SGMAI SECRETARIA GERAL
MINISTÉRIO DA ADMINISTRAÇÃO INTERNA

Implementing SIP PIDF-LO for Emergency Caller Location in Portugal

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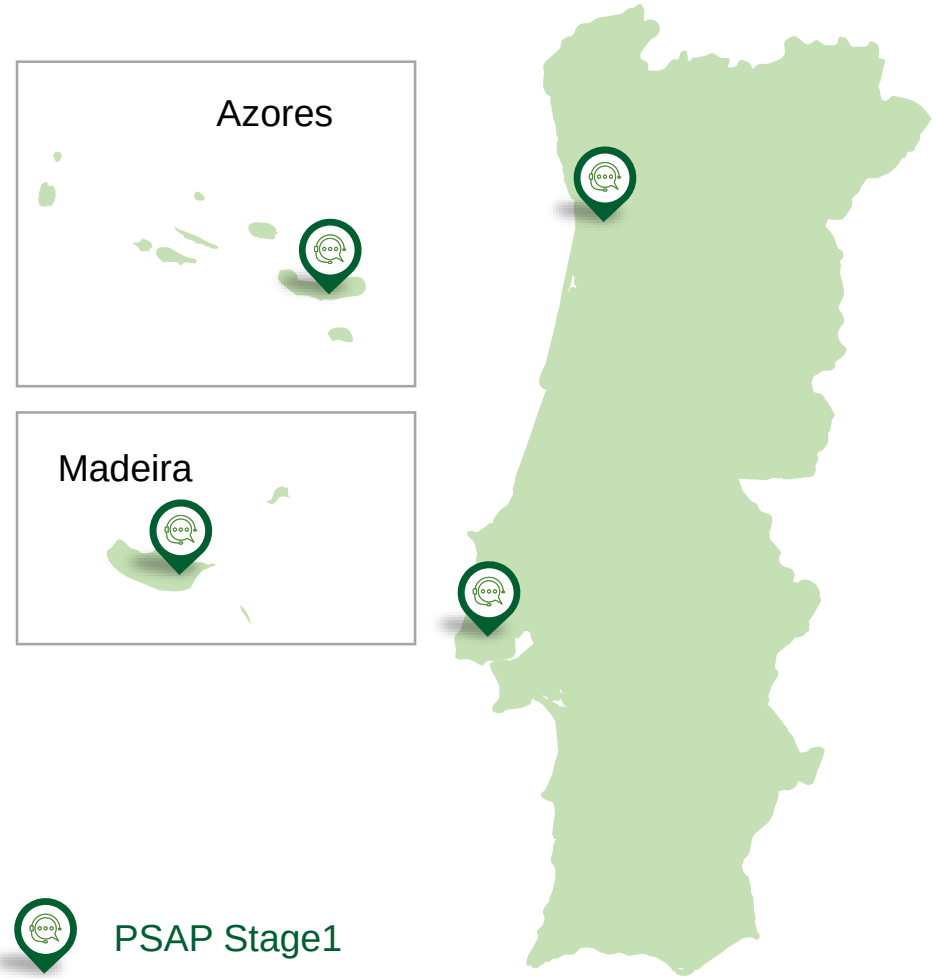
112pt Presentation

- Introduction
- Overview of Portugal's 112 transiction to IMS-based emergency communications
- Implementation Strategy for PIDF-LO, drivers, testing and timelines
- Collaboration and Stakeholder involvement

112.PT in numbers



Population
10 300 000

Land Area Covered
92 212 Km ²

Calls/Year
8 000 000

PSAP
4 Stage 1 | 59 Stage 2

Average Attendance Time
6 seconds

Responsibility Matrix

MINISTRY OF HOME AFFAIRS

RESPONSIBILITIES IN 112

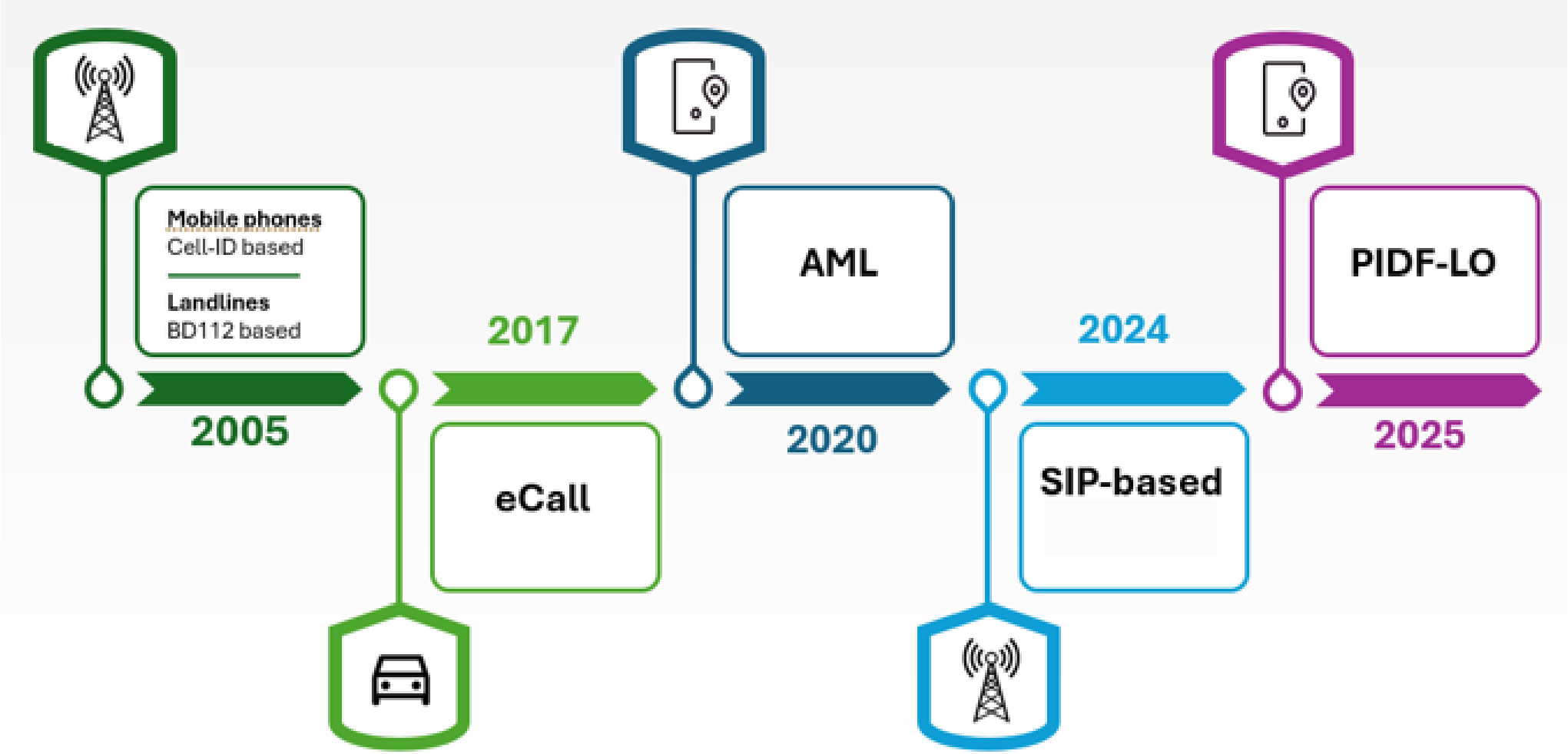
112.pt Emergency Communications Ecosystem

