DEC112 – Austrian Text-To-112 Pilot

Kamailio World Conference & Exhibition 2018

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DEC112, Frequentis AG, EENA Tech & Ops Committee

16.05.2017

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DEC112 Project

- **D**eaf **E**mergency **C**alling **112**
- Team: M. Murrent, R. Prinz and W. Kampichler (private initiative!)
- Grant: *netidee* – Project Call #12 / ProjectID: 2347
- Duration: 12/2017 – 12/2018
- Austrian-Pilot: 07/2018 – 12/2018
- The *netidee* initiative is funded by the non-profit Internet Foundation Austria (IPA) in accordance with its purpose – to promote the Internet in Austria – using funds from Austrian domain administration activities
- *netidee* funded projects are open source!

https://www.netidee.at/dec112
https://www.dec112.at/

DEC112 Objectives

- Get better accessibility to emergency services (text messaging)
- Implement core services[1] for next generation emergency calling as open source
- Showcase the use of location based (emergency) call routing standards
- Integrate with Austrian emergency response organizations
- App (Android and iOS) → location, health data (optional) and chat

[1] Routing and mapping service

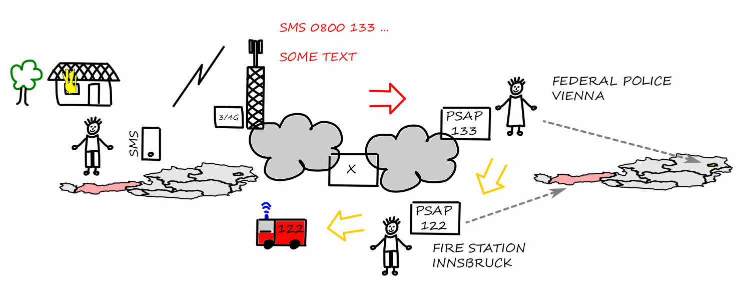
Emergency Services Accessibility in Austria

Emergency Services in Austria

ÖAMTC
POLIZEI
POLIZEI
ARBÖ

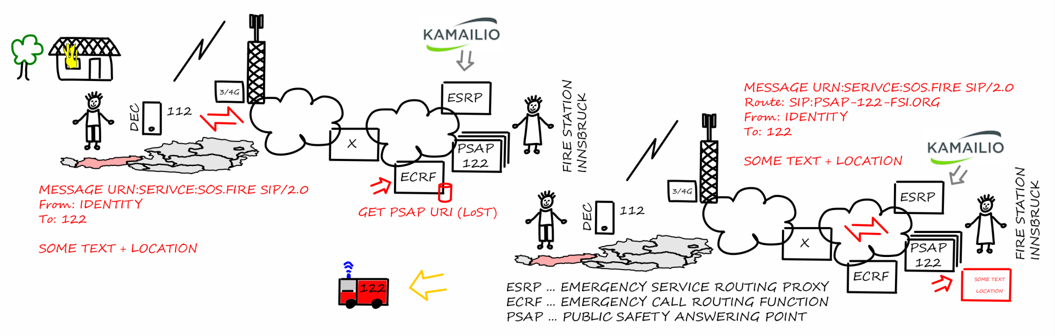
- Austrian states are responsible for the provision of emergency services
- Emergency response organizations (EROs) run own emergency center
- Service boundaries are Austrian state and/or county borders

Accessibility in Austria – Today



- Fax, Email, SMS to Federal Police Vienna
- National, toll-free fax and sms number (just one-way)
- Police coordinates with EROs: ambulance, fire, police etc.

Accessibility in Austria – DEC112



MESSAGE URN:SERIVCE:SOS.FIRE SIP/2.0
From: IDENTITY
To: 122

SOME TEXT + LOCATION

GET PSAP URI (LoST)

MESSAGE URN:SERIVCE:SOS.FIRE SIP/2.0
Route: SIP:PSAP-122-FSI.ORG
From: IDENTITY
To: 122

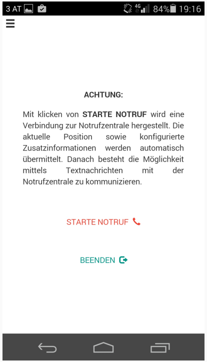
SOME TEXT + LOCATION

ESRP ... EMERGENCY SERVICE ROUTING PROXY
ECRF ... EMERGENCY CALL ROUTING FUNCTION
PSAP ... PUBLIC SAFETY ANSWERING POINT

- Registered DEC112 users (approx. up to 20K in Austria)
- Caller location (device derived location)
- Direct access via chat app to local services: ambulance, fire, police etc.

