EENA NG112 Technical Committee Document

Pan-European Mobile Emergency Application (PEMEA) Protocol and Procedures Specification

Title:	PEMEA Protocol and Procedures Specification		
Version:	5.0		
Revision Date:	23-04-2016		
Status of the document:	Draft	For comments	**Approved**

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1 Executive Summary

This document defines the protocols, information elements, rules and procedures necessary to implement the PEMEA architecture and requirements specification. It provides the XML schema implementing the message flows as well specifying the transport protocol, associated security measures and, where necessary, explicit procedures for functional entities to perform. The reader of this document is expected to be familiar with the PEMEA requirements and functional architecture document and able to read and understand XML schema.

2 Introduction

This document defines the message elements and transport protocol for the pan-European Mobile Emergency Application (PEMEA) solution. The requirements, functional entities and message flows defined in the PEMEA Requirements and Functional Architecture document [2] are implemented using the details described in this document.

3 Message transportation

All messages are conveyed as XML over secure HTTP.
The HTTP connection is established using mutual authentication in accordance with RFC-2818.
Cookies (RFC-2965) must not be used.
Providers must use the HTTP POST method to deliver emergencyDataSend messages in the body of the HTTP message. The sending entity must include a Host header when initiating a connection. No sending entity shall accept a redirect response and shall cease to attempt message delivery in the event that one is received.

emergencyDataReceived and application error messages are returned using a HTTP 200 responses.

Table 1 HTTP Request Headers for PEMEA

Header	Value	Description
Request method	POST	Defines the HTTP method being used when passing information to the server.
Host	psp.example.com:47273	The address of the host being sort.
Connection	close	Each originating message must establish a new connection to the server.
Accept	application/xml	
Content-Type	application/xml; charset=utf-8	The content type of the message
Cache-control	private	
Content-Length		

Table 2 HTTP Response Headers for PEMEA

Header	Value	Description
Response	HTTP/1.1 200 OK	
Server	Example PSP	
Date	Tue, 02 Feb 2016 20:45:30 GMT	
Expires	Tue, 02 Feb 2016 20:45:30 GMT	
Cache-control	private	
Content-Type	application/xml; charset=utf-8	The content type of the message
Content-Length		

4 Authenticating and authorizing PEMEA entities

All entities, APs, PSPs, PSAPs and ASPs need to have a PEMEA identifier (PEMEA-ID) and this is provided by the PEMEA registry whan an application is approved. The application process is described in an EENA operational document. The PEMEA registry provides a list of each entity, the entity type and entity's registered domain name. All PEMEA entities should load this information into their servers periodically. The recommended refresh period is outlined in the operational document.

Each entity is required to obtain and maintain a domain name certificate stemming from a well-known root CA and this must be the domain name provided to the PEMEA registry at the time of registration.

The client entity must assert itself to the serving entity when attempting to access a resource. This is done by using the client-side credential described in the previous paragraph. The serving entity similarly asserts its identity to the requesting entity. The requesting entity's certificate must validate, and the domain name must match to a registered PEMEA-entity, if it does not, then the request for data must be denied and an HTTP 403 "Forbidden" response is sent from the requesting entity.

Certain URI types, such as the reach-back URIs defined in Section 6.2.12, and the onCapSupportPost URI described in Section 7.1.3 must only be accessed by a PSAP or PSP.

4.1 PEMEA Securing a PSAP Retrieving Data By Reference or a reach-back URI

The PEMEA Requirements and Functional Architecture document [2], describes a means by which an AP may advertise a means for a PSAP to acquire additional information related to a call or caller from the AP. In this document, this mechanism is implemented using URIs.

Information about the AP, and caller information is conveyed in IETF Additional-Data structures defined in [11], with a general preference to information being conveyed by value. However, it may not be legal in some jurisdictions to send private caller information (contained in the SubscriberData structure) to any entity but the receiving PSAP or PSP. In this case SubscriberData must be sent by reference and only provided to a validated PSAP or PSP querying for the information.

5 PEMEA XML Processing Rules

The PEMEA messages are specified as XML elements and are designed with explicit extension points. These extension points exist for two main reasons.

Firstly, PEMEA needs to be capable of transfering intra-country messages between providers and agencies, and some countries and agencies have local requirements over and above those addressed in the basic PEMEA data set. These extension points allow this information to be included by an AP or a PSP in all PEMEA exchanges thereby simplifying implementation.

Secondly, it is envisaged that PEMEA will require general enhancements and extensions over its lifetime. However, like all wide-network deployments, it is impossible to upgrade all nodes at once, or across national boundaries to enforce upgrades. As a consequence the schema extension points designed into the protocol elements provide a means for this evolution of PEMEA functionality.

The standard processing rules for XML are that if an element is not understood or recognized then it is ignored. The interpretation of this edict is clear when the receiving node is a terminating element, that is, a tPSP. The interpretation of the edict is less clear for intermediary nodes since messages must be interpreted, altered and then passed on to the next node in the chain. Interpreting a message may result in unrecognized extensions being "ignored" and subsequently thrown away when the message is altered and passed on. It is a fundamental requirement for implementations of this specification NOT TO DISCARD any information from messages received, processed and subsequently passed on to other PEMEA nodes. That is, all valid XML objects received MUST be passed to subsequent PEMEA nodes.

6 PEMEA Element Definitions

This section is broken into a series of parts, with each part describing important types and structures. It is broken down like this to try and help the reader understand how the messages are put together. Where deemed helpful in a section an XML fragment showing how to use the structure is included. In Section 14 is the schema in its entirety. Each XML fragment has been validated against its base schema for correctness.

The PEMEA protocol messages are defined as XML documents that MUST be encoded in UTF-8.

6.1 Timestamps

PEMEA is specified using XML and timestamps are defined as XML dateTime types. While this definition does allow for the specification of timezone, all timeStamps contained in a route element must be specified in UTC time. This ensures that if different entities in the message flow are in different timezone it is easy to determine when certain events occurred without the need for timezone conversion.

This restriction does not apply to conveyed entities such as timestamps inside the PIDF-LO, though UTC time is preferable.

6.2 General types

6.2.1 pemea:posIntType

Type	Values	Description
pemea:posIntType	Zero and positive integers	N/A

6.2.2 pemea:nodeType

Type	Parameter	Param-Type	Presence	Description
pemea:nodeType	position	pemea:posIntType	Mandatory	A number representing the position of the node in the routing chain. The node initiating the message shall have a position of 0.
	timeStamp	xs:dateTime	Mandatory	The date and time that the message was sent specified in UTC time: 2015-05-16T16:46:32Z
	node	xs:anyURI	Mandatory	The URI used to send messages to the node: https://psp.oonagal.zz:9001

6.2.3 pemea:hopsType

Type	Parameter	Param-Type	Presence	Description
pemea:hopsType	hop	pemea:nodeType	Mandatory	List of nodes that the message has traversed.

```
<hops>
  <hop position="0" timeStamp="2016-01-14T19:43:00.001Z">
    <node>https://cooAP.example.com.be:2001/pemea/</node>
  </hop>
  <hop position="1" timeStamp="2016-01-14T19:43:00.098Z">
    <node>https://orig.psp.example.com:2001/pemea/</node>
  </hop>
</hops>
```

The position attribute is used to specify the order in which the <hop> occurred in the signalling chain. A document shall be deemed invalid if it contains two or more hops with the same position attribute values. Receiving such a message shall result in the receiver sending an error to the sender and terminating any further forwarding of the emergencyDataSend (EDS) message. See Table 6 for error reason codes.

6.2.4 pemea:routeType

Type	Parameter	Param-Type	Presence	Description
pemea:routeType	msgSeq	xs:token	Mandatory	Message identifier provided by the initial originator of the emergencyDataSend message. In this specification this value is set by the AP.
	hops	pemea:hopsType	Mandatory	The hops parameter contains the identity of each node through which a message has passed.

```
<route msgSeq="CoolAP-7496" >
  <hops>
    <hop position="0" timeStamp="2016-01-14T19:43:00.001Z">
      <node>https://cooAP.example.com.be:2001/pemea/</node>
    </hop>
    <hop position="1" timeStamp="2016-01-14T19:43:00.098Z">
      <node>https://orig.psp.example.com:2001/pemea/</node>
    </hop>
  </hops>
</route>
```

6.2.5 pemea:destinationType

Parameter	Type	Description
pemea:destinationType	xs:enumeration	One of the following values • PSAP • PSP • ASP

6.2.6 pemea:destinationNodeType

Type	Param-Type	Presence	Description
pemea:destinationNodeType	xs:token	Conditional	If a destination node does not have a URI then it may describe itself using a name. Only a PSAP may use this option
	xs:anyURI	Conditional	If the destination node is identifiable by a URI then it must use this form.

6.2.7 pemea:deliveryType

Type	Parameter	Param-Type	Presence	Description
pemea:deliveryType	destType	pemea:destinationType	Mandatory	Type of node the data was delivered: • PSAP • PSP • ASP *NOTE: a PSP can only deliver data to a PSAP or an ASP*
	--	pemea:destinationNodeType	Mandatory	The name or address of the entity to which the message/data was delivered.

```
<!—Example One Token -->
<delivery destType="PSAP">PSAP connected to oPSP</delivery>

<!—Example Two URI -->
<delivery destType="PSAP">https://psap.opsp.example.com:2001/pemea/</delivery>
```

6.2.8 pemea:typeOfCallerIdType

Type	Param-Type	Presence	Description
pemea:typeOfCallerIdType	xs:token	Conditional	If the caller identifier is not something that can be expressed as a URI, e.g. a Skype name, then it may use a token instead.
	xs:anyURI	Conditional	This is the normal form of caller identifier and any identifier that can be expressed as a URI must use this form.

6.2.9 pemea:callerIdType

Type	Parameter	Param-Type	Presence	Description
pemea:callerIdType	typeOfId	xs:token	Mandatory	This is the type of identifier being used, in terms of what communications application the identifier is applicable to. Since these will grow over time, a registry of valid values is established in this document.
	--	pemea:typeOfCallerIdType	Mandatory	This is the actual value of the caller id.

Table 3Caller-Id Token Types

Value	Type	Description
msisdn	tel uri	An MSISDN of the caller expressed as a tel uri
skypeName	xs.token	The identifier used by the caller when using Skype
WhatsAppId	tel uri	The identifier used by the caller when using WhatsApp

Other types may be registered through the EENA technical committee through a process to be defined.

6.2.10 pemea:callerIdListType

Type	Parameter	Param-Type	Presence	Description
pemea:callerIdListType	callerId	pemea:callerIdType	Mandatory	List of possible caller Ids

```
<callerIds>
  <callerId typeOfId="msisdn">tel:+44-555-555-1234</callerId>
  <callerId typeOfId="msisdn">tel:+34-555-222-6789</callerId>
  <callerId typeOfId="skypeName">winterb</callerId>
</callerIds>
```

6.2.11 pemea:informationType

The informationType is the means by which the AP "More Information" capability described in Annex D of the PEMEA Requirements and Functional Architecture document is implemented. All information/resources are accessed in the AP using "reach-back" URIs provided by the AP to the destination PSAP. A PSAP not understanding or implementing one or any of these capabilities must ignore the URIs.
A registry for the types of information is established and the initial entries are in Table 4. Negotiation mechanisms for the streaming capabilities are for further study.
A registry of protocols for use with the types of information when more than one protocol type may be available for the same URI scheme is established and initial entries are in Table 5
Use of these URIs is subject to the description provided in Section 4.

Type	Parameter	Param-Type	Presence	Description
pemea:informatIonType	typeOfInfo	xs:token	Mandatory	Type of additional information being provided. Allowed values to be defined in a registry, initial values are in Table 4.
	protocol	xs:token	Optional	The protocol that the AP will accept for the service defined in the typeOfInfo attribute. For example, the AP may support HELD and MLP for location updates and both provide HTTP URIs
	Value	xs:anyURI	Mandatory	The URI through which the resource can be contacted.

Table 4 AP Information Type Registry

Value	Description
Location_Update	Provides the most up to date location available to the PSAP. If not protocol attribute is specified then the request is treated as a HELD location request per the HELD de-reference specification [15]. Other possible protocols are specified in Table 5.
Web	General Webpage content
RTT	URI through which an RTT media stream can be negotiated with the caller
Audio	URI through which an audio media stream can be negotiated with the caller
Video	URI through which a video media stream can be negotiated with the caller
Audio_Video	URI through which an audio and video media stream can be negotiated with the caller
IM	URI through which text message can be exchanged with the caller
Medical	URI through which the PSAP can acquire caller medical records (format to be determined)

Table 5 AP Information Type Protocol Registry

Info type Value	Protocol Token	Description
Location_Update	HELD_Deref	Location requested using a HELD location request per the HELD de-reference specification [15].
	MLP_3.2	Mobile Location Protocol Version 3.2 [17]
	MLP_3.3	Mobile Location Protocol Version 3.3 [18]
	MLP_3.4	Mobile Location Protocol Version 3.4 [19]

6.2.12 pemea:apMoreInfoType

This is the container into which any additional AP information URI are placed. These URIs are referred to as "reach-back" URIs as they enable a tPSP or PSAP to "reach-back" to the originating AP for more information to to establish media sessions. Presence of the apMoreInfoType container in an emergency data send message is optional, however, if it is present then at least one information element must be provided.

Type	Parameter	Param-Type	Presence	Description
pemea:apMoreInfoType	information	pemea:informatIonType	Mandatory	At least one element must be provided. Each element represents a capability that the AP supports and is prepared to make available to the PSAP.

```
<apMoreInformation>
  <information typeOfInfo="IM">https://coolap.example.com.be:2002/im?id=CoolAP-7496</information>
  <information typeOfInfo="Video">https://coolap.example.com.be:2007/vid?id=CoolAP-7496</information>
  <information typeOfInfo="Web">https://coolap.example.com.be:2022/Web?id=CoolAP-7496</information>
  <information typeOfInfo="Location_Update"
          protcol="HELD">
          https://coolap.example.com.be:2096/Web?id=CoolAP-7496
  </information>
</apMoreInformation>
```

6.2.13 pemea:accessDataType

Defines the inclusion of the network and WiFi types from HELD Measurements, RFC 7105 [12].
This is defined a choice, so only one element may be present.

Type	Parameter	Param-Type	Presence	Description
pemea:accessDataType	network	cell:network[1]	Conditional	Is present if wifi is not.
	wifi	wifi:wifi[2]	Conditional	Is present if network is not.

[1] urn:ietf:params:xml:ns:geopriv:lm:cell
[2] urn:ietf:params:xml:ns:geopriv:lm:wifi

6.2.13.1 network

RFC-7105[12] section 5.4 defines the cellular elements with the XML schema defined in section 8.7. The schema defines a number of different cell representations.

Element	Parameter	PEMEA Presence	Type	Description
network	mcc	Conditional	element	Mobile Country Code. A one, two or three digit code that represents the country in which the serving cell is located. This is obtained using an API in the mobile device. It must be provided if the nid element is not used. It must be absent if the nid element is present.
	mnc	Conditional	element	Mobile Network Code. A two or three digit number representing the operator that owns the serving cell. This value is obtained using an API in the mobile device. It must be provided if the nid element is not used. It must be absent if the nid element is present.
	nid	Conditional	element	This is a non-negative integer representing the complete cell-id, MCC+MNC+CID. It must not be included if the mcc and mnc elements are present.