Executive summary

- 112pt has been using ISDN trunks since 2007.
- The migration of 112 traffic from ISDN to SIP began in 2022
- The ANACOM regulation that allows emergency calls to be delivered to the PSAP trough a SIP trunk, has been published on August 2024.
- We are expecting to start receiving SIP calls with PIDF-LO, from the Service Provider, in the beginning of 2025.

Overview of Portugal’s transition to SIP-based emergency communications

Portugal Emergency Caller Location Evolution



Transition from ISDN to SIP - Relevant legislation

- The Telecom Service Providers had started the migration , from ISDN to SIP, on 3rd quarter of 2018 maintaining the PSAP's "last mile" on ISDN.

- The PSAP's started the migration process to SIP trunks on 2022, however due to the lack of ANACOM regulation, every development and tests have been made with the MEO Lab or the Consortium Lab.

- The ANACOM regulation that allows emergency calls to be delivered to the PSAP through a SIP trunk, has been published on August 2024.

IMS-based networks

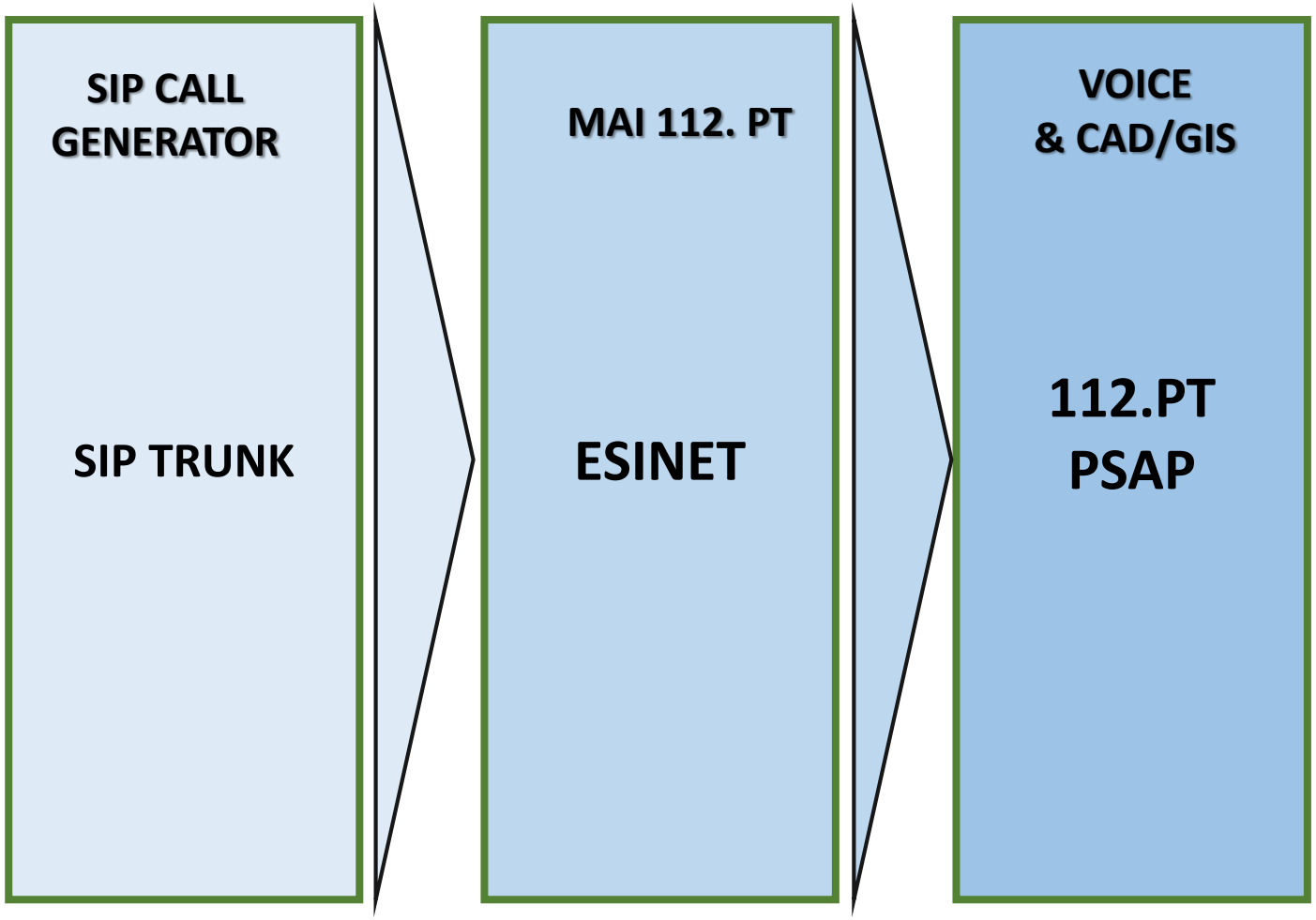
- The Portuguese regulator ANACOM published the decision on IMS networks - Telecom service providers IMS's interconnection network.
  - Emergency communications – planned to gradually move from ISDN to SIP.
  - https://www.anacom.pt/render.jsp?categoryId=393137
- All telecom service providers, operating in Portugal, have their own IMS networks and are interconnected with each other.

