers the LIS associated with the WiMAX access and acquires location information (by reference in this instance).
6. IM client software on the subscriber device conveys the location reference to the presence server.
7. User invokes the "friend finder" function again requesting location of the same subscriber. The privacy rules are evaluated again and the location request is authorized.
8. Presence server invokes a HELD request to the WiMAX network LIS using the location URI provided as the reference and acquires location value in the result.
9. IM service responds to the user, providing the newly acquired location obtained by invoking the reference.

Note: This provides the equivalent of the network-initiated (or mobile-terminated) location request as seen in standard SUPL or control plane LCS for cellular. i.e. it is a location request based on a subscriber identity through a service gateway.

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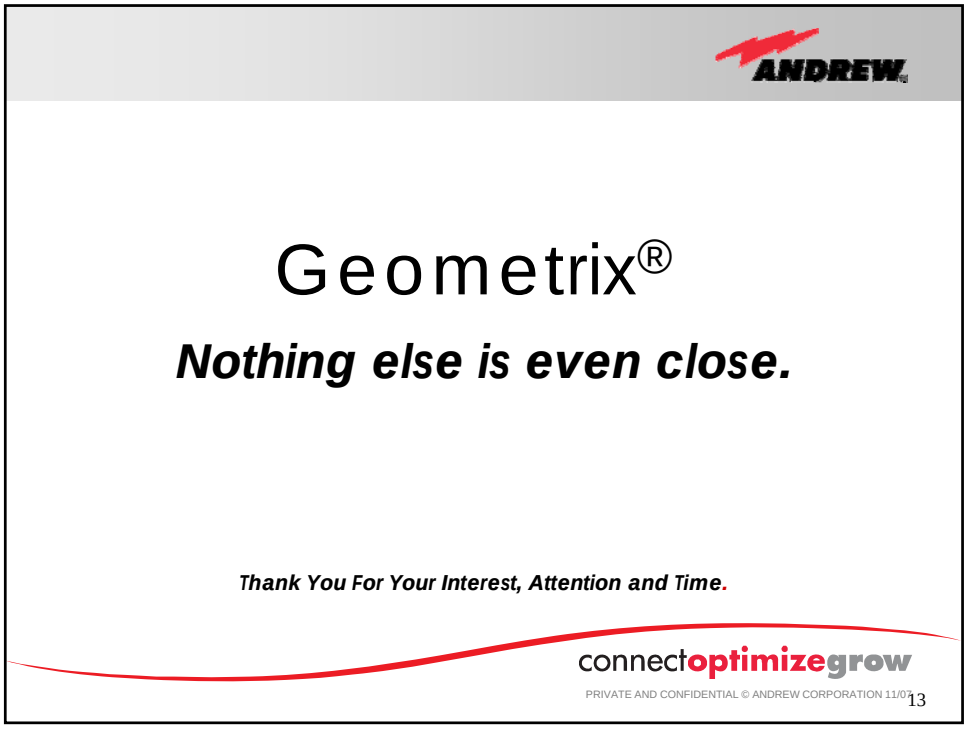
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