Example:

```
<network xmlns="urn:ietf:params:xml:ns:geopriv:lm:cell">
  <mcc>214</mcc>
  <mnc>01</mnc>
</network>
```

6.2.13.2 wifi

The elements for this section are specified in RFC-7105[12] section 5.3.

Element	Parameter	PEMEA Presence	Type	Description
wifi	ap	Mandatory	element	This element must be present if the wifi element is included.

The schema supports multiple access points (APs), however, only the serving AP is required.

Element	Parameter	PEMEA Presence	Type	Description
ap	serving	Mandatory	boolean	This indicates that the access point (AP) is the serving AP and must be set to true.
	bssid	Mandatory	element	This is the base service set identifier (bssid) is the 48 bit MAC address of the access point.

```
<wifi:wifi>
  <wifi:ap serving="true">
    <wifi:bssid>AB-CD-EF-AB-CD-EF</wifi:bssid>
  </wifi:ap>
</wifi:wifi>
```

6.2.14 pemea:accessData

Contains information the App provides about the access network it is attached to. It explicitly includes the pemea:accessDataType, but also allows any other types to be added as required in the future by use of an xml extension point.

Type	Parameter	Param-Type	Presence	Description
pemea:accessData	network	accessData	Conditional	Present if provided. Full details provided in RFC 7105 [12]
	wifi	accessData	Conditional	Present if provided. Full details provided in RFC 7105 [12]

```
<accessData>
  <cell:network>
    <cell:mcc>255</cell:mcc>
    <cell:mnc>023</cell:mnc>
  </cell:network>
</accessData>
```

6.2.15 pemea:msgInfoType

This is the container into which a free text message can be placed. It allows the specification of the language in which the message is written.

Type	Parameter	Param-Type	Presence	Description
pemea:msgInfoType	lang	xs:lang	Mandatory	The language in which the message is written.
	value	xs:token	Mandatory	The message being provided

```
<msgInfoType lang="en">This is the message that goes here</msgInfoType>
```

7 PEMEA Message Definition

7.1 emergencyDataSend Message

The emergencyDataSend (EDS) message is the means by which data is conveyed from the AP to the destination PSAP, all intermediary nodes transfer this type of message. Example does not show additional data.

Parameter	Presence	Type	Description
ttl	Mandatory	pemea:posIntType	Indicates the number of hops that the message may take before it must be deleted
onErrorPost	Conditional	xs:anyURI	Provides a URI at the AP for receiving error messages. If this attribute is present any entity receiving an error message in response to having sent an EDS message shall send the same error message to the URI specified in the attribute. Use of this attribute is recommended to assist with identifying network issues. Use of this attribute is mandatory if the apMoreInformation element is present. Refer to Section 7.1.2 for more details.
onCapSupportPost	Conditional	xs:anyURI	Provides a URI at the AP that a terminating PSAP or PSP must post to on receipt of an EDS. If this attribute is present then the terminating PSAP or PSP shall post to this URI on receipt of an EDS. Use of this attribute by the AP in EDS is

			mandatory if the apMoreInformation element is present. Refer to Section 7.1.3 for more details
route	Mandatory	pemea:routeType	Indicates the path that the message has followed up to this point.
callerIds	Mandatory	pemea:callerIdListType	The list of possible caller identifiers that may have been used to initiate the call. At the time of writing this is only expected to consist of a list containing one or more MSISDNs thereby supporting multi-sim devices.
apMoreInformation	Optional	pemea:apMoreInfoType	The list of URIs that the AP supports for the PSAP to communicate with or get more information about the caller. Only the AP may add the apMoreInformation element to the EDS message. No entities other than the AP shall add information elements to the apMoreInformation element. No elements shall remove or change information elements in the apMoreInformation element.
accessData	Conditional	pemea:accessDataType	The list of access information that the App is able to provide at call time.
pidfLo	Mandatory		Contains all of the information associated with the caller

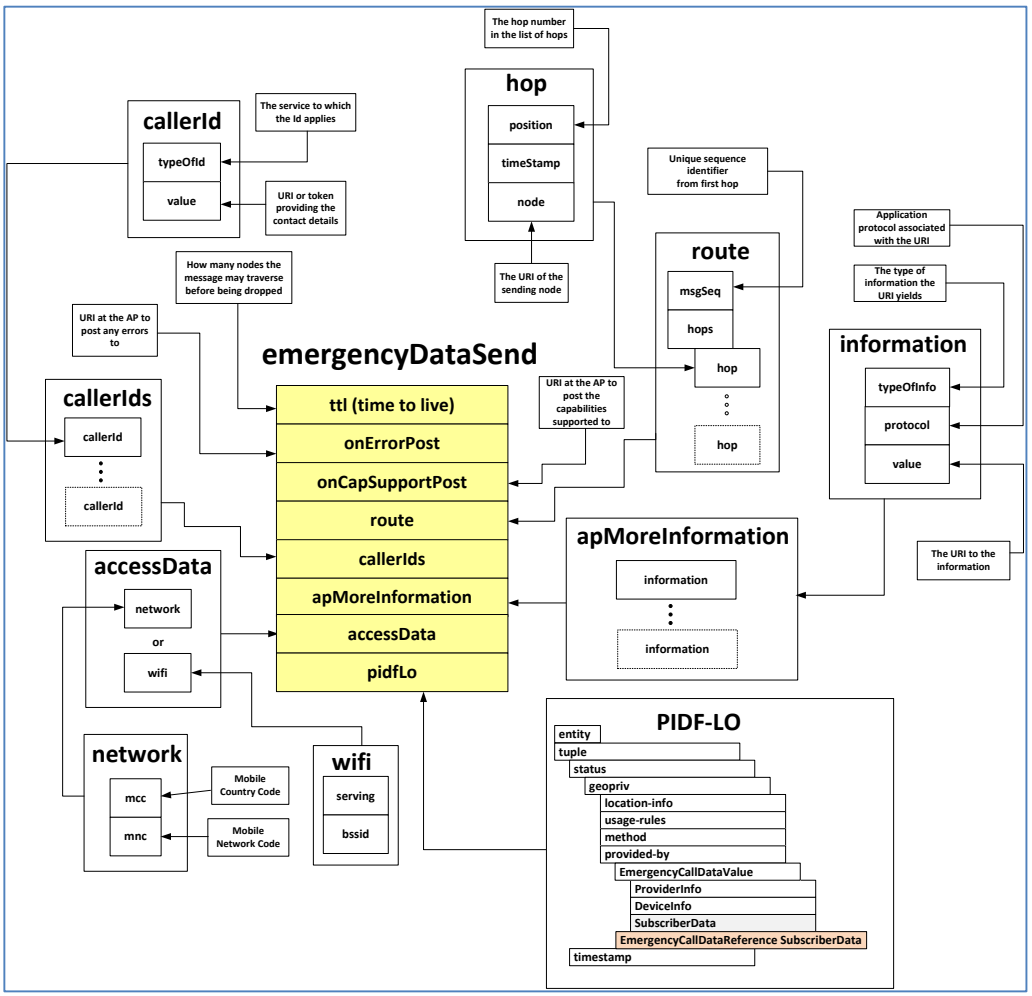

Figure 1 emergencyDataSend message structure

7.1.1 emergencyDataSend example

```
<emergencyDataSend xmlns="urn:eena:apps:xml:ns:pemea:base"
                xmlns:pdf="urn:ietf:params:xml:ns:pidf"
                            xmlns:gp="urn:ietf:params:xml:ns:pidf:geopriv10"
                xmlns:gml="http://www.opengis.net/gml"
                xmlns:gs="http://www.opengis.net/pidflo/1.0"
                xmlns:cell="urn:ietf:params:xml:ns:geopriv:lm:cell"
                xmlns:con="urn:ietf:params:xml:ns:geopriv:conf"
        ttl="5"
        onErrorPost=”https://cooAP.example.com.be:2001/pemea/error/CoolAP-7496”
        onCapSupporPost=”https://cooAP.example.com.be:2001/pemea/cap/CoolAP-7496”>
 <route msgSeq="CoolAP-7496" >
  <hops>
   <hop position="0" timeStamp="2016-02-01T19:43:00+11:00" >
    <node>https://cooAP.example.com.be:2001/pemea/ </node>
   </hop>
  </hops>
 </route>
 <callerIds>
  <callerId typeOfId="msisdn">tel:+44-555-555-1234</callerId>
  <callerId typeOfId="msisdn">tel:+34-555-222-6789</callerId>
  <callerId typeOfId="skypeName">winterb</callerId>
 </callerIds>
 <apMoreInformation>
  <information typeOfInfo="IM">https://coolap.example.com.be:2002/im?id=CoolAP-7496</information>
  <information typeOfInfo="Video">https://coolap.example.com.be:2007/vid?id=CoolAP-7496</information>
  <information typeOfInfo="Web">https://coolap.example.com.be:2009/Web?id=CoolAP-7496</information>
  <information typeOfInfo="Location_Update">
          https://coolap.example.com.be:2045/loc?id=CoolAP-7496
  </information>
 </apMoreInformation>
 <accessData>
  <cell:network>
   <cell:mcc>255</cell:mcc>
   <cell:mnc>023</cell:mnc>
  </cell:network>
 </accessData>
 <pdf:presence entity=" tel:+44-555-555-1234">
  <pdf:tuple id="circle">
   <pdf:status>
    <gp:geopriv>
     <gp:location-info>
      <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">
           30.0
       </gs:radius>
      </gs:Circle>
      <con:confidence pdf="normal">95</con:confidence>
     </gp:location-info>
     <gp:usage-rules/>
     <gp:method>GNSS</gp:method>
    </gp:geopriv>
   </pdf:status>
  </pdf:tuple>
 </pdf:presence>
</emergencyDataSend>
```

7.1.2 onErrorPost usage details

The onErrorPost attribute is a URI provided by the AP to which error messages related to the delivery an EDS message are sent. The URI must be specified as an HTTPS URI and the same authentication and authorization procedures procedures defined in Section 4 shall apply.

Any PEMEA entity receiving an error in response to sendng an EDS, where the EDS message contained an onErrorPost attribute and URI, shall post this same error to the URI contained in the onErrorPost attribute.

If the URI is invalid, or an error is received from the server addressed by the URI then the PEMEA eneity may log the error but does not need to take any further action.

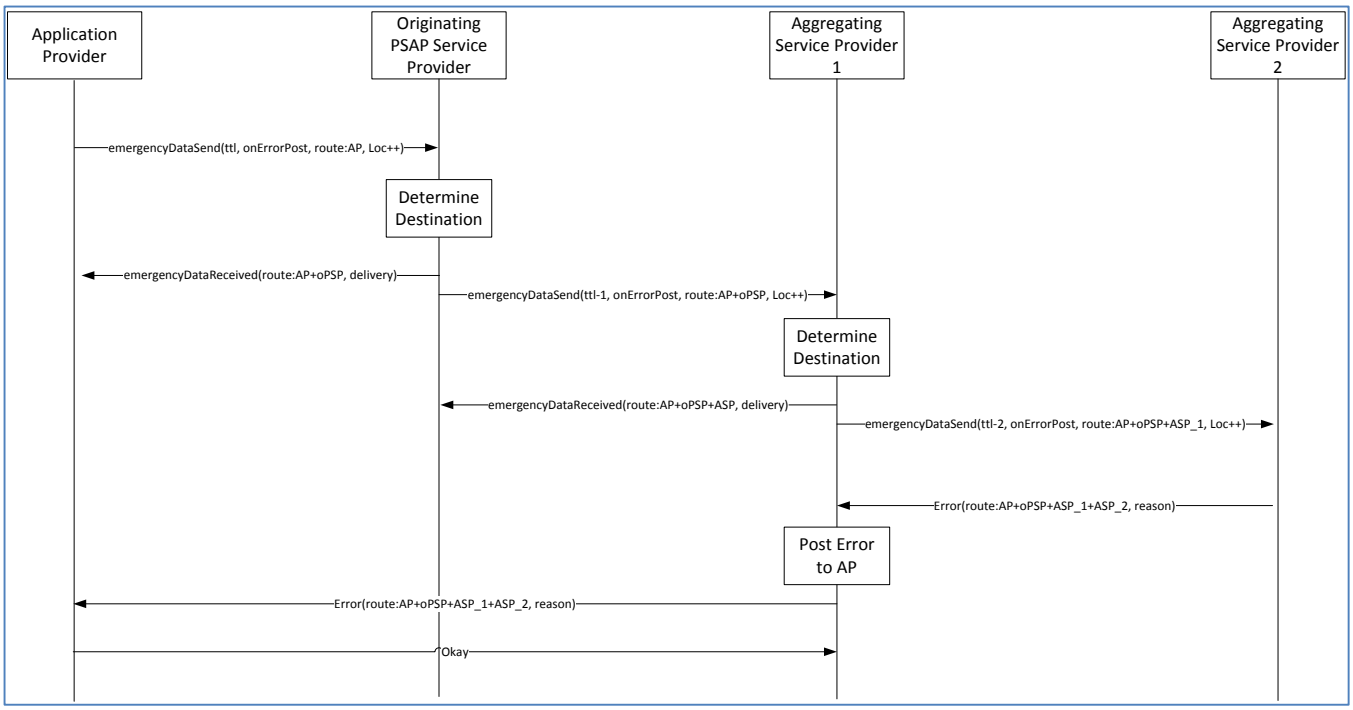

Figure 2 onErrorPost message flow

7.1.3 onCapSupportPost usage details

The onCapSupportPost attribute is a URI provided by the AP to which a terminating PSAP or PSP indicates which proffered capabilities contained in the information elements of the apMoreInformation element the terminating entity supports.

The URI must be specified as an HTTPS URI and the same authentication and authorization procedures procedures defined in Section 4 shall apply. If the AP determines that the posting entity is not a PSAP or PSP then the AP shall respond with an HTTP 403 "Forbidden" response.

If the onCapSupportPost attribute is provided in the EDS and the EDS does not contain an apMoreInformation element then the terminating PSAP or PSP shall post an empty message to the provided URI. This mechanism signifies receipt of the EDS message by a terminating entity to the AP.

If the onCapSupportPost attribute is provide in the EDS message and an apMoreInformation element is present in the EDS but the terminating PSAP or PSP does not support any of the information elements then the terminating PSAP or PSP shall post an empty message to the provided URI. This mechanism signifies receipt of the EDS message by a terminating entity to the AP and that terminating entity does not support any of the information elements expressed in the apMoreInformation element.

If the onCapSupportPost attribute is provide in the EDS message and an apMoreInformation element is present in the EDS and the terminating PSAP or PSP supports one or more of the information elements then the terminating PSAP or PSP shall:

1. construct an apMoreInformation element containing all information elements received in the EDS that are supported by the PSAP or PSP.
2. place the constructed apMoreInformation element into the body of an HTTP POST message.
3. POST the HTTP message to the URI contained in the onCapSupportPost attribute.

If a terminating PSAP or PSP were to receive the EDS from the example in Section 7.1.1 and the PSAP/PSP could only support Video and Location_Updates then the PSAP/PSP would post a message to the onCapSupportPost URI with the following body:

```
<?xml version="1.0" encoding="UTF-8"?>
<apMoreInformation xmlns="urn:eena:apps:xml:ns:pemea:base">
```

```
        <information typeOfInfo="Video"/>
        <information typeOfInfo="Location_Update" protocol="HELD"/>
</apMoreInformation>
```

If the posting entity receives an error from the AP in response to the post, then the posting entity may log the error. No further action is required on the part of the posting entity.