ANACOM regulations on the provision of caller location information to the PSAP's; (New Regulation 112L).

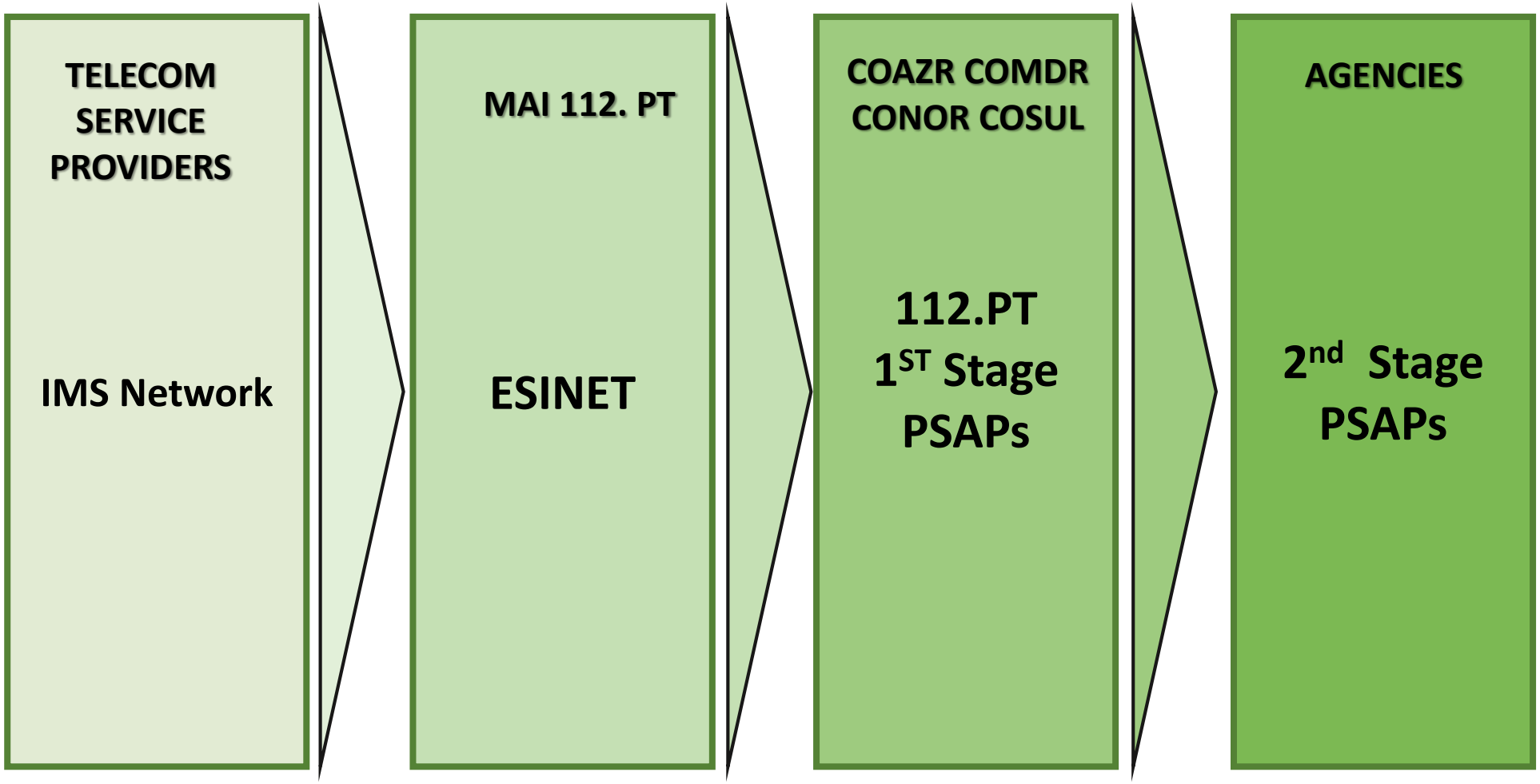
- On August 2024, ANACOM approved the Regulation on the provision of information on the caller's location to the Public Security Answering Point. https://anacom.pt/render.jsp?contentId=1792605
- **The Regulation now approved establishes**
  - **The principles and rules concerning the information to be made available to the most appropriate PSAP…**
  - **The technical specifications for emergency communications and caller location information;**
  - **The criteria for the accuracy and reliability of the caller location information.**
- The regulation, now known as "Regulation 989/2024", was published in the "Diario da Republica" and will come into force 12 months after their publication, without prejudice to the transitional provisions set out therein.

