A Routing Request Extension for the HELD Protocol
draft-ietf-ecrit-held-routing-03.txt

Abstract

   For cases where location servers have access to emergency routing
   information they are able to return routing information with the
   location information if the location request includes a request for
   the desired routing information. This document specifies an
   extension to the HELD protocol to support this funciton.

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1. Introduction

The general ECRIT calling models described in [RFC6443] and
[RFC6881]require a local LoST server or network of forest guides in
order to determine the address of the PSAP in the best position to
handle a call. Networks of forest guides have not eventuated and
while PSAPs are moving towards IP networks, LoST server deployment is
not ubiquitous. Some regions and countries have expressed reluctance
to deploy LoST servers making aspects of the current ECRIT
architecture hard to realize.

Evolving architectures in Europe to address regulatory requirements,
such as [M493], couple location and routing information in the access
network whilst using a softswitch-centric approach to emergency call
processing. This document describes adding an extension to the HELD
protocol [RFC5985] so that a location information server can provide
emergency routing information in the absence of a LoST server or
network of forest guides.

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 [RFC2119].

The terms LIS, ESRP, VSP and PSAP are used as defined in [RFC6443].

The term "Access Network Provider" is used as defined in [RFC5687]
and incompasses both the Internet Access Provider (IAP) and Internet
Service Provider (ISP).

3. Motivation

The Internet emergency calling architecture specified in [RFC6881]
describes two main models for emergency call processing. The first
is a device-centric model, where a device obtains location
information using a location configuration protocol, such a HELD
[RFC5985], and then proceeds to determine the address of the next hop
closer to the local PSAP using LoST [RFC5222]. Figure 1 shows this
model in a simplified form.

```
      +---Location Request---+
      |          (1)         |
  +---+----+            +---V---+
  |        |<--Location--| LIS  |
  | Caller |    (2)      +-------+            +--------+
  |        |                                 | ESRP/  |
  |        |----Find Service-------+         | PSAP   |
  +------^-+        (3)            |         +--------+
      |   |                +--------V----+        ^
      |   +-----Service----| LoST Server |        |
      |         (4)        +-------------+    +---+---+
      +-------------Call Initiation------------>| VSP  |
                   (5)                          +-------+
```
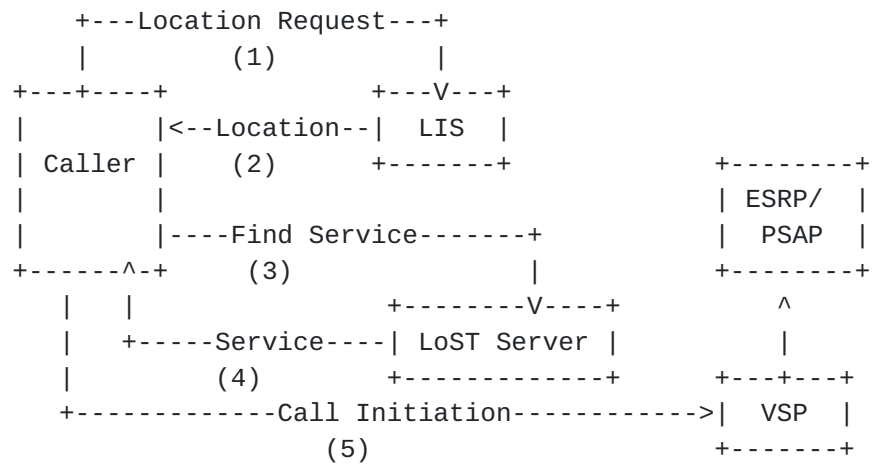
                 Figure 1: Device-Centric Emergency Services Model