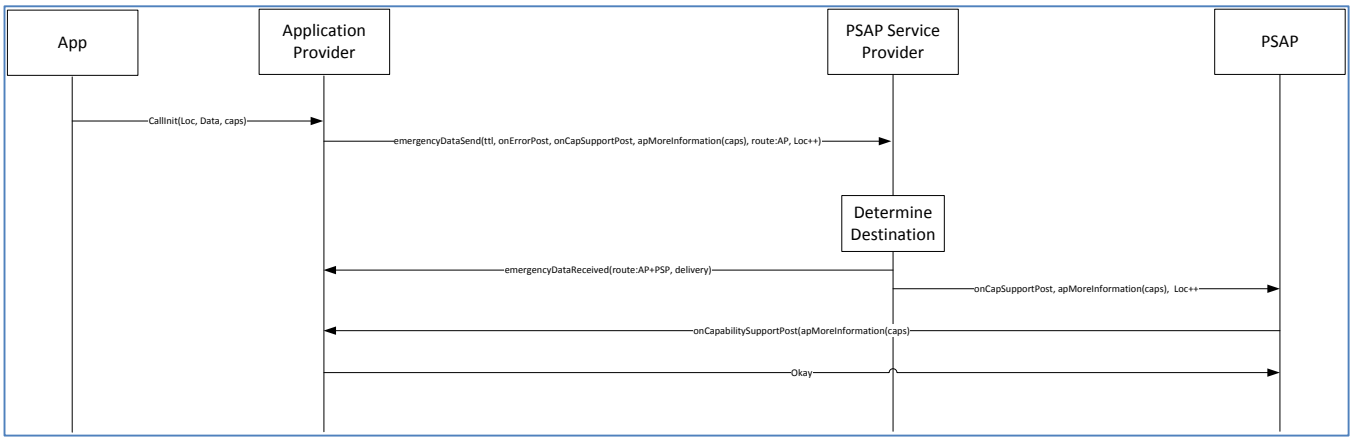

Figure 3 onCapSupportPost message sequence

7.2 emergencyDataReceived message

Parameter	Presence	Type	Description
timeStamp	Mandatory	xs:timeStamp	Time stamp that the message is sent specified in UTC
route	Mandatory	pemea:routeType	Indicates the path that the message has followed up to this point.
delivery	Mandatory	pemea:deliveryType	The node to which the data has just been sent.

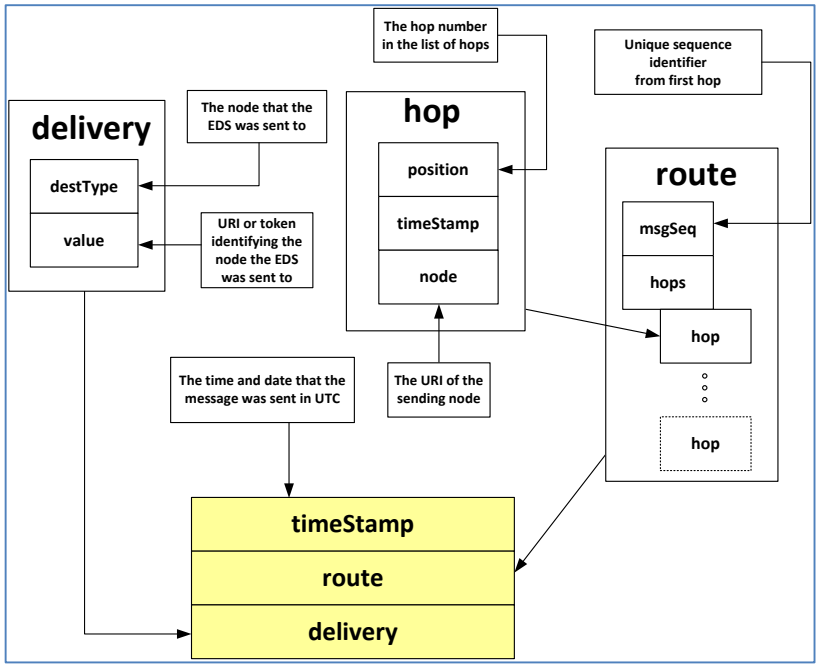

Figure 4 emergencyDataReceived message structure

7.2.1 emergencyDataReceived example

```
<emergencyDataReceived xmlns="urn:eena:apps:xml:ns:pemea:base" timeStamp="2016-01-14T19:43:01.521Z">
  <route msgSeq="CoolAP-7496" >
    <hops>
      <hop position="0" timeStamp="2016-01-14T19:43:00.001Z">
        <node>https://cooAP.example.com.be:2001/pemea/</node>
      </hop>
      <hop position="1" timeStamp="2016-01-14T19:43:00.098Z">
        <node>https://orig.psp.example.com:2001/pemea/</node>
      </hop>
    </hops>
  </route>
  <delivery destType="PSAP">https://psap.opsp.example.com:2001/pemea/</delivery>
</emergencyDataReceived>
```

7.3 error message

Parameter	Presence	Type	Description
timeStamp	Mandatory	xs:timeStamp	Time stamp that the message is sent specified in UTC
reason	Mandatory	xs:token	The reason that the error was generated based on a token value defined in Table 4.
message	Optional	pemea:msgInfoType	The human readable text message describing the problem. Note that the language is a mandatory attribute.
route	Mandatory	pemea:routeType	Indicates the path that the message has followed up to this point.

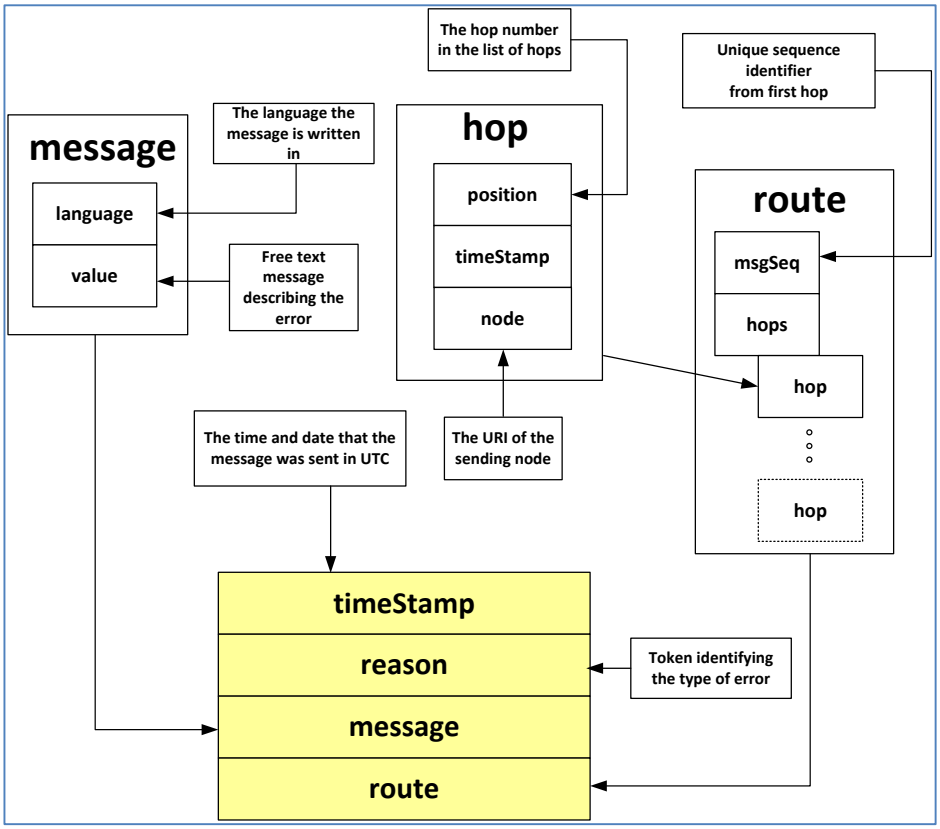

Figure 5 error message structure

Table 6 Error reasonToken values

Value	Description
ttlExhausted	The time to live value reached zero and the message was not delivered to a PSAP
noRoute	The entity currently responsible for routing the message does not have a relationship with any entity that can receive it.
badMessage	The message could not be understood by the receiving entity (normally this message will be sent by the home PSP)
circularRoute	The entity currently trying to route the message has identified that the next hop it would send the message to is already in the route element.
duplicateHopPosition	The route element contained two or more hops with the same position attribute value.

```
<error xmlns="urn:eena:apps:xml:ns:pemea:base" timeStamp="2016-01-14T19:43:01.521Z">
  <reason>noRoute</reason>
  <message lang=”en”>Cannot find route for location provided</message>
  <route msgSeq="CoolAP-7496" >
    <hops>
      <hop position="0" timeStamp="2016-01-14T19:43:00.001Z">
        <node>https://cooAP.example.com.be:2001/pemea/</node>
      </hop>
      <hop position="1" timeStamp="2016-01-14T19:43:00.098Z">
        <node>https://asp1.example.com:2001/pemea/</node>
      </hop>
    </hops>
  </route>
</error>
```

8 PEMEA PIDF-LO Profiling

The presence information data format (PIDF)[7] location object (LO)[3] is a highly extensible data structure. The original EENA mobile Apps specification provided a comprehensive profile for the PIDF-LO for use in mobile emergency applications. This section does not change that profile it seeks only to more clearly specify the profile. IETF schemas are not repeated in this document, however references are provided to the documents where these schemas are specified. Note that SubscriberData may be sent either by value or by reference depending on jurisdictional constraints.

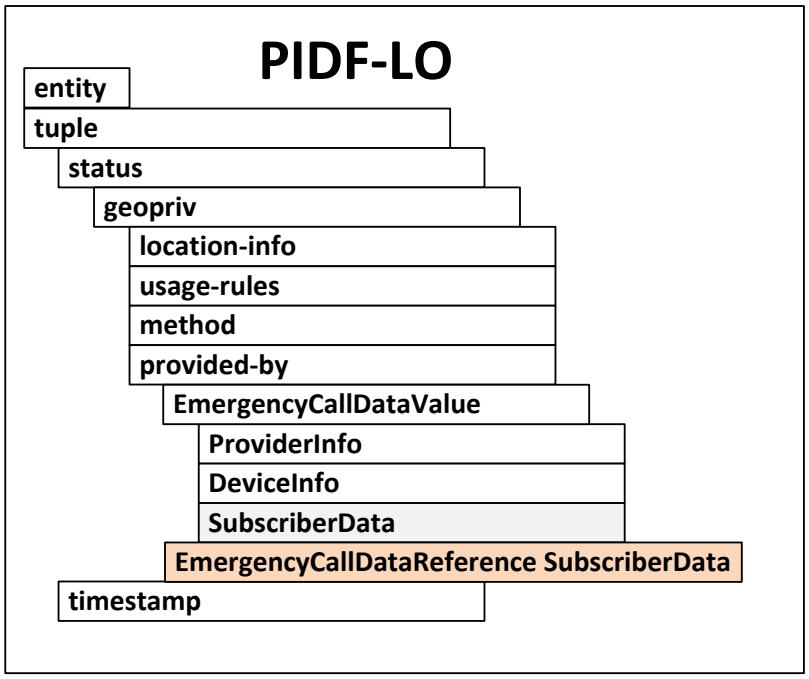

Figure 6 PEMEA PIDF-LO Structure

8.1 entity

Parameter	Presence	Type	Value	Description
entity	Mandatory	xs:anyURI	uri [5]	This value must be expressed as a URI and should be a URI from the callerIds list if a URI is provided as a URI.

8.2 tuple

Element	Parameter	PEMA Presence	Type	Value	Description
tuple	id	Mandatory	xs:ID	Unique token	Used to identify the tuple within the PIDF-LO document. NOTE: RFC 5491 [4] allows geopriv elements to be contained in a <person> or <device> element in addition to a <tuple> element. PEMEA shall only support geopriv elements being provided in a <tuple> element.
	status	Mandatory	element	--	Container for the geopriv object

8.3 status

Element	Parameter	PEMEA Presence	Type	Value	Description
status	geopriv	Mandatory	element	--	Container for location and user information

8.4 geopriv

Element	Parameter	PEMEA Presence	Type	Value	Description
geopriv	Location-info	Mandatory	element	--	Container for location and user information
	usage-rules	Mandatory	element	--	Container for usage rules
	method	Mandatory	element	From IANA[10]	The value for the method should be based on the values from the IANA registry[10].
	provided-by	Mandatory	element	--	Used to provide all supplementary user data.

8.4.1 location-info

The location-info element as defined in the PIDF-LO[3] is open to any XML namespace. PEMEA constrains the location types to those described in the PIDF-LO profile specification [4].

Element	Parameter	PEMEA Presence	Type	Description
Location-info	gml:Point	Conditional	element	A 2 dimensional or 3 dimensional point in space form the GML specification.
	gml:Polygon	Conditional	element	Construction for defining a 2D polygon from the GML specification.
	gs:Circle	Conditional	element	Construct for defining a circle from the GeoShape specification.
	gs:Ellipse	Conditional	element	Construct for defining an ellipse from the GeoShape specification.
	gs:ArcBand	Conditional	element	Construct for defining an arcband from the GeoShape specification.
	gs:Sphere	Conditional	element	Construct for defining a sphere from the GeoShape specification.
	gs:Ellipsoid	Conditional	element	Construct for defining an ellipsoid from the GeoShape specification.
	gs:Prism	Conditional	element	Construct for defining an extruded polygon (prism) from the GeoShape specification.
	confidence	Conditional	element	Defines the confidence level in the location information being provided.
	civicAddress	Conditional	element	Construct for defining civic address elements from RFC-5139[8] and civic extension complying with RFC-6848[9].

8.4.1.1 Confidence

RFC-7459[6] introduced an explicit means of representing confidence and uncertainty into locations provided in a PIDF-LO. Inclusion of this parameter is mandatory with all shape-types with the exception of the point types. If the location API of the device provided a confidence then this value can be explicitly provided, if the API does not provide this value then including the confidence with a value of "unknown" ensures that the receiving entity doesn't assume a value of 95% as stipulated in RFC-5491[4].

Element	Parameter	Default Value	Description
confidence	pdf	unknown	Probability Density Function. For GNSS solutions this must be set to "normal", for other determination mechanisms it should be set to "unknown".
	Element value	--	This is a value between 0 and 100 representing the confidence in the location being provided.

8.4.2 usage-rules

Element	Parameter	PEMEA Presence	Type	Value	Description
usage-rules	retransmission-allowed	Mandatory	element	yes	This value should be set to "yes" whenever the application user may be roaming. NOTE: If this parameter is set to "no", then the ttl value is ignored by the PSP and data from the AP can only be delivered from the PSP to a directly-connected PSAP. The EDS must not be passed to a second PSP or an ASP.
	retention-expiry	Mandatory	xs:dateTime	--	This value is set by the AP based on user policy. If no user policy is provided then the AP should set the value to 1 hour after the time the call for help is initiated by the user.

8.4.3 method

The method parameter is an element in the geopriv structure that is used to describe how the location information was determined. Often, this will be provided by the location API in the device, sometimes it is not. If is provided then one of values in the IANA registry[10] should be used. If the method is not provided or is unknown then "*Unknown"* should be used. While this value is defined in IANA, it informs downstream entities that the way in which location was determined is not known.

8.4.4 provided-by

Element	Parameter	PEMEA Presence	Scheme	Description
provided-by	provided-by	Mandatory	Additional-Data	This element contains the provided-by element taken the from the "additional-data"[11] scheme.

8.5 timestamp

This occurs after the status stanza is closed. It expresses the time that the PIDF-LO was created and in the context of PEMEA is represents the date and time that the AP received the location and other caller information associated with the current emergency.