Implementation Strategy for PIDF-LO, drivers, testing and timelines

SIP Emergency Call Delivery – Lab Test Version



SIP Emergency Call Delivery



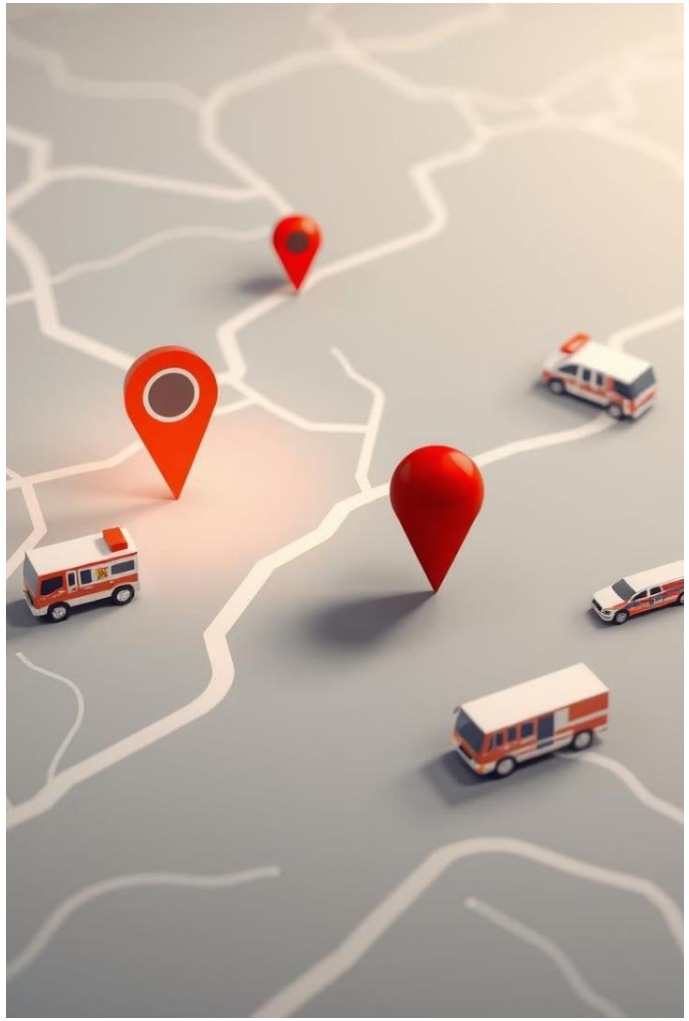
PIDF-LO

An overview

PIDF-LO in Emergency Communications

PIDF-LO (Presence Information Data Format - Location Object) is a protocol for transmitting geographic location information in SIP (Session Initiation Protocol) based emergency communications.

It can be a powerful tool for emergency services, but careful consideration must be given to its implications before deployment.

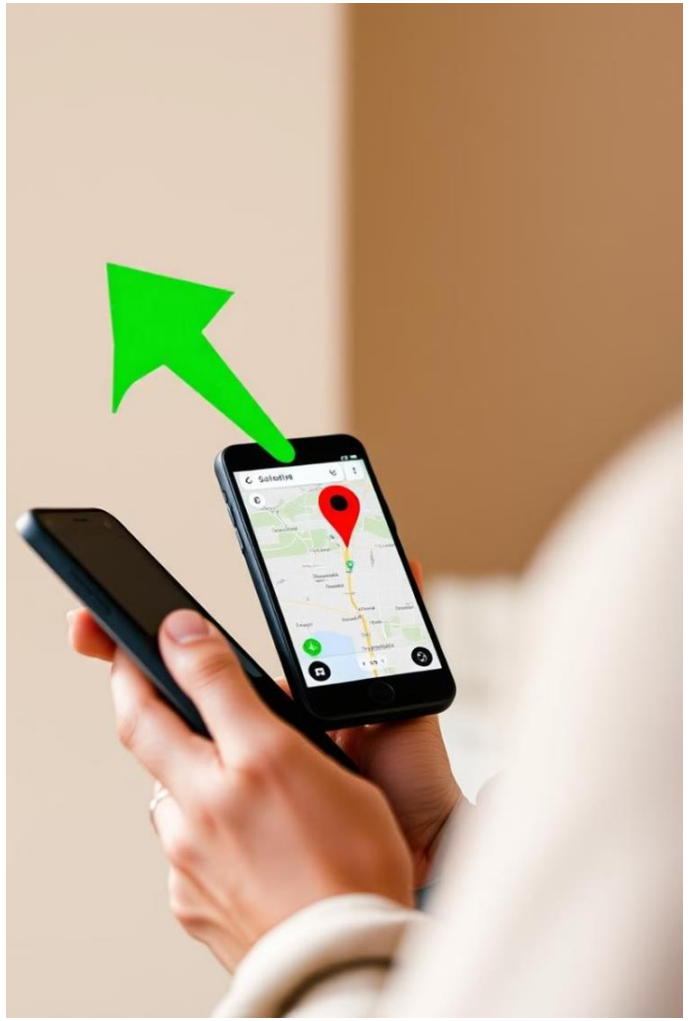


Pros of PIDF-LO Usage

Accurate Location Reporting
PIDF-LO allows for the precise location of a caller to be transmitted with emergency calls, improving the ability of responders to locate them.

Diverse Location Formats
PIDF-LO supports different types of location data, including geodetic coordinates and civic addresses, allowing for flexibility in how location information is received.

Interoperability & Integration
As an IETF standard, PIDF-LO is widely supported and can be integrated into existing SIP-based communication systems, ensuring interoperability and ease of deployment.



PIDF-LO presentation

For Physical address

When caller location information corresponds to physical address data, namely from the NTP (Network Termination Point), the data must be represented in the PIDF- LO as "civic" type.

Geographical coordinates

When the caller location information, from the mobile device, corresponds to geographical coordinates, the respective data must be represented in the PIDF-LO as type "Geodetic" through the Geodetic Shape Representation "point" (RFC 5491). Additionally, the service provider must send the Cell Sector or Arc Band.