   The second approach is a softswitch-centric model, where a device
   initiates an emergency call and the serving softswitch detects that
   the call is an emergency and initiates retrieving the caller's
   location from a Location Information Server (LIS) using HELD
   [RFC5985] with identity extensions [RFC6155] [RFC6915] and then
   determining the route to the local PSAP using LoST [RFC5222].
   Figure 2 shows the high-level protocol interactions.

```
                         +---Location Request---+
                         |          (2)         |
                     +---V---+                  |
                     | LIS   |                  |
                     +----+--+       +----+----+
                          |          |         |
                          +----Location--->|  Soft    |
  +--------+                     (3)        | Switch  |
  | Caller |------Call Initiation------------> |       |
  +--------+          (1)                  +-+-^---+-+
              +-------------+                 | |   |
              | LoST Server |<-Find Service--+ |   |
              +------+------+      (4)          |   |
                     |                          |   |
                 +----------Service--------+    |
                          (5)                   |
                   +-----------+                |
                   | ESRP/PSAP |<------Call----+
                   +-----------+       (6)
```
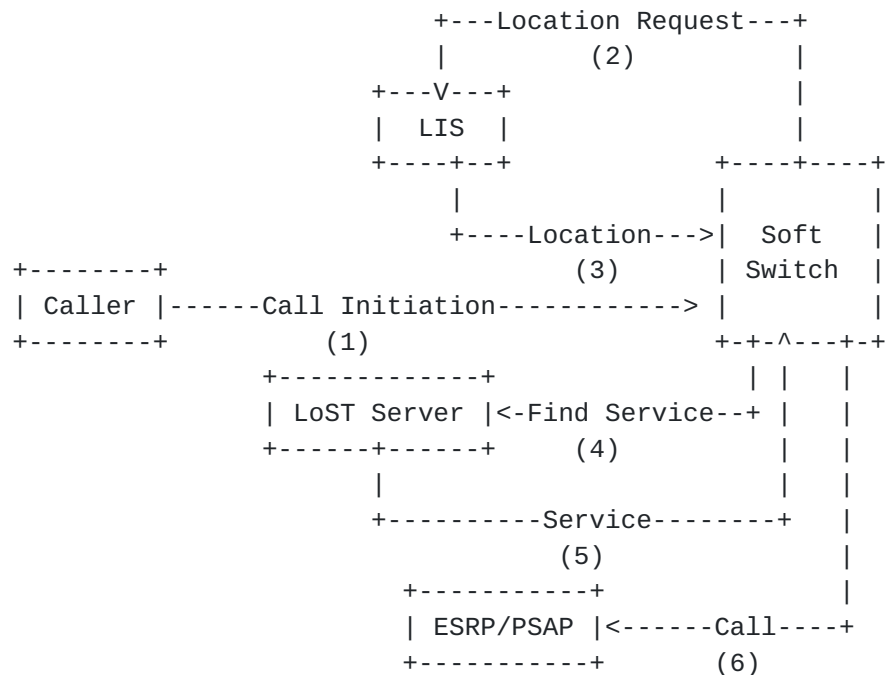
                    Figure 2: Softswitch-Centric Calling Model

In the softswitch-centric model when a VSP receives an emergency call
it performs two tasks. The first task is to determine the correct
LIS to ask for location information, this is done using a combination
of reverse DNS lookup described in [RFC7216] to acquire the serving
domain name and then using [RFC5986] to determine the LIS URI. Once
the location is obtained from the LIS, the VSP determines the LoST
server associated with the domain serving the caller and queries it
for the correct PSAP address.

LoST server discovery is a domain based activity, similar to the LIS
discovery technique. However, unlike the LIS that is a domain bound
service, a LoST server is a geographically bound service. This means
that for a domain that spans multiple geographic regions the LoST
server determined may not be able to provide a route to the necessary
PSAP. When this occurs, the contacted LoST server invokes the help
of other LoST servers and this requires the deployment of forest
guides.

At the time of writing, several countries have expressed a reluctance
to deploy public LoST servers. In countries amenable to the use of
LoST and forest guides no public forest guides have been deployed.
There appears little interest from the public sector in establishing
a global forest guide network. These issues pose threats to both the
device-centric and the softswitch-centric calling approaches in terms
of them operating everywhere.

The device-centric and softswitch-centric calling models both involve
the notion of a LIS bound to the serving access network. In many
cases the LIS already knows the destination PSAP URI for any given
location. In [RFC6881] for example, the LIS validates civic
locations using a location validation procedure based on the LoST
protocol [RFC5222]. The LoST validation request is similar to a LoST
routing request and provides the LIS with the same PSAP routing
information that a routing request would. In other cases, the LIS
knows the correct PSAP for a given location at provisioning time, or
the access network might always route to the same emergency provider.
Irrespective of the way in which the LIS learns the PSAP URI for a
location, the LIS will, in a great many cases, already have this
information.