8.6 PIDF-LO example

The following XML fragment is of a PIDF-LO. The Additional-Data information is not included for brevity.

```
<presence
   xmlns="urn:ietf:params:xml:ns:pidf"
   xmlns:gp="urn:ietf:params:xml:ns:pidf:geopriv10"
   xmlns:gml="http://www.opengis.net/gml"
   xmlns:gs="http://www.opengis.net/pidflo/1.0"
   xmlns:con="urn:ietf:params:xml:ns:geopriv:conf"

   entity="tel:+44-555-555-1234">
     <tuple id="circle">
       <status>
         <gp:geopriv>
           <gp:location-info>
             <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">
                 30.0
               </gs:radius>
             </gs:Circle>
             <con:confidence pdf="normal">95</con:confidence>
           </gp:location-info>
           <gp:usage-rules/>
           <gp:method>GNSS</gp:method>
         </gp:geopriv>
       </status>
     </tuple>
</presence>
```

9 PEMEA Additional-Data Profiling

The additional-data specification [11] was explicitly designed to provide containers for additional information about an emergency call, including who is making the call, what kind of device and network they are using and who the various providers are. The type and nature of the information being conveyed requires the data structures to be very flexible. PEMEA requires that the structures are used in a specific way so the structures are profiled for use in the PEMEA data exchanges, ensuring that all entities are able to interpret information provided different sources.

9.1 Additional-Data :- provided-by

PEMEA prefers to pass additional data by value, Section 4.1 describes situations where this may not be allowed. Information relating to the AP must always be passed by-value, however, caller information may be sent by reference where by-value is prohibited except to authorized entities. Entity authorization is described in Section 4.

Element	Parameter	PEMEA Presence	Type	Description
provided-by	EmergencyCallDataValue	Mandatory	EmergencyCallDataValueType	This element contains the provided-by element defined in the Additional-Data document [11].
	EmergencyCallDataReference	Conditional	ByRefType	Caller information is sensitive. Where a message is likely to go beyond the local PSP, then sending this information by reference may be required. This element is defined in the Additional-Data

				document [11].

9.2 EmergencyCallDataValue

Element	Parameter	PEMEA Presence	Type	Description
EmergencyCallDataValue	EmergencyCallData.ProviderInfo	Mandatory	ProviderInfoType	This information is filled in by the AP.
	EmergencyCallData.DeviceInfo	Optional	DeviceInfoType	This information must be provided by the application to the AP either at call time or ahead of call time.
	EmergencyCallData.SubscriberInfo	Conditional	SubscriberInfoType	This information must be provided by the application to the AP either at call time or ahead of call time. This element must be present if an EmergencyCallDataReference element is not included in the provided-by element of the PIDF-LO.

9.3 EmergencyCallData.ProviderInfo

Inclusion of this element is mandatory. It conveys information for contacting the AP that is originating an EDS message.

A full example is of an XML EmergencyCallData.ProviderInfo structure that is compliant with this specification is provided in Section 9.3.2.

Element	Parameter	PEMEA Presence	Type	Description
EmergencyCallData.ProviderInfo	DataProviderReference	Mandatory	xs:token	This information is provided by the AP and must be the same for all DataProviderReference elements in all additional data blocks in the same emergency DataSend message.
	DataProviderString	Mandatory	xs:string	A plain text string containing the name of the Application Provider. The Additional-Data specification [11] does provide for setting a language for this field. The value of the first Language element shall be used as the language to interpret this field.
	ProviderID	Mandatory	xs:string	Value provided by EENA after protocol certification.
	ProviderIDSeries	Mandatory	xs:string	This must have a value of EENA.
	TypeOfProvider	Mandatory	xs:string	This value must be set to "Application Provider".
	ContactURI	Mandatory	xs:anyURI	This value must contain the telephone number of the AP expressed as a tel uri [5].
	Language	Mandatory	Restricted xs:string	There must be one, but the AP may support more than one spoken language. The list of acceptable abbreviation can be found in [13]
	DataProviderContact	Mandatory	vcard	This supplies more information about the application provider. Only one vcard is allowed DataProviderContact in PEMEA.

9.3.1 DataProviderContact :- vcard

The vcard is used extensively in the additional data specification. This is a very flexible and potentially unstructured information container. This table attempts to add structure to the data provider contact information. The information in this table must be provided, other fields may be provided.

Element	Field being represented	PEMEA Presence	vcard element	Description
vcard	Organization's full name	Mandatory	org	Contains the full name of the AP
	Organization's street address	Mandatory	adr	Street address of the AP
	Email	Mandatory	<email><text>	General support email address must be provided
	Public website (URL)	Mandatory	<url><url>	Public email address for the AP

9.3.1.1 DataProviderContact :- org

Element	Element	PEMEA Presence	type	Description
org	parameters	Mandatory	element	Holds the parameter that defines the language that the organization name is provided in.
	text	Mandatory	xs:string	Contains the full name of the AP

Element	Element	PEMEA Presence	value	Description
parameters	language	Mandatory	--	
	language-tag	Mandatory	Any abbreviation from [13]	PEMEA requires the language that the organization name is specified in. This must be an abbreviation and the allowable abbreviations are specified in [13]

```
<vcard xmlns="urn:ietf:params:xml:ns:vcard-4.0">
  <org>
    <parameters>
      <language>
        <language-tag>en</language-tag>
      </language>
    </parameters>
    <text>Really Application Provider</text>
  </org>
</vcard>
```

9.3.1.2 DataProviderContact :- adr

Element	Element	PEMEA Presence	type	Description
adr	parameters	Mandatory	element	Block defining parameters that describe the type of address
	pobox	Optional[3]	xs:string	Post office box of the AP if applicable
	ext	Optional[3]	xs:string	Not used.
	street	Mandatory	xs:string	Street address, street name, number, suite and floor if applicable
	locality	Mandatory	xs:string	Municipality, city or suburb. May be empty if not applicable.
	region	Mandatory	xs:string	State or Province. May be empty if not applicable
	code	Mandatory	xs:string	The post code of the AP
	country	Mandatory	xs:string	Country name. Must be provided.

[3] The contents for this parameter are optional. The vCard schema requires the presence of this element even if it is empty.

Element	Element	PEMEA Presence	value	Description
parameters	language	Mandatory	--	
	language-tag	Mandatory	Any abbreviation from [13]	PEMEA requires the language that the address is specified in. This must be an abbreviation and the allowable abbreviations are specified in [13]

```
<vcard xmlns="urn:ietf:params:xml:ns:vcard-4.0">
  <adr>
    <parameters>
      <language>
        <language-tag>fr</language-tag>
      </language>
    </parameters>
    <pobox>77222</pobox>
    <ext/>
    <street>Avenue de la Toison d'Or, 79 - 3rd Floor</street>
    <locality>Brussels</locality>
    <region/>
    <code>1060</code>
    <country>Belgium</country>
  </adr>
</vcard>
```

9.3.1.3 DataProviderContact :- email

Element	Element	PEMEA Presence	type	Description
email	text	Mandatory	xs:string	The primary email address of the Application Provider.

```
<vcard xmlns="urn:ietf:params:xml:ns:vcard-4.0">
  <email><text>jw@eena.org</text></email>
</vcard>
```

9.3.1.4 DataProviderContact :- URL

Element	Element	PEMEA Presence	type	Description
url	uri	Mandatory	xs:anyURI	The public website of the Application Provider

```
<vcard xmlns="urn:ietf:params:xml:ns:vcard-4.0">
  <url>
    <uri>http://www.eena.org</uri>
  </url>
</vcard>
```

9.3.2 EmergencyCallData.ProviderInfo:- Complete Example

This section provides an example of a complete PEMEA compliant EmergencyCallData.ProviderInfo structure.

```
<EmergencyCallData.ProviderInfo xmlns="urn:ietf:params:xml:ns:EmergencyCallData:ProviderInfo"
                    xmlns:xc="urn:ietf:params:xml:ns:vcard-4.0">
  <DataProviderReference>CoolAP-0xFF4568262458</DataProviderReference>
  <DataProviderString>Cool Application Provider</DataProviderString>
  <ProviderID>urn:eena:pemea:ap:ID0x123FEDAC</ProviderID>
  <ProviderIDSeries>EENA</ProviderIDSeries>
  <TypeOfProvider>Application Provider</TypeOfProvider>
  <ContactURI>tel:+32-2534-9789</ContactURI>
  <Language>en</Language>
  <Language>fr</Language>
  <DataProviderContact>
    <xc:vcard>
      <xc:org>
        <xc:parameters>
          <xc:language>
            <xc:language-tag>en</xc:language-tag>
          </xc:language>
        </xc:parameters>
        <xc:text>Really Application Provider</xc:text>
      </xc:org>
      <xc:adr>
        <xc:parameters>
          <xc:language>
            <xc:language-tag>fr</xc:language-tag>
          </xc:language>
        </xc:parameters>
        <xc:pobox>77222</xc:pobox>
        <xc:ext/>
        <xc:street>Avenue de la Toison d'Or, 79 - 3rd Floor</xc:street>
        <xc:locality>Brussels</xc:locality>
        <xc:region/>
        <xc:code>1060</xc:code>
        <xc:country>Belgium</xc:country>
      </xc:adr>
      <xc:email>
        <xc:text>support@eena.org</xc:text>
      </xc:email>
      <xc:url>
        <xc:uri>http://www.eena.org</xc:uri>
      </xc:url>
    </xc:vcard>
  </DataProviderContact>
</EmergencyCallData.ProviderInfo>
```

9.4 EmergencyCallData.DeviceInfo

Inclusion of this element is optional.

Much of the information included in this element is unknown to the Application Provider and it need only be provided if the App provides it at call time. See [11] for examples.

Element	Parameter	PEMEA Presence	Type	Description
EmergencyCallData.DeviceInfo	DataProviderReference	Mandatory	xs:token	This information is provided by the AP and must be the same for all DataProviderReference elements in all additional data blocks in the same emergency DataSend message.
	DeviceClassification	Mandatory	xs:string	This must be set to "smart-phone-app"
	DeviceManufacturer	Optional	xs:string	This should be provided if available.
	DeviceModelNr	Optional	xs:string	This should be provided if

				available.
	UniqueDeviceID	Mandatory	xs:string	Two of these must be provided. See below.
	DeviceSpecificType	Conditional	xs:string	The information in this field represents the name of the device application being used and the version number of the application.

Element	Parameter	Value	Description
UniqueDeviceID	TypeOfDeviceID	"IMSI"	This is an attribute on the UniqueDeviceID element and specifies how to interpret the value.
	Element value	--	The value of the element must be the IMSI of the device.
UniqueDeviceID	TypeOfDeviceID	"IMEI"	This is an attribute on the UniqueDeviceID element and specifies how to interpret the value.
	Element value	--	The value of the element must be the IMEI of the device.

9.5 EmergencyCallData.SubscriberData

Inclusion of this element is mandatory. Future extension to the protocol usage may move its inclusion to conditional based on EDS origination.

This section defines the elements that make up the EmergencyCallData.SubscriberData structure for use in PEMEA. A full example of an EmergencyCallData.SubscriberData element compliant with this specification is provided in Section 9.5.2.

Element	Parameter	PEMEA Presence	Type	Description
EmergencyCallData.SubscriberData	privacyRequested	Mandatory	xs:boolean	This is an attribute of the EmergencyCallData.SubscriberData element. Normally set to "false", if set to "true" adherence is determined by the destination jurisdiction not the originating jurisdiction.
	DataProviderReference	Mandatory	xs:token	This information is provided by the AP and must be the same for all DataProviderReference elements in all additional data blocks in the same emergency DataSend message.
	SubscriberData	Mandatory	vcard	This supplies more information about the caller. Only one vcard is allowed SubscriberData in PEMEA.

9.5.1 SubscriberData :- vcard

The vcard is used extensively in the additional data specification. This is a very flexible and potentially unstructured information container. This table attempts to add structure to the caller information provided in the SubscriberData vcard. The information in this table must be provided, other fields may be provided.

Element	Field being represented	PEMEA Presence	vcard element	Description
vcard	Full name of caller	Mandatory	n	Contains the full name of the caller.
	Home address	Conditional	adr	The home address of the caller if available. Not all people are of fixed abode, so this data may not be provided.
	Language	Mandatory	lang	Contains the languages that the caller can speak. This should include all verbal and non-verbal languages (for example sign language)
	Gender	Optional	gender	Gender of the caller
	Age	Optional	bday	Birthday of the caller allowing age of caller to be determined.
	Other Contacts	Optional		Defines other ways that the caller may be contacted.
	Telephone numbers	Optional	tel	Additional telephone numbers associated with the caller
	Email Address	Optional	email	An email address for the caller
	Emergency Family Contacts	Conditional	related	Next of kin or family member to contact if required. This information is sent if the application user has provided it.

9.5.1.1 SubscriberData :- Caller's name

Element	Element	PEMEA Presence	type	Description
n	parameter	Mandatory	element	Used to specify the language that the name is written in.
	surname	Mandatory	xs:string	Last name of the caller
	given	Mandatory	xs:string	Given/first name of the caller
	additional	Optional	xs:string	Any other names the caller may have if available
	prefix	Mandatory	xs:string	Prefix salutation of the caller. E.g. Mr, Ms, Dr
	suffix	optional[4]	xs:string	Any name suffixes that the caller may have.

Element	Element	PEMEA Presence	value	Description
parameters	language	Mandatory	--	
	language-tag	Mandatory	Any abbreviation from [13]	PEMEA requires the language that the caller's name is specified in. This must be an abbreviation and the allowable abbreviations are specified in [13]

[4] The presence of the element is required by the vCard schema, the contents of the element may be blank.

```
<vcard xmlns="urn:ietf:params:xml:ns:vcard-4.0">
  <n>
    <parameters>
      <language>
        <language-tag>en</language-tag>
      </language>
    </parameters>
    <surname>Smith</surname>
    <given>George</given>
    <additional>Lawrence</additional>
    <prefix>Mr</prefix>
    <suffix/>
  </n>
</vcard>
```

9.5.1.2 SubscriberData :- home address

Element	Element	PEMEA Presence	type	Description
adr	parameters	Mandatory	element	Block defining parameters that describe the type of address
	pobox	Optional[5]	xs:string	Use is not recommended.
	ext	Optional[5]	xs:string	Not used
	street	Mandatory	xs:string	Street address, street name, number, suite and floor if applicable
	locality	Mandatory	xs:string	Municipality, city or suburb. May be empty if not applicable.
	region	Mandatory	xs:string	State or Province. May be empty if not applicable
	code	Mandatory	xs:string	The post code the caller
	country	Mandatory	xs:string	Country name. Must be provided.

Element	Element	PEMEA Presence	value	Description
parameters	language	Mandatory	--	
	language-tag	Mandatory	Any abbreviation from [13]	PEMEA requires the language that the address is specified in. This must be an abbreviation and the allowable abbreviations are specified in [13]
	type	Mandatory	--	Defines the type of element that contains the information that describes the address
	text	Mandatory	home	PEMEA only allows a value of "home" to be specified in this field when relating to SubscriberData.

[5] The contents for this parameter are optional. The vCard schema requires the presence of this element even if it is empty.

```
<vcard xmlns="urn:ietf:params:xml:ns:vcard-4.0">
  <adr>
    <parameters>
      <language>
        <language-tag>fr</language-tag>
      </language>
      <type><text>home</text></type>
    </parameters>
    <pobox/>
    <ext/>
    <street>Avenue de la Toison d'Or, 79 - 3rd Floor</street>
    <locality>Brussels</locality>
    <region/>
    <code>1060</code>
    <country>Belgium</country>
  </adr>
</vcard>
```

9.5.1.3 SubscriberData :- language

There must be at least one of these elements but there must be at least one.