PIDF-LO presentation for Cell "Arc band"

Cell Sector

This geometric shape makes it possible, by representing the theoretical coverage area of the respective cell, to obtain the area where the mobile terminal equipment is located. (Figure I-1)

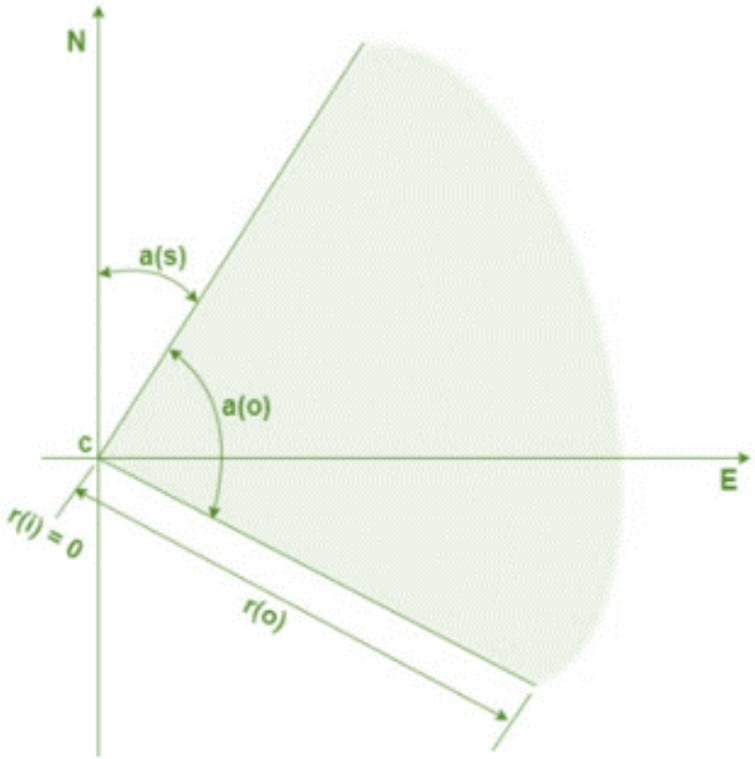


Figure I-1: Sector.

PIDF-LO presentation for Cell "Arc band"

Cell Sector Arcband

This geometric shape makes it possible, through the representation of an inner radius - r(i) - and an outer radius - r(o) - to indicate the area, within the respective cell, where the mobile terminal equipment is located (Figure I-2) Arcband.