This document specifies an extension to the HELD protocol so that
emergency routing information can be requested from the LIS at the
same time that location information is requested. The document
updates [RFC6881] by requiring devices and softswitches that
understand this specification to always request routing information
to avoid the risk of query failure where no LoST server or forest
guide network is deployed.

3.1. LoST Reuse Considerations

The LoST Protocol [RFC5222] defines a <mapping> element that
describes a service region and associated service URLs. Reusing this
element from LoST to provide the routing URIs was considered.
However, this would have meant that several of the mandatory
components in the <mapping> element would have had to contain
ambiguous or misleading values. Specifically, the "source" attribute
is required to contain a LoST application unique string for the
authoritative server. However, in the situations described in this
specification there may not be an authoritative LoST server, so any
value put into this attribute would be misleading. In addition to
this, routing information received in the manner described in this
specification should not be cached by the receiver, so detailing when
the routing information expires or was last updated is irrelevant.

4. Mechanism

The mechanism consists of adding an element to the HELD
locationRequest and an element to the locationResponse.

The request element indicates that the requestor wants the LIS to
provide routing information based on the location of the end-device.
If the routing request is sent with no attribute then URIs for
urn:service:sos are returned. If the requestor wants routing
information for a specific service then they may include an optional
service URN. If a service is specified, and the LIS does not
understand the requested service then URIs for urn:service:sos are
returned.

If the LIS understands the routing request and has routing
information for the location then it includes the information in a
routingInformation element returned in the locationResponse. How the
LIS obtains this information is left to implementation, one possible
option is that the LIS acquires it from a LoST server, other
possibilities are described in Section 3.

A LIS that does not understand the routing request element ignores it
and returns location as normal.

A LIS that does support the routing request element MUST support
returning URIs for urn:service:sos and any regionally defined sub-
services while following the URN traversal rules defined in
[RFC5031].

A LIS that does understand the routing request element but can't
obtain any routing information for the end-device's location MUST
only return location information.

A LIS that understands the routing request element but not the
specified service URN, MUST follow the URN traversal rules defined in
[RFC5031].

A LIS that receives a request for emergency routing information that
it understands MUST return the correct emergency routing information
if it has or is able to acquire the routing information for the
location of the target device.

The routing information in the location response consists of a
service element identified by a service name. The service name is a
urn and might contain a general emergency service urn such as
urn:service:sos or might contain a specific service urn depending on
what was requested and what the LIS is able to provide. A list of
one or more service destinations is provided for the service name.
Each destination is expressed as a URI and each URI scheme should
only appear once in this list. The routing URIs are intended to be
used at the time they are received. To avoid any risks of using
stale routing URIs the values MUST NOT be cached by the receiving
entity.

5. HELD Schema Extension

This section describes the schema extension to HELD.

```
<?xml version="1.0"?>
<xs:schema
  targetNamespace="urn:ietf:params:xml:ns:geopriv:held:ri"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:ri="urn:ietf:params:xml:ns:geopriv:held:ri"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  elementFormDefault="qualified" attributeFormDefault="unqualified">

  <xs:element name="requestRoutingInformation">
     <xs:complexType name="empty">
        <xs:attribute name="service" type="xs:anyUri"
            use="optional" default="urn:service:sos"/>
     </xs:complexType>
  </xs:element>

  <xs:complexType name="service">
     <xs:complexContent>
        <xs:restriction base="xs:anyType">
           <xs:sequence>
              <xs:element name="dest" type="xs:anyURI"
                  maxOccurs="unbounded"/>
              <xs:any namespace="##other" processContents="lax"
                     minOccurs="0" maxOccurs="unbounded"/>
           </xs:sequence>
           <xs:attribute name="serviceUri" type="xs:anyURI"
                        use="required"/>
        </xs:restriction>
     </xs:complexContent>
  </xs:complexType>

  <xs:element name="routingInformation" type="ri:riType"/>
     <xs:complexType name="riType">
        <xs:complexContent>
           <xs:restriction base="xs:anyType">
            <xs:sequence>
              <xs:element name="service" type="ri:service"/>
              <xs:any namespace="##other" processContents="lax"
                     minOccurs="0" maxOccurs="unbounded"/>
            </xs:sequence>
            <xs:anyAttribute namespace="##any" processContents="lax"/>
          </xs:restriction>
         </xs:complexContent>
        </xs:complexType>

</xs:schema>
```