Element	Element	PEMEA Presence	type	Description
lang	parameters	Mandatory	element	Used to assist in defining the order of preference if the caller can speak more than one language
	Language-tag	Mandatory	xs:string	Name of the language used by the caller, this may be spoke or unspoken. List of the allowable abbreviations are contained in [13] or [14].

Element	Element	PEMEA Presence	value	Description
parameters	pref	Mandatory	--	Defines the parameter is specifying a preference
	integer	Mandatory	1-20	Specifies the preference towards the specific language. The smaller the number the higher the preference.

```
<vcard xmlns="urn:ietf:params:xml:ns:vcard-4.0">
  <lang>
    <parameters>
      <pref><integer>1</integer></pref>
    </parameters>
    <language-tag>en</language-tag>
  </lang>
  <lang>
    <parameters>
      <pref><integer>2</integer></pref>
    </parameters>
    <language-tag>fr</language-tag>
  </lang>
</vcard>
```

9.5.1.4 SubscriberData :- gender

Element	Element	PEMEA Presence	type	Description
gender	sex	Mandatory	xs:string	Indicates the gender of the caller. M, F, O, N, U

```
<vcard xmlns="urn:ietf:params:xml:ns:vcard-4.0">
  <gender><sex>M</sex></gender>
</vcard>
```

9.5.1.5 SubscriberData :- bday

Element	Element	PEMEA Presence	Value	Description
bday	date	Mandatory	YYYYMMDD	If a value is provided it must be provided in the form YYYYMMDD. The purpose of the value is provide the age of the caller.

```
<vcard xmlns="urn:ietf:params:xml:ns:vcard-4.0">
  <bday><date>19670722</date></bday>
</vcard>
```

9.5.1.6 SubscriberData :- tel

Inclusion of this element is optional but recommended.

This section defines how to specify additional telephone contacts for the caller. These may be repeats of the contacts provided in the callerIds specified in Section 6.2.10, however, the numbers in the tel fields are designed for display to the PSAP, while those in the callerId fields are designed as keys through which the PSAP can access this additional data.

Element	Element	PEMEA Presence	Value	Description
tel	parameters	Mandatory	--	Contains the type of telephony device.
	text	Mandatory	anyURI	If this is a telephone number then it must be expressed as a tel URI [5]. Text and video types may be expressed using other URI forms.

Element	Element	PEMEA Presence	value	Description
parameters	pref	Optional	-	Specifies a preference in terms of numbers to try and contact the caller on. Note this may not specify the calling number as the first choice.
	type	Mandatory	--	Defines the parameter is specifying a preference

Element	Element	PEMEA Presence	value	Description
pref	integer	Conditional	1 - 100	This field must contain a value if the pref element is present. It specifies the preference in terms on numbers to call to reach the caller, with 1 being the most preferred option.
type	text	Mandatory	work home cell video text	Only the types listed in the value column are allowed in PEMEA. Multiple entries for each type are allowed.

```
<vcard xmlns="urn:ietf:params:xml:ns:vcard-4.0">
  <tel>
    <parameters>
      <pref><integer>1</integer></pref>
      <type><text>home</text></type>
    </parameters>
    <text>tel:+32-2534-9789</text>
  </tel>
  <tel>
    <parameters>
      <pref><integer>2</integer></pref>
      <type><text>cell</text></type>
    </parameters>
    <text>tel:+32-4352-9789</text>
  </tel>
  <tel>
    <parameters>
      <pref><integer>3</integer></pref>
      <type><text>cell</text></type>
    </parameters>
    <text>tel:+44-3425-9789</text>
  </tel>
</vcard>
```

9.5.1.7 SubscriberData :- email

Inclusion of this element is optional.

This element provide email contacts for the caller. No preference or types are specified for the email address.

Element	Element	PEMEA Presence	type	Description
email	text	Conditional	xs:string	Specifying an email is completely optional. If an email element exists, then the text element with a correctly formed email address must also be present.

```
<vcard xmlns="urn:ietf:params:xml:ns:vcard-4.0">
  <email><text>jw@eena.org</text></email>
</vcard>
```

9.5.1.8 SubscriberData :- Emergency Family Contacts

Inclusion of this element is optional.

The vCard doesn't explicitly provide fields for this information. To support the representation of this information the vCard *related* construct is used. This type has a set of tokens explicitly defined in the vCard

schema, however, only the types in Table 7 are valid within the scope of PEMEA. This will ensure that any receiving entity can parse the data and render it to the PSAP staff and first responders.

The vCard schema restricts the related element so that only one contact means can be provided per instance. This means that if the caller wishes to specify home, work and mobile numbers for his/her wife/husband/partner, then a new related structure must be added for each.

Element	Element	PEMEA Presence	Type	Description
related	parameters	Mandatory	element	The parameter element holds the information that relates the caller to the contact, this aspect is mandatory for PEMEA. It may in addition optional include a relationship between the contact and the contact details, e.g. home or work.
	uri	Mandatory	element	This is the means of contacting the emergency contact person. Only one contact mechanism is allowed per related element in the vCard schema.

Element	Element	PEMEA Presence	Value	Description
parameters	type	Mandatory	--	Contains the text element that indicates the relationship between the caller and the contact. In addition it may optional also contain the relationship between the contact and the contact details
	text	Mandatory	See Table 7	The relationship between the caller and the contact must be present.
	text	Optional	See Table 8	This element is optional. If present, it contains the relationship between the contact and the contact details.

The entries in Table 7 contains the allowed the values for the description of the relationship between the caller and contact. This list is a reduced set of the defined tokens in the vCard schema that is not extensible. The descriptions are representative examples only and not expected to be exhaustive. Values other than those provided in Table 7 are not valid in PEMEA and should be ignored by a receiving entity.

Table 7 Emergency contact relationship to caller

Value	Description
spouse	Wife, husband or partner
parent	Father, mother, step-parents, grand-parents, adoptive and foster parents
child	Son, daughter, adopted child, step-child, grand-child.
sibling	Brother, sister, step-sibling, half-sibling
kin	Uncle, aunt, cousin
emergency	Caller doesn't to specify the relationship this is just who to call in an emergency.
neighbor	Lives close to the caller
friend	A friend of the caller
co-resident	Shares accommodation with the caller, flat-mate, house-mate
co-worker	Works with the caller

The entries in Table 8 contain the allowed values used to express the relationship between the contact and the contact details. Only the values in Table 8 are considered valid and any other values should be ignored by a receiving entity.

Table 8 Relationship between contact and contact details

Value	Description
home	Details provided are for reaching the contact at home
work	Details provided are for reaching the contact at work
contact	Details provided are for reaching the contact in general, for example mobile phone.

```
<vcard xmlns="urn:ietf:params:xml:ns:vcard-4.0">
  <related>
    <parameters>
      <type>
        <text>spouse</text>
        <text>home</text>
      </type>
    </parameters>
    <uri>tel:+32-2534-9789</uri>
  </related>
  <related>
    <parameters>
      <type>
        <text>spouse</text>
        <text>contact</text>
      </type>
    </parameters>
    <uri>tel:+32-7777-9789</uri>
  </related>
</vcard>
```

9.5.2 EmergencyCallData.SubscriberData :- Complete Example

This section provides an example of a complete PEMEA compliant EmergencyCallData.SubscriberData structure.

```
<EmergencyCallData.SubscriberInfo
  xmlns="urn:ietf:params:xml:ns:EmergencyCallData:SubscriberInfo"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xc="urn:ietf:params:xml:ns:vcard-4.0"
  xsi:schemaLocation="urn:ietf:params:xml:ns:EmergencyCallData:SubscriberInfo SubscriberInfo.xsd"
  privacyRequested="true">
  <DataProviderReference>CoolAP-0xFF4568262458</DataProviderReference>
  <SubscriberData>
    <xc:vcard>
      <xc:n>
        <xc:parameters>
          <xc:language>
            <xc:language-tag>en</xc:language-tag>
          </xc:language>
        </xc:parameters>
        <xc:surname>Smith</xc:surname>
        <xc:given>George</xc:given>
        <xc:additional>Lawrence</xc:additional>
        <xc:prefix>Mr</xc:prefix>
        <xc:suffix/>
      </xc:n>
      <xc:adr>
        <xc:parameters>
          <xc:language>
            <xc:language-tag>fr</xc:language-tag>
          </xc:language>
        </xc:parameters>
        <xc:pobox>77222</xc:pobox>
        <xc:ext/>
        <xc:street>Avenue de la Toison d'Or, 79 - 3rd Floor</xc:street>
        <xc:locality>Brussels</xc:locality>
        <xc:region/>
        <xc:code>1060</xc:code>
        <xc:country>Belgium</xc:country>
      </xc:adr>
      <xc:lang>
        <xc:parameters>
          <xc:pref><xc:integer>1</xc:integer></xc:pref>
        </xc:parameters>
        <xc:language-tag>en</xc:language-tag>
      </xc:lang>
      <xc:lang>
        <xc:parameters>
          <xc:pref><xc:integer>2</xc:integer></xc:pref>
```

```
      </xc:parameters>
      <xc:language-tag>fr</xc:language-tag>
    </xc:lang>
    <xc:gender><xc:sex>M</xc:sex></xc:gender>
    <xc:tel>
      <xc:parameters>
        <xc:pref><xc:integer>1</xc:integer></xc:pref>
        <xc:type><xc:text>home</xc:text></xc:type>
      </xc:parameters>
      <xc:text>tel:+32-2534-9789</xc:text>
    </xc:tel>
    <xc:tel>
      <xc:parameters>
        <xc:pref><xc:integer>2</xc:integer></xc:pref>
        <xc:type><xc:text>cell</xc:text></xc:type>
      </xc:parameters>
      <xc:text>tel:+32-4352-9789</xc:text>
    </xc:tel>
    <xc:tel>
      <xc:parameters>
        <xc:pref><xc:integer>3</xc:integer></xc:pref>
        <xc:type><xc:text>cell</xc:text></xc:type>
      </xc:parameters>
      <xc:text>tel:+44-3425-9789</xc:text>
    </xc:tel>
    <xc:email>
      <xc:text>support@eena.org</xc:text>
    </xc:email>
    <xc:related>
      <xc:parameters>
        <xc:type>
          <xc:text>spouse</xc:text>
          <xc:text>home</xc:text>
        </xc:type>
      </xc:parameters>
      <xc:uri>tel:+32-2534-9789</xc:uri>
    </xc:related>
    <xc:related>
      <xc:parameters>
        <xc:type>
          <xc:text>spouse</xc:text>
          <xc:text>contact</xc:text>
        </xc:type>
      </xc:parameters>
      <xc:uri>tel:+32-7777-9789</xc:uri>
    </xc:related>
  </xc:vcard>
 </SubscriberData>
</EmergencyCallData.SubscriberInfo>
```

9.6 Additional-Data :- EmergencyCallDataReference

The only valid additional-data element that may be sent by reference is for caller information, contained in an EmergencyCallData.SubscriberInfo.

Element	Parameter	PEMEA Presence	Type	Description
EmergencyCallDataReference	purpose	Mandatory	xs:token	This value must be set to "EmergencyCallData.SubscriberInfo"
	ref	Mandatory	xs:anyURI	The URI must use the https scheme. The URI must be constructed so as not to expose the identity of the caller and the URI construction techniques described in Section 3.4 of RFC 5808 [16] apply. The authentication procedures outlined in Section 4 must be followed.

```
<EmergencyCallDataReference xmlns="urn:ietf:params:xml:ns:EmergencyCallData"
                    purpose="EmergencyCallData.SubscriberInfo"
                    ref="https://coolAP.pemea.org:7865/duheuh38x894nxe3iu3iu"/>
```

The PSAP/PSP shall use an HTTP GET to retrieve the EmergencyCallData.SubscriberInfo data block. The MIME type in the content header field of the request shall be set to
"application/EmergencyCallData.SubscriberInfo+xml"
The EmergencyCallData.SubscriberInfo data structure is described in detail in Section 9.5.

9.7 provided-by : Complete Examples

The provided-by element is defined inside the PIDF-LO schema, it is therefore necessary to show the examples inside the geopriv structure in order to provide an example that validates.

9.7.1 provided-by : SubscriberInfo by reference

This section provides subscriberInfo by reference.

```
<geopriv xmlns="urn:ietf:params:xml:ns:pidf:geopriv10"
      xmlns:ecd="urn:ietf:params:xml:ns:EmergencyCallData"
      xmlns:pi="urn:ietf:params:xml:ns:EmergencyCallData:ProviderInfo"
      xmlns:xc="urn:ietf:params:xml:ns:vcard-4.0">
  <location-info/>
  <usage-rules/>
  <provided-by>
    <ecd:EmergencyCallDataValue>
      <pi:EmergencyCallData.ProviderInfo>
        <pi:DataProviderReference>xhjjshjsdhjsdh</pi:DataProviderReference>
        <pi:DataProviderString>Cool Application Provider</pi:DataProviderString>
        <pi:ProviderID>urn:eena:pemea:ap:ID0x123FEDAC</pi:ProviderID>
        <pi:ProviderIDSeries>EENA</pi:ProviderIDSeries>
        <pi:TypeOfProvider>Application Provider</pi:TypeOfProvider>
        <pi:ContactURI>tel:+32-2534-9789</pi:ContactURI>
        <pi:Language>fr</pi:Language>
        <pi:DataProviderContact>
          <xc:vcard>
            <xc:org>
              <xc:parameters>
                <xc:language>
                  <xc:language-tag>en</xc:language-tag>
                </xc:language>
              </xc:parameters>
              <xc:text>Really Application Provider</xc:text>
            </xc:org>
            <xc:adr>
              <xc:parameters>
                <xc:language>
                  <xc:language-tag>fr</xc:language-tag>
                </xc:language>
              </xc:parameters>
              <xc:pobox>77222</xc:pobox>
              <xc:ext/>
              <xc:street>Avenue de la Toison d'Or, 79 - 3rd Floor</xc:street>
              <xc:locality>Brussels</xc:locality>
              <xc:region/>
              <xc:code>1060</xc:code>
              <xc:country>Belgium</xc:country>
            </xc:adr>
            <xc:email>
              <xc:text>support@eena.org</xc:text>
            </xc:email>
            <xc:url>
              <xc:uri>http://www.eena.org</xc:uri>
            </xc:url>
          </xc:vcard>
        </pi:DataProviderContact>
      </pi:EmergencyCallData.ProviderInfo>
    </ecd:EmergencyCallDataValue>
```

```
    <ecd:EmergencyCallDataReference
            purpose="EmergencyCallData.SubscriberInfo"
            ref="https://coolAP.pemea.org:7865/duheuh38x894nxe3iu3iu"/>
  </provided-by>
</geopriv>
```