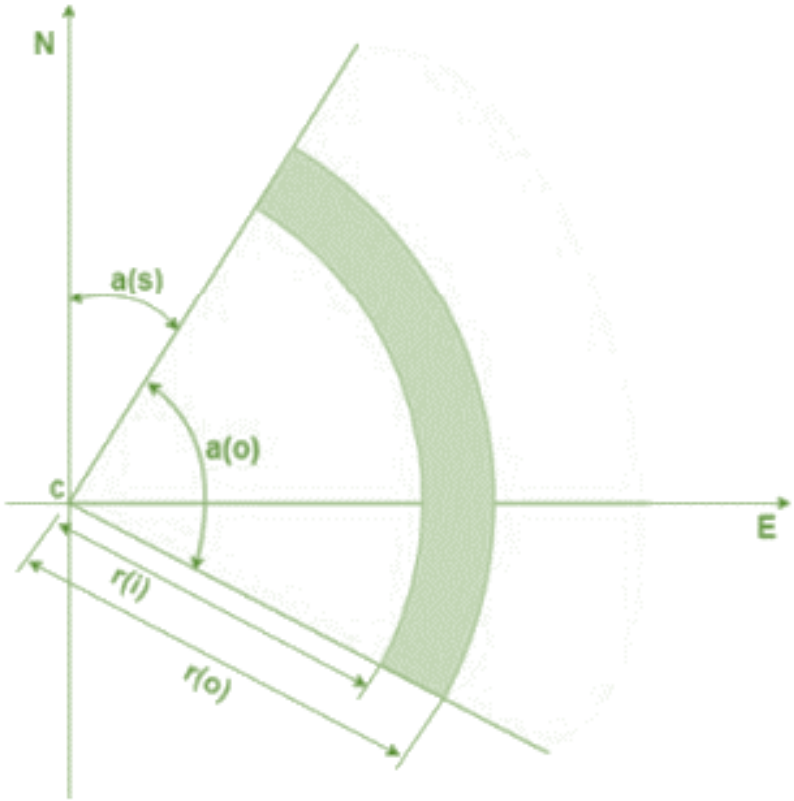


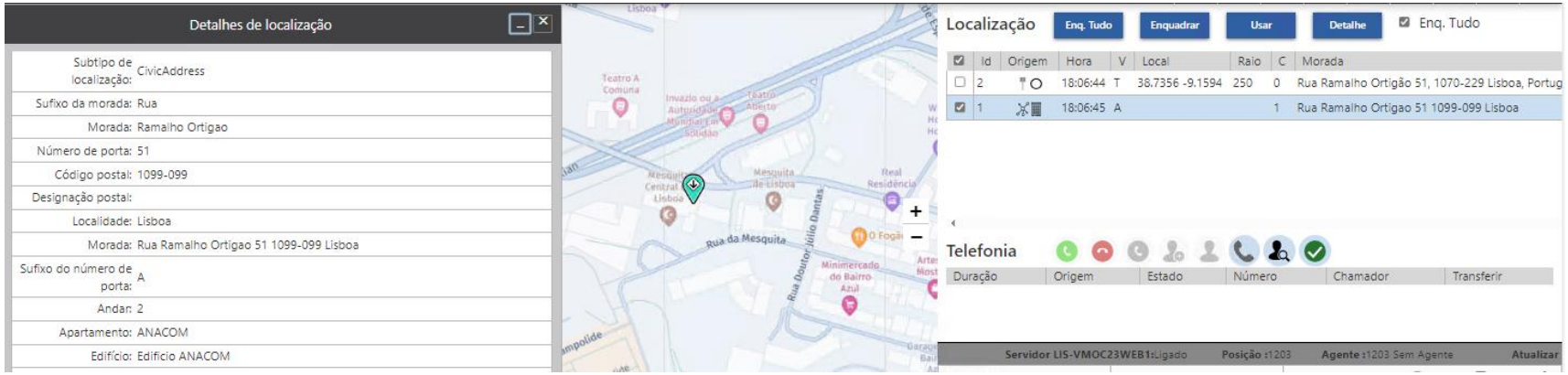
Figure I-2: *Arcband.*

PIDF-LO

Lab test examples

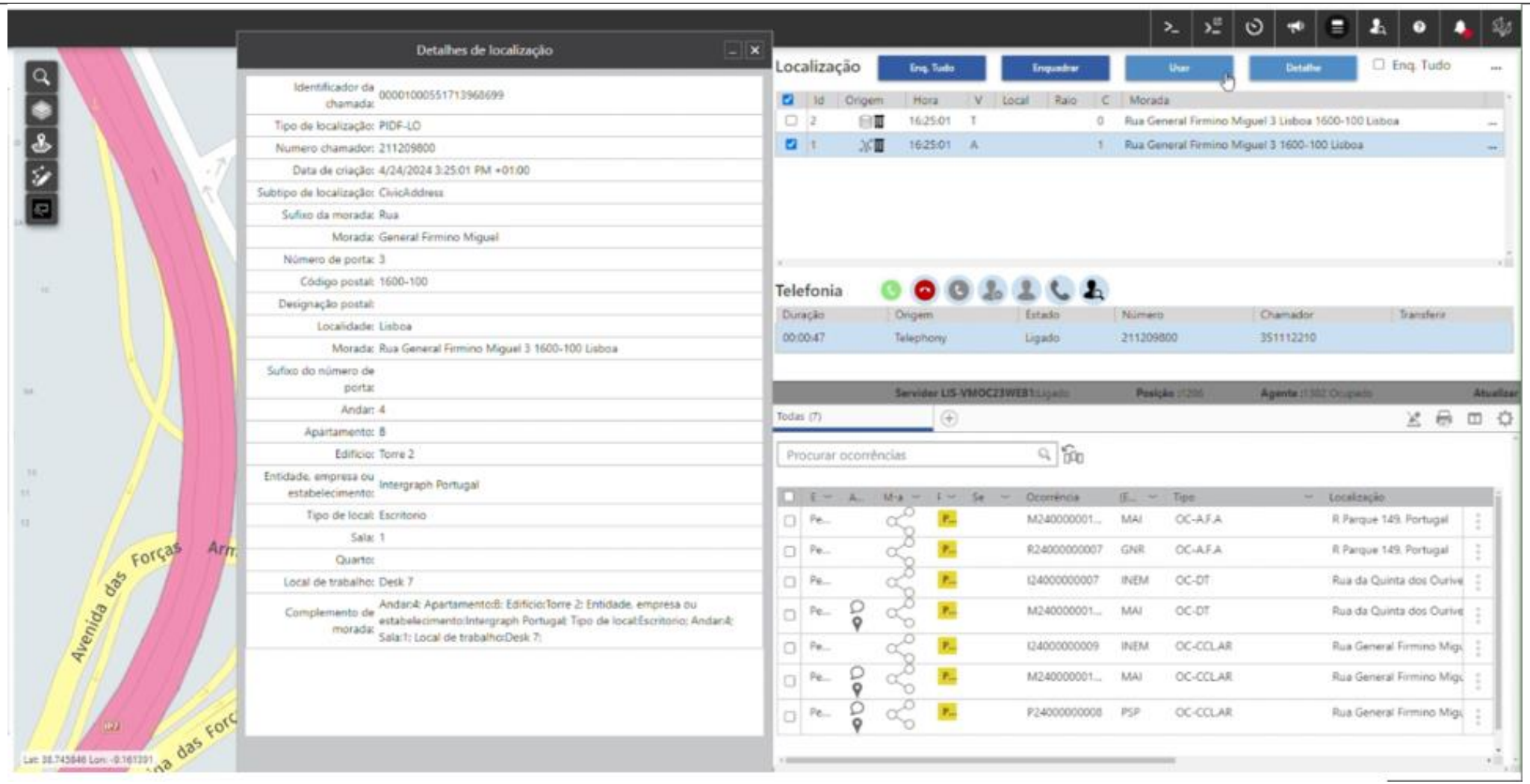
Emergency Call with PIDF-LO "Civic"


```
<tuple id="civic">
  <status>
    <gp:geopriv>
      <gp:location-info>
        <cl:civicAddress>
          <cl:country>PT</cl:country>
          <cl:A3>Lisboa</cl:A3>
          <cl:A6>Ramalho Ortigao</cl:A6>
          <cl:STS>Rua</cl:STS>
          <cl:HNO>51</cl:HNO>
          <cl:HNS>A</cl:HNS>
          <cl:PC>1099-099</cl:PC>
          <cl:PCN>Lisboa</cl:PCN>
          <cl:FLR>2</cl:FLR>
          <cl:UNIT>ANACOM</cl:UNIT>
          <cl:BLD>Edificio ANACOM</cl:BLD>
          <cl:NAM>ANACOM</cl:NAM>
          <cl:PLC>Escritorio</cl:PLC>
          <cl:LOC>Entrada adicional Rua da Mesquita,
```