6. **Examples**

   Figure 3 illustrates a <locationRequest> example that contains IP
   flow information in the request.

```
<locationRequest xmlns="urn:ietf:params:xml:ns:geopriv:held"
                 responseTime="emergencyRouting">

        <requestRoutingInformation
            xmlns="urn:ietf:params:xml:ns:geopriv:held:ri"/>

        <flow xmlns="urn:ietf:params:xml:ns:geopriv:held:flow"
            layer4="tcp" layer3="ipv4">
          <src>
             <address>192.168.1.1</address>
             <port>1024</port>
          </src>
          <dst>
             <address>10.0.0.1</address>
             <port>80</port>
          </dst>
        </flow>
</locationRequest>
```

                    Figure 3: Example Location Request.

Figure 4 illustrates the <locationResponse> message containing two
location URIs: a HTTPS and a SIP URI. Additionally, the response
contains routing information.

```
<locationResponse xmlns="urn:ietf:params:xml:ns:geopriv:held">
      <locationUriSet expires="2006-01-01T13:00:00.0Z">
        <locationURI>
                https://ls.example.com:9768/357yc6s64ceyoiuy5ax3o
        </locationURI>
        <locationURI>
                sip:9769+357yc6s64ceyoiuy5ax3o@ls.example.com
        </locationURI>
      </locationUriSet>

      <routingInformation
         xmlns="urn:ietf:params:xml:ns:geopriv:held:ri">
        <service serviceUri="urn:service:sos">
          <dest>sip:112@example.com</dest>
          <dest>sips:112@example.com</dest>
          <dest>xmpp:112@example.com</dest>
        </service>
      </routingInformation>

   </locationResponse>
```

Figure 4: Example Location Response

7. Privacy Considerations

This document makes no changes that require privacy considerations
beyond those already described in [RFC5687]. It does however extend
those described in [RFC6155].

[RFC5687] describes the issues surrounding Layer 7 location
configuration protocols, which this document makes no specific
changes to.

[RFC6155] extends HELD beyond a simple LCP by enabling authorized
third-parties to acquire location information and describes the
issues in Section 4. The HELD Routing extension supports returning
URIs that represent specific services operating in the Target's
vicinity. This represents additional information about the Target,
as a consequence it is recommended that this option only be used when
a location URI is returned by the LIS.

8. Security Considerations

   This document imposes no additional security considerations beyond
   those already described in [RFC5687] and [RFC6155].

9. IANA Considerations

9.1. URN sub-namespace registration for
      'urn:ietf:params:xml:ns:geopriv:held:ri'

   This document calls for IANA to register a new XML namespace, as per
   the guidelines in [RFC3688].

   URI: urn:ietf:params:xml:ns:geopriv:held:ri

   Registrant Contact: IETF, ECRIT working group (ecrit@ietf.org),
      James Winterbottom (a.james.winterbottom@gmail.com).

   XML:

   BEGIN
    <?xml version="1.0"?>
    <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
      "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
    <html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en">
     <head>
       <title>HELD Routing Information Extensions</title>
     </head>
     <body>
      <h1>Additional Element for HELD Routing Information</h1>
      <h2>urn:ietf:params:xml:ns:geopriv:held:ri</h2>
      [[NOTE TO IANA/RFC-EDITOR: Please update RFC URL and replace XXXX
        with the RFC number for this specification.]]
      <p>See RFCXXXX.</p>
     </body>
    </html>
   END

9.2. XML Schema Registration

   This section registers an XML schema as per the procedures in
   [RFC3688].

   URI: urn:ietf:params:xml:schema:geopriv:held:ri

   Registrant Contact: IETF, ECRIT working group, (ecrit@ietf.org),
      James Winterbottom (a.james.winterbottom@gmail.com).

The XML for this schema can be found as the entirety of Section 5
of this document.

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