9.7.2 provided-by : SubscriberInfo by value

This section provides subscriberInfo by value.

```
<geopriv xmlns="urn:ietf:params:xml:ns:pidf:geopriv10"
       xmlns:ecd="urn:ietf:params:xml:ns:EmergencyCallData"
       xmlns:pi="urn:ietf:params:xml:ns:EmergencyCallData:ProviderInfo"
       xmlns:si="urn:ietf:params:xml:ns:EmergencyCallData:SubscriberInfo"
       xmlns:xc="urn:ietf:params:xml:ns:vcard-4.0">
  <location-info/>
  <usage-rules/>
  <provided-by>
    <ecd:EmergencyCallDataValue>
      <pi:EmergencyCallData.ProviderInfo>
        <pi:DataProviderReference>xhjjshjsdhjsdh</pi:DataProviderReference>
        <pi:DataProviderString>Cool Application Provider</pi:DataProviderString>
        <pi:ProviderID>urn:eena:pemea:ap:ID0x123FEDAC</pi:ProviderID>
        <pi:ProviderIDSeries>EENA</pi:ProviderIDSeries>
        <pi:TypeOfProvider>Application Provider</pi:TypeOfProvider>
        <pi:ContactURI>tel:+32-2534-9789</pi:ContactURI>
        <pi:Language>fr</pi:Language>
        <pi:DataProviderContact>
          <xc:vcard>
            <xc:org>
              <xc:parameters>
                <xc:language>
                  <xc:language-tag>en</xc:language-tag>
                </xc:language>
              </xc:parameters>
              <xc:text>Really Cool Application Provider</xc:text>
            </xc:org>
            <xc:adr>
              <xc:parameters>
                <xc:language>
                  <xc:language-tag>fr</xc:language-tag>
                </xc:language>
              </xc:parameters>
              <xc:pobox>77222</xc:pobox>
              <xc:ext/>
              <xc:street>Avenue de la Toison d'Or, 79 - 3rd Floor</xc:street>
              <xc:locality>Brussels</xc:locality>
              <xc:region/>
              <xc:code>1060</xc:code>
              <xc:country>Belgium</xc:country>
            </xc:adr>
            <xc:email>
              <xc:text>support@eena.org</xc:text>
            </xc:email>
            <xc:url>
              <xc:uri>http://www.eena.org</xc:uri>
            </xc:url>
          </xc:vcard>
        </pi:DataProviderContact>
      </pi:EmergencyCallData.ProviderInfo>
      <si:EmergencyCallData.SubscriberInfo privacyRequested="true">
        <si:DataProviderReference>CoolAP-0xFF4568262458</si:DataProviderReference>
        <si:SubscriberData>
          <xc:vcard>
            <xc:n>
              <xc:parameters>
                <xc:language>
                  <xc:language-tag>en</xc:language-tag>
                </xc:language>
              </xc:parameters>
              <xc:surname>Smith</xc:surname>
```

```
        <xc:given>George</xc:given>
        <xc:additional>Lawrence</xc:additional>
        <xc:prefix>Mr</xc:prefix>
        <xc:suffix/>
      </xc:n>
      <xc:adr>
        <xc:parameters>
          <xc:language>
            <xc:language-tag>fr</xc:language-tag>
          </xc:language>
        </xc:parameters>
        <xc:pobox>77222</xc:pobox>
        <xc:ext/>
        <xc:street>Avenue de la Toison d'Or, 79 - 3rd Floor</xc:street>
        <xc:locality>Brussel</xc:locality>
        <xc:region/>
        <xc:code>1060</xc:code>
        <xc:country>Belgium</xc:country>
      </xc:adr>
      <xc:lang>
        <xc:parameters>
          <xc:pref><xc:integer>1</xc:integer></xc:pref>
        </xc:parameters>
        <xc:language-tag>en</xc:language-tag>
      </xc:lang>
      <xc:lang>
        <xc:parameters>
          <xc:pref><xc:integer>2</xc:integer></xc:pref>
        </xc:parameters>
        <xc:language-tag>fr</xc:language-tag>
      </xc:lang>
      <xc:gender><xc:sex>M</xc:sex></xc:gender>
      <xc:tel>
        <xc:parameters>
          <xc:pref><xc:integer>1</xc:integer></xc:pref>
          <xc:type><xc:text>home</xc:text></xc:type>
        </xc:parameters>
        <xc:text>tel:+32-2534-9789</xc:text>
      </xc:tel>
      <xc:tel>
        <xc:parameters>
          <xc:pref><xc:integer>2</xc:integer></xc:pref>
          <xc:type><xc:text>cell</xc:text></xc:type>
        </xc:parameters>
        <xc:text>tel:+32-4352-9789</xc:text>
      </xc:tel>
      <xc:email>
        <xc:text>support@eena.org</xc:text>
      </xc:email>
      <xc:related>
        <xc:parameters>
          <xc:type>
            <xc:text>spouse</xc:text>
            <xc:text>home</xc:text>
          </xc:type>
        </xc:parameters>
        <xc:uri>tel:+32-2534-9789</xc:uri>
      </xc:related>
      <xc:related>
        <xc:parameters>
          <xc:type>
            <xc:text>emergency</xc:text>
            <xc:text>contact</xc:text>
          </xc:type>
        </xc:parameters>
        <xc:uri>tel:+32-7777-9789</xc:uri>
      </xc:related>
    </xc:vcard>
  </si:SubscriberData>
 </si:EmergencyCallData.SubscriberInfo>
</ecd:EmergencyCallDataValue>
</provided-by>
</geopriv>
```

10 Operating Procedures

This section describes the operating procedures for each of the nodes defined in the PEMEA architecture.

10.1 Application Provider Operating Procedures

This section defines the AP operating procedures.

10.1.1 AP sending an EDS to the PSP

This section defines the procedures for sending an emergencyDataSend message to a PSP.

- Generate a unique message sequence (msgSeq) for the EDS
- Set the ttl value:
  - the value shall be set to 1 if the caller has indicated to the AP that they do not wish to roam beyond their home PSP area.
  - the value shall be set to a minimum of 3 if the caller has indicated to the AP that they do wish be able to roam beyond their home region.
  - a value of 5 is recommended, as this allows for 2 ASPs in the message path.
  - must not exceed a value of 10.
- Create a URI for:
  - onErrorPost so that the AP is notified of any delivery errors (refer to Section 7.1.2).
  - Retrieval of SubscriberInfo (if ttl > 1)
  - For each <information> element reach-back URI type supported by the AP and by the App.
  - onCapSupportPost so that the AP is notified of EDS delivery to a terminating entity, and which <information> capabilities the terminating entity supports (refer to Section 7.1.3).
-
- Create a route:
  - Add the message msgSeq
  - Add a <hop> to the <hops>
    - Set position to zero
    - Set timeStamp to the current time
    - Set the node to the URL of the AP
- Create the callerIDs element based on the caller-ids registered by the user.
- Create the PIDF-LO
  - Set the entity to the first callerId URI type.
  - Convert the location provided by the App to a GeoShape
  - Add the method if available
  - Add a provided-by element
    - Create an EmergencyDataValue element
      - Create a ProviderInfo element and add it to the EmergencyDataValue element
      - If ttl = 1, create a SubscriberInfo element and add it to the EmergencyDataValue element
    - If ttl >1, Create a EmergencyCallReference element and add the SubscriberInfo URI to it.
  - Set the timeStamp to the current time.
- Create an ApMoreInformation element containing all of the information URI determined previously.
- Create an EDS
  - Set the timeStamp to the current time
  - Set the ttl value
  - Set the onErrorPost URI if used
  - Set the onCapSupportPost URI if used
  - Add the route element
  - Add the callerIDs
  - Add the apMoreInformation
  - Add the PIDF-LO
- Log the key components of the EDS
- Send the EDS to the PSP
- Log the response from the PSP

10.1.2 AP reach-back URI queries

This condition occurs when the AP has included an onCapSupportPost URI and an apMoreInformation element in the EDS. The PSAP uses the provided reach-back URIs to request further information about the call/caller from the AP.

- The PSAP or tPSP receives the EDS message containing an onCapSupportPost URI and posts to this URI which of the proffered capabilities it supports (this may be an empty post refer to Section 7.1.3)
- If the post to the onCapSupportPost URI contains an apMoreInformation element then the AP:
    - receives an apMoreInformation element from the terminating entity via the URI contained in the onCapSupportPost attribute of the EDS.
    - has a list of PSAPs and PSPs and their associated domains (this is an operational procedure).
    - has core CA root certificates contained in a local trust store
    - is listening on a port assigned to one of the URIs sent in the apMoreInformation element in the EDS message (refer to Section 6.2.12).
    - receives client-certificate from the PSAP and validates it against a root CA certificate from the local trust store
        - If the validation fails then the request is denied with an HTTP 403 "Forbidden" response. The source of the request as well as the URI used is logged.
        - If the requesting entity validates against a root CA certificate, then the domain is checked against the PSAP or PSP list described above.
        - If the domain of the requesting entity is not in the list then the request is denied with an HTTP 403 "Forbidden" response. The source of the request as well as the URI used is logged.
    - If all authentication and validation succeed then specific protocol exchange procedures are invoked for the feature being requested.

10.1.3 Call termination (ending) and URI invalidation

- AP shall invalidate URIs associated with caller data after a fixed period of time from a specific time X.
    - Unless the App explicitly notifies the AP that the call is still in progress.
        - Location updates from the App to the AP are one example of how this may be achieved.
    - The time period shall not exceed more than 1 hour from time X.
- The initial time X is set when the AP receives notification from the App that a call has been initiated.
- Time X is set to the current time each time the App notifies that AP that the call is still in progress.
- Start time + time X shall not exceed 24 hours.
- Once the duration has expired, any attempt to access a reach-back URI by a requesting entity shall result in an HTTP 404 "Not Found" response being returned.

10.2 PSAP Service Provider Operating Procedures

10.2.1 PSP receiving an EDS message over Ps

This section provides the PSP procedures when receiving an emergencyDataSend message from an AP.

- The AP is authenticated
    - If the AP fails authentication then an HTTP 403 "Forbidden" response is returned.
- If the *ttl* value is less than one then an error is returned to the AP with a reason code of *ttlExhausted*
- If the *ttl* value is set to one and the PSP determines that routing the ESD requires the use of an ASP, then the PSP shall return an error to the AP with a reason code of ttlExhausted and indicate a message of "ASP required" in the preferred language of the PSP.
- The PSP uses its internal routing functions to determine the destination or next hop of the EDS message.
- If the PSP determines that the final destination is for a PSAP that it directly serves then:
    - The PSP shall send an EDR message to the AP and:
        - Set the timestamp to be the time that the message is constructed for sending to the AP.
        - Add a <hop> to the <hops> element in the <route> element.
        - The new hop shall have position="1"
        - The new hop shall have a value of the URI of the PSP
        - The destination element shall have a destType="PSAP" and the value shall be a URI identifying the PSAP is one is available, otherwise a name describing the PSAP.
        - Return the EDR to the AP and terminate the session.

- The PSP shall make the data available to the PSAP
- If the EDS contains an onCapSupportPost URI and the PSAP cannot support initiating a post to the onCapSupportPost URI then the PSAP may perfom this task on behalf of the PSAP. The PSP shall:
  - If no apMoreInformation element is present in the EDS then the PSP shall post an empty message to the onCapSupportPost URI.
  - If an apMoreInformation element is present in the EDS then the PSP shall:
    - determine which capabilities the PSAP does support (how the PSP knows which capabilities the PSAP supports is out of scope of this document) of the proffered AP capabilities.
    - Construct an apMoreInformation element containing all of the capabilities common to the AP and the PSAP
    - Post the apMoreInformation element to the URI contained in the onCapSupportPost URI.

- If the PSP determines that the final destination is not a PSAP that it directly serves then:
  - If the PSP does not have a relationship with a routing node it shall return an error to the AP:
    - Set the timestamp to the time that the message is constructed for sending to the AP
    - Set the reason=”noRoute”
    - Set the message if desirable
    - Add a <hop> to the <hops> element in the <route> element.
    - The new hop shall have a timeStamp value set to the time that the hop is added.
    - The new hop shall have position=”1”
    - The new hop shall have a value of the URI of the PSP
    - Return the error to the AP and terminate the session
  - If the PSP does have a relationship with a routing node it:
    - Sends an EDR to the AP
      - Set the timestamp to be the time that the message is constructed for sending to the AP.
      - Add a <hop> to the <hops> element in the <route> element.
      - The new hop shall have a timeStamp value set to the time that the hop is added.
      - The new hop shall have position=”1”
      - The new hop shall have a value of the URI of the PSP
      - The destination element shall have a destType=”ASP” and the value shall be a URI identifying the ASP to which the EDS is being sent.
      - Return the EDR to the AP and terminate the session with the AP.

10.2.2 PSP sending an EDS message over Pr

The PSP has received an EDS from an AP.

- Send an EDS to an ASP:
  - Decrement the ttl value in the EDS received from the AP
  - Add a <hop> to the <hops> element in the <route> element.
  - The new hop shall have a timeStamp value set to the time that the hop is added.
  - The new hop shall have position=”1”
  - The new hop shall have a value of the URI of the PSP
  - The modified ttl and route elements replace the ttl and route fields in the EDS received from the AP and this message is sent to the ASP.
  - The PSP logs the response from the ASP.
- If the PSP receives an error message from the ASP and the EDS message contains an “onErrorPost” URI attribute then the PSP shall post the error message received from the ASP to the URI specified by the onErrorPost attribute (refer to Section 7.1.2).

10.2.3 PSP receiving an EDS message over Pr

This section provides the PSP procedures when receiving an emergencyDataSend message from an ASP.

- The ASP is authenticated
  - If the ASP fails authentication then an HTTP 403 “Forbidden” response is returned.
- If the *ttl* value is less than one then an error is returned to the ASP with a reason code of *ttlExhausted*
- If the *ttl* value is set to one and the PSP determines that routing the ESD requires the use of another ASP, then the PSP shall return an error to the ASP with a reason code of ttlExhausted and indicate a message of “ASP required” in the preferred language of the PSP.

- If the PSP determines that the final destination is for a PSAP that it directly serves then:
    - The PSP shall send an EDR message to the ASP and:
        - Set the timestamp to be the time that the message is constructed for sending to the ASP.
        - Add a <hop> to the <hops> element in the <route> element.
        - The new hop position of the next number in the sequence
        - The new hop shall have a value of the URI of the PSP
        - The destination element shall have a destType="PSAP" and the value shall be a URI identifying the PSAP is one is available, otherwise a name describing the PSAP.
        - Return the EDR to the ASP and terminate the session.
    - The PSP shall make the data available to the PSAP
    - If the EDS contains an onCapSupportPost URI and the PSAP cannot support initiating a post to the onCapSupportPost URI then the PSAP may perfom this task on behalf of the PSAP. The PSP shall:
        - If no apMoreInformation element is present in the EDS then the PSP shall post an empty message to the onCapSupportPost URI.
        - If an apMoreInformation element is present in the EDS then the PSP shall:
            - determine which capabilities the PSAP does support (how the PSP knows which capabilities the PSAP supports is out of scope of this document) of the proffered AP capabilities.
            - Construct an apMoreInformation element containing all of the capabilities common to the AP and the PSAP
        - Post the apMoreInformation element to the URI contained in the onCapSupportPost URI.
- If the PSP determines that the final destination is not a PSAP that it directly serves then:
    - If the PSP does not have a relationship with a routing node then it shall return an error to the ASP:
        - Set the timestamp to the time that the message is constructed for sending to the ASP
        - Set the reason="noRoute"
        - Set the message if desirable
        - Add a <hop> to the <hops> element in the <route> element.
        - The new hop shall have a timeStamp value set to the time that the hop is added.
        - The new hop position of the next number in the sequence
        - The new hop shall have a value of the URI of the PSP
        - Return the error to the ASP and terminate the session
    - If the PSP does have a relationship with a routing node then it will:
        - Send an EDR to the ASP
            - Set the timestamp to be the time that the message is constructed for sending to the AP.
            - Add a <hop> to the <hops> element in the <route> element.
            - The new hop shall have a timeStamp value set to the time that the hop is added.
            - The new hop position of the next number in the sequence
            - The new hop shall have a value of the URI of the PSP
            - The destination element shall have a destType="ASP" and the value shall be a URI identifying the ASP to which the EDS is being sent.
- Return the EDR to the ASP and terminate the session with the ASP.