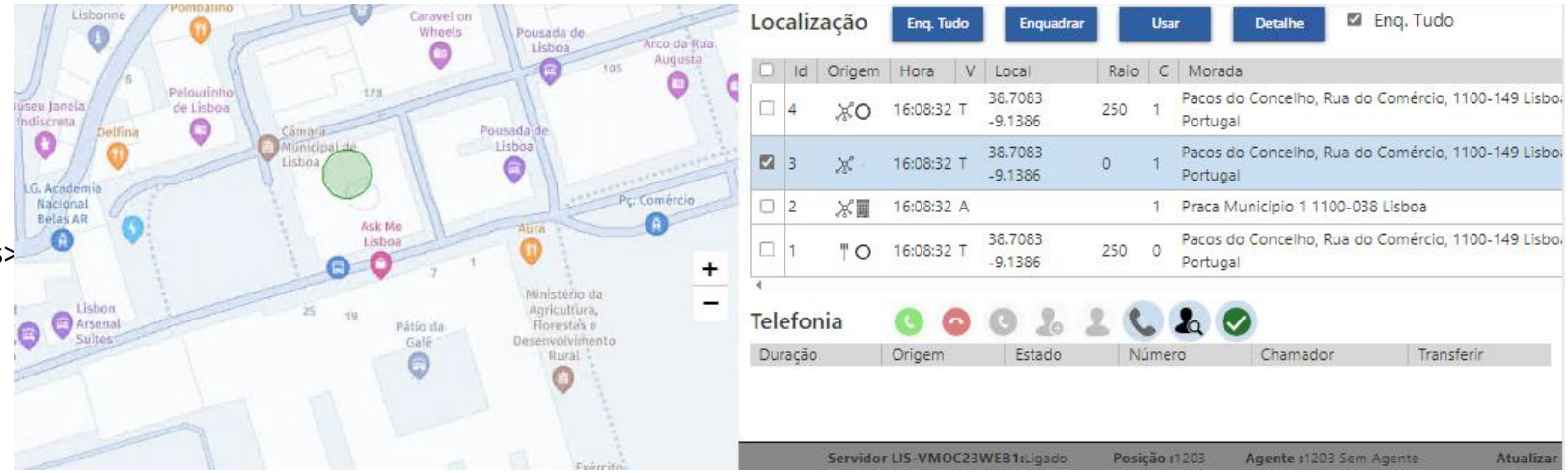
Rua Ramalho Ortigão 51, 1099-099 Lisboa, Portugal

Call Location
Civic Address with PIDF-LO details



Emergency call with PIDF-LO "Point"

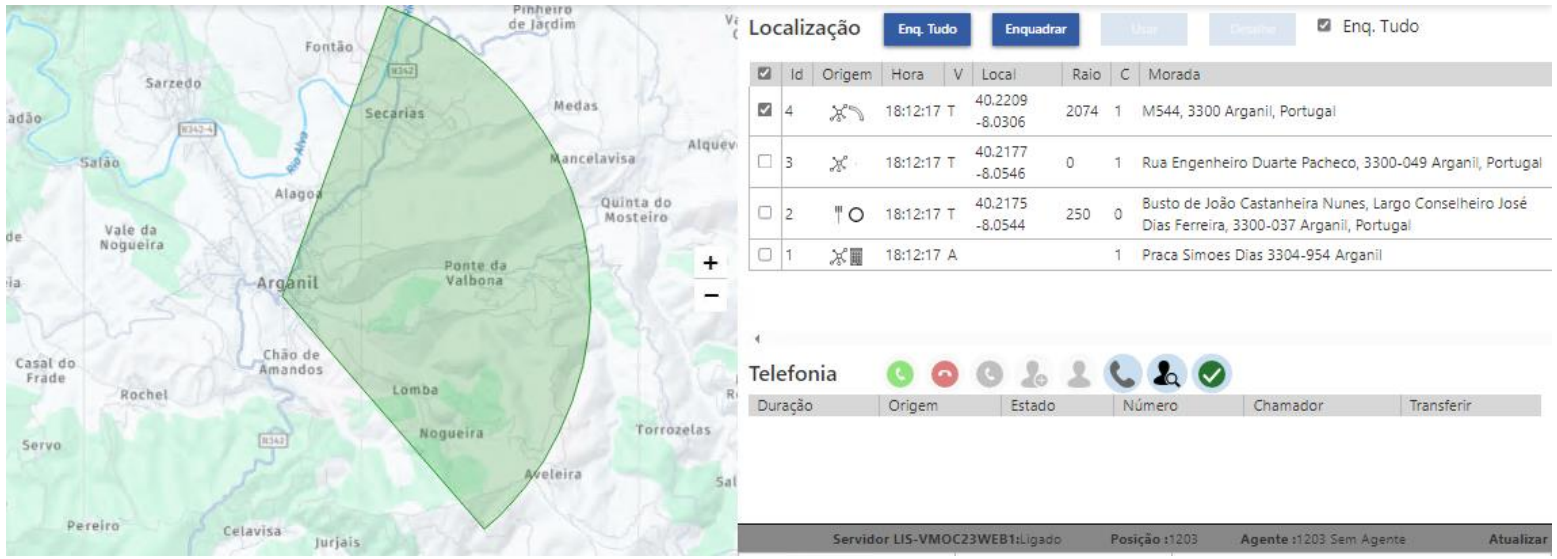
```
<tuple id="mBoRC5ploE">
<presence xmlns="urn:ietf:params:xml:ns:pidf"
        xmlns:dm="urn:ietf:params:xml:ns:pidf:data-model"
        xmlns:gp="urn:ietf:params:xml:ns:pidf:geopriv10"
        xmlns:gml="http://www.opengis.net/gml"
        entity="pres:point3d@example.com">
  <dm:device id="point3d">
    <gp:geopriv>
      <gp:location-info>
        <gml:Point srsName="urn:ogc:def:crs:EPSG::4979"
                xmlns:gml="http://www.opengis.net/gml">
          <gml:pos> 38.708283 -9.138559 123.4</gml:pos>
        </gml:Point>
      </gp:location-info>
      <gp:usage-rules/>
      <gp:method>Wiremap</gp:method>
    </gp:geopriv>
    <dm:deviceID>mac:1234567890ab</dm:deviceID>
    <dm:timestamp>2024-01-01T00:00:00Z</dm:timestamp>
  </dm:device>
```