10.3 Aggregating Service Provider Operating Procedures

The aggregating service provider has two distinct interfaces, a receiving Pr interface on which it receives EDS messages from an oPSP or ASP, and a sending Pr interface on which it sends EDS messages to a tPSP or subsequent ASP.

10.3.1 ASP receiving an EDS message over Pr

This section the procedures for an ASP when receiving an emergencyDataSend message over the Pr interface.

- If the *ttl* value is less than two then an error is returned to the sender with a reason code of *ttlExhausted,* a message may be included in the preferred language of the ASP.

- If the ASP does not have a relationship with the tPSP or a routing node to get there then it shall return an error to the oPSP:
    - Sets the timestamp to the time that the message is constructed for sending to the oPSP
    - Sets the reason=”noRoute”
    - Sets the message if desirable
    - Adds a <hop> to the <hops> element in the <route> element.
    - The new hop shall have a timeStamp value set to the time that the hop is added.
    - The new hop position of the next number in the sequence
    - The new hop shall have a value of the URI of the ASP
    - Returns the error to the oPSP and terminate the session
- If the ASP does have a relationship with the tPSP or a routing node to get there then it:
    - Sends an EDR to the oPSP
    - Sets the timestamp to be the time that the message is constructed for sending to the oPSP.
    - Adds a <hop> to the <hops> element in the <route> element.
    - The new hop shall have a timeStamp value set to the time that the hop is added.
    - The new hop position of the next number in the sequence
    - The new hop shall have a value of the URI of the ASP
    - The destination element shall have a destType=”tPSP” or “ASP” depending on the type of the destination and the value shall be a URI identifying the tPSP/ASP to which the EDS is being sent.
    - Returns the EDR to the oPSP and terminate the session with the oPSP.

10.3.2 ASP sending an EDS message over Pr

The ASP has received an EDS from an oPSP or ASP.

- Sends an EDS to a tPSP or ASP
    - Decrement the ttl value in the EDS received from the oPSP
    - Add a <hop> to the <hops> element in the <route> element.
    - The new hop shall have a timeStamp value set to the time that the hop is added.
    - The new hop position of the next number in the sequence
    - The new hop shall have a value of the URI of the ASP
    - The modified ttl and route elements replace the ttl and route fields in the EDS received from the oPSP and the message is sent to the tPSP/ASP.
    - The ASP logs the response from the tPSP/ASP.
- If the ASP receives an error message from the tPSP and the EDS message contains an “onErrorPost” URI attribute then the ASP shall post the error message received from the tPSP to the URI specified by the onErrorPost attribute.

11 Example message Flows

The following flows provide the messages from an AP to the oPSP and from the oPSP to an ASP and from the ASP to a tPSP.

11.1 AP to PSP EDS

```
<emergencyDataSend xmlns="urn:eena:apps:xml:ns:pemea:base"
                   xmlns:pdf="urn:ietf:params:xml:ns:pidf"
                                xmlns:gp="urn:ietf:params:xml:ns:pidf:geopriv10"
                   xmlns:gml="http://www.opengis.net/gml"
                   xmlns:gs="http://www.opengis.net/pidflo/1.0"
                   xmlns:con="urn:ietf:params:xml:ns:geopriv:conf"
                   xmlns:pi="urn:ietf:params:xml:ns:EmergencyCallData:ProviderInfo"
                   xmlns:ecd="urn:ietf:params:xml:ns:EmergencyCallData"
                   xmlns:xc="urn:ietf:params:xml:ns:vcard-4.0"
                   xmlns:cell="urn:ietf:params:xml:ns:geopriv:lm:cell"
                   DE="5"
                   onErrorPost=”https://cooAP.example.com.be:2001/pemea/error/CoolAP-7496”
                   onCapSupporPost=”https://cooAP.example.com.be:2001/pemea/cap/CoolAP-7496”>
 <route msgSeq=”CoolAP-7496” >
  <hops>
   <hop position="0" timeStamp=”2016-02-02T18:14:001Z”>
    <node>https://cooAP.example.com.be:2001/pemea/</node>
   </hop>
  </hops>
 </route>
 <callerIds>
  <callerId typeOfId="msisdn">tel:+44-555-555-1234</callerId>
  <callerId typeOfId="msisdn">tel:+34-555-222-6789</callerId>
  <callerId typeOfId="skypeName">winterb</callerId>
 </callerIds>
 <apMoreInformation>
  <information typeOfInfo="Location_Update" protocol="HELD">
          https://coolap.example.com.be:2096/Web?id=CoolAP-7496
  </information>
 </apMoreInformation>
 <accessData>
  <cell:network>
   <cell:mcc>253</cell:mcc>
   <cell:mnc>002</cell:mnc>
  </cell:network>
 </accessData>
 <pdf:presence entity="tel:+44-555-555-1234">
  <pdf:tuple id="circle">
   <pdf:status>
    <gp:geopriv>
     <gp:location-info>
      <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">
          30.0
       </gs:radius>
      </gs:Circle>
      <con:confidence pdf="normal">95</con:confidence>
     </gp:location-info>
     <gp:usage-rules/>
     <gp:method>GNSS</gp:method>
     <gp:provided-by>
      <ecd:EmergencyCallDataValue>
       <pi:EmergencyCallData.ProviderInfo>
        <pi:DataProviderReference>xhjjshjsdhjsdh</pi:DataProviderReference>
        <pi:DataProviderString>Cool Application Provider</pi:DataProviderString>
                <pi:ProviderID>urn:eena:pemea:ap:ID0x123FEDAC</pi:ProviderID>
                <pi:ProviderIDSeries>EENA</pi:ProviderIDSeries>
                <pi:TypeOfProvider>Application Provider</pi:TypeOfProvider>
                <pi:ContactURI>tel:+32-2534-9789</pi:ContactURI>
        <pi:Language>fr</pi:Language>
        <pi:DataProviderContact>
         <xc:vcard>
          <xc:org>
           <xc:parameters>
            <xc:language>
             <xc:language-tag>en</xc:language-tag>
            </xc:language>
           </xc:parameters>
```

```
            <xc:text>Really Application Provider</xc:text>
           </xc:org>
           <xc:adr>
            <xc:parameters>
              <xc:language>
               <xc:language-tag>fr</xc:language-tag>
              </xc:language>
            </xc:parameters>
            <xc:pobox>77222</xc:pobox>
            <xc:ext/>
            <xc:street>Avenue de la Toison d'Or, 79 - 3rd Floor</xc:street>
            <xc:locality>Brussels</xc:locality>
            <xc:region/>
            <xc:code>1060</xc:code>
            <xc:country>Belgium</xc:country>
           </xc:adr>
           <xc:email>
            <xc:text>support@eena.org</xc:text>
           </xc:email>
           <xc:url>
            <xc:uri>http://www.eena.org</xc:uri>
           </xc:url>
          </xc:vcard>
         </pi:DataProviderContact>
        </pi:EmergencyCallData.ProviderInfo>
       </ecd:EmergencyCallDataValue>
       <ecd:EmergencyCallDataReference purpose="EmergencyCallData.SubscriberInfo"
                                       ref="https://coolAP.pemea.org:7865/duheuh38x894nxe3iu3iu"/>
      </gp:provided-by>
     </gp:geopriv>
    </pdf:status>
   </pdf:tuple>
  </pdf:presence>
</emergencyDataSend>
```

11.2 oPSP to AP EDR

The oPSP determines that it needs the services of an ASP. It adds its address to the route, and marks the destination as being an ASP, along with the address of the ASP.

```
<emergencyDataReceived xmlns="urn:eena:apps:xml:ns:pemea:base"
                       xmlns:xs="http://www.w3.org/2001/XMLSchema"
                       xmlns:pemea="urn:eena:apps:xml:ns:pemea:base"
      timeStamp="2016-02-02T18:14:00.521Z">
  <route msgSeq="CoolAP-7496" >
    <hops>
      <hop position="0" timeStamp="2016-02-02T18:14:00.001Z">
        <node>https://cooAP.example.com.be:2001/pemea/</node>
      </hop>
      <hop position="1" timeStamp="2016-02-02T18:14:00.521Z">
        <node>https://orig.psp.example.com:2134/pemea/</node>
      </hop>
    </hops>
  </route>
  <delivery destType="ASP">https://asp.example.com:2195/pemea/</delivery>
</emergencyDataReceived>
```

11.3 oPSP to ASP EDS

oPSP decrements ttl and adds is address to the route element.

```
<emergencyDataSend xmlns="urn:eena:apps:xml:ns:pemea:base"
                   xmlns:pdf="urn:ietf:params:xml:ns:pidf"
                             xmlns:gp="urn:ietf:params:xml:ns:pidf:geopriv10"
                   xmlns:gml="http://www.opengis.net/gml"
                   xmlns:gs="http://www.opengis.net/pidflo/1.0"
                   xmlns:con="urn:ietf:params:xml:ns:geopriv:conf"
                   xmlns:pi="urn:ietf:params:xml:ns:EmergencyCallData:ProviderInfo"
                   xmlns:ecd="urn:ietf:params:xml:ns:EmergencyCallData"
                   xmlns:xc="urn:ietf:params:xml:ns:vcard-4.0"
                   xmlns:cell="urn:ietf:params:xml:ns:geopriv:lm:cell"
```

```
            ttl="4"
            onErrorPost="https://cooAP.example.com.be:2001/pemea/error/CoolAP-7496"
            onCapSupporPost="https://cooAP.example.com.be:2001/pemea/cap/CoolAP-7496">
<route msgSeq="CoolAP-7496" >
  <hops>
    <hop position="0" timeStamp="2016-02-02T18:14:001Z ">
      <node>https://cooAP.example.com.be:2001/pemea/</node>
    </hop>
    <hop position="1" timeStamp="2016-01-02T18:14:5212" >
      <node>https://opsp.example.com.be:2134/pemea/</node>
    </hop>
  </hops>
</route>
<callerIds>
  <callerId typeOfId="msisdn">tel:+44-555-555-1234</callerId>
  <callerId typeOfId="msisdn">tel:+34-555-222-6789</callerId>
  <callerId typeOfId="skypeName">winterb</callerId>
</callerIds>
<apMoreInformation>
  <information typeOfInfo="Location_Update" protocol="HELD">
                https://coolap.example.com.be:2096/Web?id=CoolAP-7496
  </information>
</apMoreInformation>
<accessData>
  <cell:network>
    <cell:mcc>253</cell:mcc>
    <cell:mnc>002</cell:mnc>
  </cell:network>
</accessData>
<pdf:presence entity="tel:+44-555-555-1234">
  <pdf:tuple id="circle">
    <pdf:status>
      <gp:geopriv>
        <gp:location-info>
          <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">
                30.0
            </gs:radius>
          </gs:Circle>
          <con:confidence pdf="normal">95</con:confidence>
        </gp:location-info>
        <gp:usage-rules/>
        <gp:method>GNSS</gp:method>
        <gp:provided-by>
          <ecd:EmergencyCallDataValue>
            <pi:EmergencyCallData.ProviderInfo>
              <pi:DataProviderReference>xhjjshjsdhjsdh</pi:DataProviderReference>
              <pi:DataProviderString>Cool Application Provider</pi:DataProviderString>
              <pi:ProviderID>urn:eena:pemea:ap:ID0x123FEDAC</pi:ProviderID>
                        <pi:ProviderIDSeries>EENA</pi:ProviderIDSeries>
                        <pi:TypeOfProvider>Application Provider</pi:TypeOfProvider>
                        <pi:ContactURI>tel:+32-2534-9789</pi:ContactURI>
              <pi:Language>fr</pi:Language>
              <pi:DataProviderContact>
                <xc:vcard>
                  <xc:org>
                    <xc:parameters>
                      <xc:language>
                        <xc:language-tag>en</xc:language-tag>
                      </xc:language>
                    </xc:parameters>
                    <xc:text>Really Application Provider</xc:text>
                  </xc:org>
                  <xc:adr>
                    <xc:parameters>
                      <xc:language>
                        <xc:language-tag>fr</xc:language-tag>
                      </xc:language>
                    </xc:parameters>
                    <xc:pobox>77222</xc:pobox>
                    <xc:ext/>
                    <xc:street>Avenue de la Toison d'Or, 79 - 3rd Floor</xc:street>
```

```
            <xc:locality>Brussels</xc:locality>
            <xc:region/>
            <xc:code>1060</xc:code>
            <xc:country>Belgium</xc:country>
           </xc:adr>
           <xc:email>
            <xc:text>support@eena.org</xc:text>
           </xc:email>
           <xc:url>
            <xc:uri>http://www.eena.org</xc:uri>
           </xc:url>
          </xc:vcard>
         </pi:DataProviderContact>
        </pi:EmergencyCallData.ProviderInfo>
       </ecd:EmergencyCallDataValue>
       <ecd:EmergencyCallDataReference purpose="EmergencyCallData.SubscriberInfo"
                                       ref="https://coolAP.pemea.org:7865/duheuh38x894nxe3iu3iu"/>
      </gp:provided-by>
     </gp:geopriv>
    </pdf:status>
   </pdf:tuple>
  </pdf:presence>
</emergencyDataSend>
```

11.4 ASP to oPSP EDR

The ASP determines the tPSP. It adds its address to the route, and marks the destination as being a PSP, along with the address of the tPSP.

```
<emergencyDataReceived xmlns="urn:eena:apps:xml:ns:pemea:base"
                       xmlns:xs="http://www.w3.org/2001/XMLSchema"
                       xmlns:pemea="urn:eena:apps:xml:ns:pemea:base"
     timeStamp="2016-02-02T18:14:00.980Z">
<route msgSeq="CoolAP-7496" >
  <hops>
    <hop position="0" timeStamp="2016-02-02T18:14:00.001Z">
      <node>https://cooAP.example.com.be:2001/pemea/</node>
    </hop>
    <hop position="1" timeStamp="2016-02-02T18:14:00.521Z">
      <node>https://orig.psp.example.com:2134/pemea/</node>
    </hop>
    <hop position="2" timeStamp="2016-02-02T18:14:00.980Z">
      <node>https://asp.example.com:2195/pemea/</node>
    </hop>
  </hops>
  </route>
  <delivery destType="tPSP">https://term.psp.example.com:3297/pemea/</delivery>
</emergencyDataReceived>
```