Paços do Concelho, Rua do Comércio, 1100-149 Lisboa, Portugal

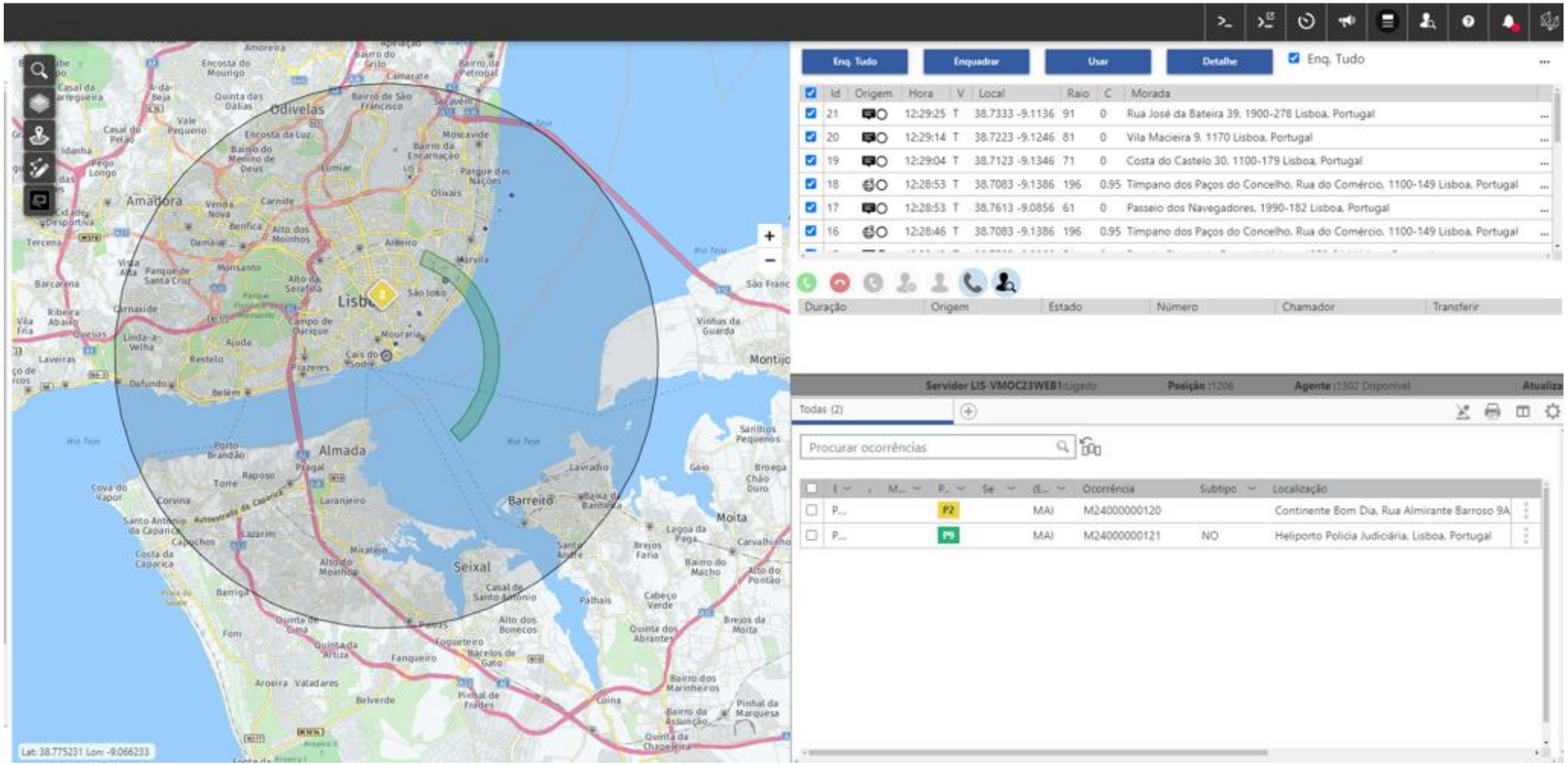
Emergency call with PIDF-LO “Cell-Sector"


```
<presence xmlns=\"urn:ietf:params:xml:ns:pidf\">
 <tuple>
  <status>
   <geopriv xmlns=\"urn:ietf:params:xml:ns:pidf:geopriv10\">
    <location-info>
     <ArcBand xmlns=\"http://www.opengis.net/pidflo/1.0\">
      <pos xmlns=\"http://www.opengis.net/gml\">
       40.217699 -8.054595
      </pos>
      <innerRadius>0</innerRadius>
      <outerRadius>4148</outerRadius>
      <startAngle>20</startAngle>
      <openingAngle>120</openingAngle>
     </ArcBand>
    </location-info>
    <usage-rules/>
    </geopriv>
    </status>
 </tuple>
</presence>
```

M544, 3300 Arganil, Portugal

Call Location with
AML-SMS, Cell-ID, PIDF-LO ArcBand



PIDF-LO

Key drivers & CAD changes

PIDF-LO Implementation Drivers

1. IMS networks implementation by the service providers (2018)
2. Need to adopt SIP and decommission ISDN (2022/4)
3. Opt-in for a standard architecture instead of a proprietary solution (2023/4)
4. Enhance geolocation info (2024/5)

CAD changes to accommodate SIP PIDF-LO

NG-112 solution receives and processes the PIDF-LO sent by the Service Provider, and delivers the result to the CAD, which presents it to the 112pt call-taker's map.

This requires CAD solution changes, namely into

- caller location processing components,
- information to be presented to the call-taker map and locations list,
- databases and reporting.

Collaboration and Stakeholders involvement

Collaboration and Stakeholders

- We had made several, and successful, tests with one of the main Portuguese Telecom Service Providers
- The consortium has been able to generate, in lab, the SIP calls with Caller Location, using PIDF-LO.
  - The Lab replicates the entire 112pt solution, which has allowed all parties involved in the project, whether national or international, to carry out the necessary development and testing to ensure that we will be operational by 2025.
- A presentation of a fully functional solution, using the Consortium capabilities, has been made, in July’24, to the 112pt team and the Regulator ANACOM.
- All parts of the present project, including the Regulator, ANACOM, Telecom Service Providers and the Consortium have been cooperative and helpful on this transition process.

Thank you