11.5 ASP to tPSP EDS

The ASP determines the tPSP, decrements the ttl, adds its address to the route and send the EDS to the tPSP

```
<emergencyDataSend xmlns="urn:eena:apps:xml:ns:pemea:base"
                   xmlns:pdf="urn:ietf:params:xml:ns:pidf"
                                          xmlns:gp="urn:ietf:params:xml:ns:pidf:geopriv10"
                   xmlns:gml="http://www.opengis.net/gml"
                   xmlns:gs="http://www.opengis.net/pidflo/1.0"
                   xmlns:con="urn:ietf:params:xml:ns:geopriv:conf"
                   xmlns:pi="urn:ietf:params:xml:ns:EmergencyCallData:ProviderInfo"
                   xmlns:ecd="urn:ietf:params:xml:ns:EmergencyCallData"
                   xmlns:xc="urn:ietf:params:xml:ns:vcard-4.0"
                   xmlns:cell="urn:ietf:params:xml:ns:geopriv:lm:cell"
                   ttl="3"
                   onErrorPost="https://cooAP.example.com.be:2001/pemea/error/CoolAP-7496"
                   onCapSupporPost="https://cooAP.example.com.be:2001/pemea/cap/CoolAP-7496">
  <route msgSeq="CoolAP-7496" >
    <hops>
      <hop position="0" timeStamp="2016-02-02T18:14:00.001Z">
        <node>https://cooAP.example.com.be:2001/pemea/</node>
      </hop>
```

```
    <hop position="1" timeStamp="2016-02-02T18:14:00.521Z" >
      <node>https://opsp.example.com.be:2134/pemea/</node>
    </hop>
    <hop position="2" timeStamp="2016-02-02T18:14:00.960Z" >
      <node>https://asp.example.com.be:2195/pemea/</node>
    </hop>
  </hops>
 </route>
 <callerIds>
  <callerId typeOfId="msisdn">tel:+44-555-555-1234</callerId>
  <callerId typeOfId="msisdn">tel:+34-555-222-6789</callerId>
  <callerId typeOfId="skypeName">winterb</callerId>
 </callerIds>
 <apMoreInformation>
  <information typeOfInfo="Location_Update" protocol="HELD">
                    https://coolap.example.com.be:2096/Web?id=CoolAP-7496
  </information>
 </apMoreInformation>
 <accessData>
  <cell:network>
   <cell:mcc>253</cell:mcc>
   <cell:mnc>002</cell:mnc>
  </cell:network>
 </accessData>
 <pdf:presence entity="tel:+44-555-555-1234">
  <pdf:tuple id="circle">
   <pdf:status>
    <gp:geopriv>
     <gp:location-info>
      <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">
          30.0
       </gs:radius>
      </gs:Circle>
      <con:confidence pdf="normal">95</con:confidence>
     </gp:location-info>
     <gp:usage-rules/>
     <gp:method>GNSS</gp:method>
     <gp:provided-by>
      <ecd:EmergencyCallDataValue>
       <pi:EmergencyCallData.ProviderInfo>
        <pi:DataProviderReference>xhjjshjsdhjsdh</pi:DataProviderReference>
        <pi:DataProviderString>Cool Application Provider</pi:DataProviderString>
        <pi:ProviderID>urn:eena:pemea:ap:ID0x123FEDAC</pi:ProviderID>
                  <pi:ProviderIDSeries>EENA</pi:ProviderIDSeries>
                  <pi:TypeOfProvider>Application Provider</pi:TypeOfProvider>
                  <pi:ContactURI>tel:+32-2534-9789</pi:ContactURI>
        <pi:Language>fr</pi:Language>
        <pi:DataProviderContact>
         <xc:vcard>
          <xc:org>
           <xc:parameters>
            <xc:language>
             <xc:language-tag>en</xc:language-tag>
            </xc:language>
           </xc:parameters>
           <xc:text>Really Application Provider</xc:text>
          </xc:org>
          <xc:adr>
           <xc:parameters>
            <xc:language>
             <xc:language-tag>fr</xc:language-tag>
            </xc:language>
           </xc:parameters>
           <xc:pobox>77222</xc:pobox>
           <xc:ext/>
           <xc:street>Avenue de la Toison d'Or, 79 - 3rd Floor</xc:street>
           <xc:locality>Brussels</xc:locality>
           <xc:region/>
           <xc:code>1060</xc:code>
           <xc:country>Belgium</xc:country>
          </xc:adr>
```

```
            <xc:email>
              <xc:text>support@eena.org</xc:text>
            </xc:email>
            <xc:url>
              <xc:uri>http://www.eena.org</xc:uri>
            </xc:url>
          </xc:vcard>
        </pi:DataProviderContact>
      </pi:EmergencyCallData.ProviderInfo>
    </ecd:EmergencyCallDataValue>
    <ecd:EmergencyCallDataReference purpose="EmergencyCallData.SubscriberInfo"
                                    ref="https://coolAP.pemea.org:7865/duheuh38x894nxe3iu3iu"/>
  </gp:provided-by>
 </gp:geopriv>
</pdf:status>
</pdf:tuple>
</pdf:presence>
</emergencyDataSend>
```

11.6 tPSP to ASP EDR

The tPSP determines the correct PSAP. It adds its address to the route, and marks the destination as being a PSAP, along with the name of the PSAP. The example illustrates the name of the PSAP in the delivery element, this could also be a URI that provides a means to contact the PSAP.

```
<emergencyDataReceived xmlns="urn:eena:apps:xml:ns:pemea:base"
                       xmlns:xs="http://www.w3.org/2001/XMLSchema"
                       xmlns:pemea="urn:eena:apps:xml:ns:pemea:base"
    timeStamp="2016-02-02T18:14:01.327Z">
<route msgSeq="CoolAP-7496" >
 <hops>
  <hop position="0" timeStamp="2016-02-02T18:14:00.001Z">
   <node>https://cooAP.example.com.be:2001/pemea/</node>
  </hop>
  <hop position="1" timeStamp="2016-02-02T18:14:00.521Z">
   <node>https://orig.psp.example.com:2134/pemea/</node>
  </hop>
  <hop position="2" timeStamp="2016-02-02T18:14:00.980Z">
   <node>https://asp.example.com:2195/pemea/</node>
  </hop>
  <hop position="3" timeStamp="2016-02-02T18:14:01.327Z">
    <node> https://term.psp.example.com:3297/pemea/</node>
  </hop>
 </hops>
 </route>
 <delivery destType="PSAP">PSAP Serving Caller</delivery>
</emergencyDataReceived>
```

12 Abbreviations

AP	Access Point (WiFi access point)
AP	Application Provider
APP	Application
ASP	Aggregating Service Provider
BSSID	Basic Service Set Identifier
CID	Cell Identifier
GNSS	Global Navigation Satellite System
EDS	Emergency Data Send
EDR	Emergency Data Received
GPS	Global Positioning System (a type of GNSS)
GSM	Global System for Mobile
HELD	HTTP-Enabled Location Delivery
HTTP	Hyper-Text Transfer Protocol

IETF	Internet Engineering Task Force
IMEI	International Mobile Equipment Identifier
IMSI	International Mobile Subscriber Identity
LAC	Location Area Code
LTE	Long-Term Evolution (4G cellular)
MAC	Media Access Control
MCC	Mobile Country Code
MLP	Mobile Location Protocol
MNC	Mobile Network Code
MNO	Mobile Network Operator
MSISDN	Mobile Station International Subscriber Dial Number
oPSP	Originating PSP
PEMEA	Pan European Mobile Emergency Application
PIDF-LO	Presence Information Data Format Location Object
Pr	PEMEA Roaming interface
Ps	PEMEA Service provider interface
PSAP	Public Safety Answering Point
PSP	PSAP Service Provider
RNC	Radio Network Controller
TLS	Transport Layer Security
tPSP	Terminating PSP
ttl	Time To Live
UMTS	Universal Mobile Telecommunications System (cellular 3G)
URI	Universal Resource Identifier
URL	Universal Resource Locator
URN	Universal Resource Name
XML	eXtensible Markup Language
XSD	XML Schema Description

13 References

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14 PEMEA Schema

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

<xs:schema
    targetNamespace="urn:eena:apps:xml:ns:pemea:base"
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
    xmlns:pemea="urn:eena:apps:xml:ns:pemea:base"
    xmlns:cell="urn:ietf:params:xml:ns:geopriv:lm:cell"
    xmlns:wifi="urn:ietf:params:xml:ns:geopriv:lm:wifi"
    xmlns:xml="http://www.w3.org/XML/1998/namespace"
    elementFormDefault="qualified" attributeFormDefault="unqualified">

 <xs:annotation>
  <xs:documentation>
     This document defines PEMEA messages.
  </xs:documentation>
 </xs:annotation>

 <xs:import namespace="http://www.w3.org/XML/1998/namespace"
          schemaLocation="http://www.w3.org/2001/xml.xsd"/>

 <!-- import the cellular and wifi namespaces from RFC 7105 -->
 <xs:import namespace="urn:ietf:params:xml:ns:geopriv:lm:cell"/>
 <xs:import namespace="urn:ietf:params:xml:ns:geopriv:lm:wifi"/>

 <!-- posIntType -->

 <xs:simpleType name="posIntType">
  <xs:restriction base="xs:nonNegativeInteger">
    <xs:minInclusive value="0"/>
  </xs:restriction>
 </xs:simpleType>

 <!-- nodeType -->

 <xs:complexType name="nodeType">
  <xs:complexContent>
    <xs:restriction base="xs:anyType">
      <xs:sequence>
        <xs:element name="node" type="xs:anyURI" minOccurs="1" maxOccurs="1"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:attribute name="position" type="pemea:posIntType" use="required"/>
      <xs:attribute name="timeStamp" type="xs:dateTime" use="required"/>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:restriction>
  </xs:complexContent>
 </xs:complexType>

 <!-- hopsType -->
```

```
<xs:complexType name="hopsType">
  <xs:complexContent>
    <xs:restriction base="xs:anyType">
      <xs:sequence>
        <xs:element name="hop" type="pemea:nodeType" minOccurs="1" maxOccurs="unbounded"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:restriction>
  </xs:complexContent>
 </xs:complexType>

<!-- baseRouteType -->

<xs:complexType name="baseRouteType">
  <xs:complexContent>
    <xs:restriction base="xs:anyType">
      <xs:sequence/>
        <xs:attribute name="msgSeq" type="xs:token" use="required"/>
        <xs:anyAttribute namespace="##any" processContents="lax"/>
     </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<!-- routeType -->

<xs:complexType name="routeType">
  <xs:complexContent>
    <xs:extension base="pemea:baseRouteType">
      <xs:sequence>
        <xs:element name="hops" type="pemea:hopsType" minOccurs="1" maxOccurs="unbounded"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<!-- destinationType -->

<xs:simpleType name="destinationType">
  <xs:restriction base="xs:token">
    <xs:enumeration value="PSAP"/>
    <xs:enumeration value="PSP"/>
    <xs:enumeration value="ASP"/>
  </xs:restriction>
</xs:simpleType>

<!-- destinationNodeType -->

<xs:simpleType name="destinationNodeType">
  <xs:union>
    <xs:simpleType>
      <xs:restriction base="xs:token">
        <xs:enumeration value="any"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType>
      <xs:restriction base="xs:anyURI">
        <xs:minLength value="1"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:union>
</xs:simpleType>

<!-- deliveryType -->

<xs:complexType name="deliveryType">
  <xs:simpleContent>
    <xs:extension base="pemea:destinationNodeType">
      <xs:attribute name="destType" type="pemea:destinationType" />
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:extension>
```

```
  </xs:simpleContent>
</xs:complexType>

<!-- typeOfcallerIdType -->

<xs:simpleType name="typeOfCallerIdType">
  <xs:union>
    <xs:simpleType>
      <xs:restriction base="xs:token">
        <xs:enumeration value="any"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType>
      <xs:restriction base="xs:anyURI">
        <xs:minLength value="1"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:union>
</xs:simpleType>

<!-- callerIdType -->

<xs:complexType name="callerIdType">
  <xs:simpleContent>
    <xs:extension base="pemea:typeOfCallerIdType">
      <xs:attribute name="typeOfId" type="xs:token" />
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<!-- callerIdListType -->

<xs:complexType name="callerIdListType">
  <xs:complexContent>
    <xs:restriction base="xs:anyType">
      <xs:sequence>
        <xs:element name="callerId" type="pemea:callerIdType" minOccurs="1" maxOccurs="unbounded"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<!-- informationType -->

<xs:complexType name="informationType">
  <xs:simpleContent>
    <xs:extension base="xs:anyURI">
      <xs:attribute name="typeOfInfo" type="xs:token" use="required"/>
      <xs:attribute name="protocol" type="xs:token" use="optional"/>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<!-- apMoreInfoType -->

<xs:complexType name="apMoreInfoType">
  <xs:complexContent>
    <xs:restriction base="xs:anyType">
      <xs:sequence>
        <xs:element name="information" type="pemea:informationType"
                minOccurs="1" maxOccurs="unbounded"/>
        <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:element name="apMoreInformation" type="pemea:apMoreInfoType"/>
```

```
<!-- Access Data Types-->

<xs:complexType name="accessDataBaseType">
  <xs:choice>
    <xs:element ref="cell:network"/>
    <xs:element ref="wifi:wifi"/>
  </xs:choice>
</xs:complexType>

<xs:element name="accessDataType" type="pemea:accessDataBaseType"/>

<!-- Access Data -->

<xs:complexType name="accessData">
  <xs:complexContent>
    <xs:restriction base="xs:anyType">
      <xs:sequence>
        <xs:element ref="pemea:accessDataType" minOccurs="0" maxOccurs="2"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<!-- edsBaseType -->

<xs:complexType name="edsBaseType">
  <xs:complexContent>
    <xs:restriction base="xs:anyType">
      <xs:sequence/>
      <xs:attribute name="ttl" type="pemea:posIntType" use="required"/>
      <xs:attribute name="onErrorPost" type="xs:anyURI" use="optional"/>
      <xs:attribute name="onCapSupportPost" type="xs:anyURI" use="optional"/>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<!-- emergencyDataSend -->

<xs:complexType name="edsType">
  <xs:complexContent>
    <xs:extension base="pemea:edsBaseType">
      <xs:sequence>
        <xs:element name="route" type="pemea:routeType" minOccurs="1" maxOccurs="1"/>
        <xs:element name="callerIds" type="pemea:callerIdListType" minOccurs="1" maxOccurs="1"/>
        <xs:element name="apMoreInformation" type="pemea:apMoreInfoType" minOccurs="0" maxOccurs="1"/>
        <xs:element name="accessData" type="pemea:accessData" minOccurs="0" maxOccurs="1"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="1" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:element name="emergencyDataSend" type="pemea:edsType"/>

<!-- edrBaseType -->

<xs:complexType name="edrBaseType">
  <xs:complexContent>
    <xs:restriction base="xs:anyType">
      <xs:sequence/>
      <xs:attribute name="timeStamp" type="xs:dateTime" use="required"/>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<!-- emergencyDataReceived -->

<xs:complexType name="edrType">
```

```
  <xs:complexContent>
    <xs:extension base="pemea:edrBaseType">
      <xs:sequence>
        <xs:element name="route" type="pemea:routeType" minOccurs="1" maxOccurs="1"/>
        <xs:element name="delivery" type="pemea:deliveryType"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:element name="emergencyDataReceived" type="pemea:edrType"/>

<!-- errorBaseType -->

<xs:complexType name="errorBaseType">
  <xs:complexContent>
    <xs:restriction base="xs:anyType">
      <xs:sequence/>
      <xs:attribute name="timeStamp" type="xs:dateTime" use="required"/>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="msgInfoType">
  <xs:simpleContent>
    <xs:extension base="xs:token">
      <xs:attribute ref="xml:lang"/>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>


<!-- errorType -->

<xs:complexType name="errorType">
  <xs:complexContent>
    <xs:extension base="pemea:errorBaseType">
      <xs:sequence>
        <xs:element name="reason" type="xs:token" minOccurs="1" maxOccurs="1"/>
        <xs:element name="message" type="pemea:msgInfoType" minOccurs="0" maxOccurs="1" />
        <xs:element name="route" type="pemea:routeType" minOccurs="1" maxOccurs="1"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:element name="error" type="pemea:errorType"/>

</xs:schema>
```