DEC112 Elements

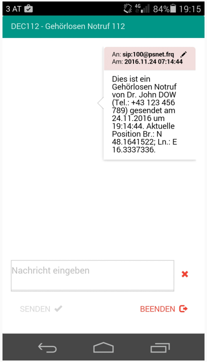
DEC112 – Application



ACHTUNG:

Mit klicken von **STARTE NOTRUF** wird eine Verbindung zur Notrufzentrale hergestellt. Die aktuelle Position sowie konfigurierte Zusatzinformationen werden automatisch übermittelt. Danach besteht die Möglichkeit mittels Textnachrichten mit der Notrufzentrale zu kommunizieren.

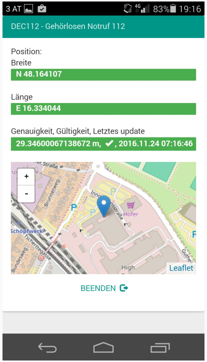
Android v1.1.0



An: **sip:100@psnet.frq**
Am: **2016.11.24 07:14:44**

Dies ist ein Gehörlosen Notruf von Dr. John DOW (Tel.: +43 123 456 789) gesendet am 24.11.2016 um 19:14:44. Aktuelle Position Br.: N 48.1641522; Ln.: E 16.3337336.

Android v1.1.0



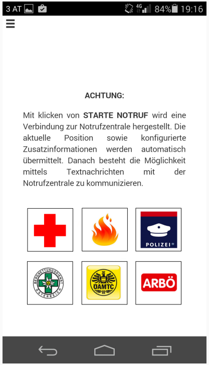
Position:

Breite: **N 48.164107**

Länge: **E 16.334044**

Genauigkeit, Gültigkeit, Letztes update: **29.34600067138672 m, ✓ , 2016.11.24 07:16:46**

Android v1.1.0



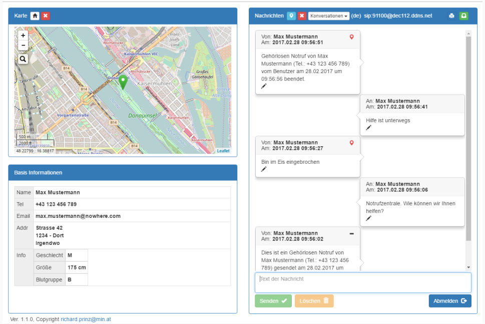
ACHTUNG:

Mit klicken von **STARTE NOTRUF** wird eine Verbindung zur Notrufzentrale hergestellt. Die aktuelle Position sowie konfigurierte Zusatzinformationen werden automatisch übermittelt. Danach besteht die Möglichkeit mittels Textnachrichten mit der Notrufzentrale zu kommunizieren.

Android v1.1.1

- Simple and easy to use application available for iOS and Android

DEC112 – PSAP



Name	Max Mustermann	
Tel	+43 123 456 789	
Email	max.mustermann@nowhere.com	
Addr	Strasse 42 1234 - Dort Irgendwo	
Info	Geschlecht	M
	Größe	175 cm
	Blutgruppe	B

Ver. 1.1.0, Copyright richard.prinz@min.at

(de) sip:91100@dec112.ddns.net

Von: **Max Mustermann**
Am: **2017.02.28 09:56:51**

Gehörlosen Notruf von Max Mustermann (Tel.: +43 123 456 789) vom Benutzer am 28.02.2017 um 09:56:56 beendet.

An: **Max Mustermann**
Am: **2017.02.28 09:56:41**

Hilfe ist unterwegs

Von: **Max Mustermann**
Am: **2017.02.28 09:56:27**

Bin im Eis eingebrochen

An: **Max Mustermann**
Am: **2017.02.28 09:56:06**

Notrufzentrale. Wie können wir Ihnen helfen?

Von: **Max Mustermann**
Am: **2017.02.28 09:56:02**

Dies ist ein Gehörlosen Notruf von Max Mustermann (Tel.: +43 123 456 789) gesendet am 28.02.2017 um

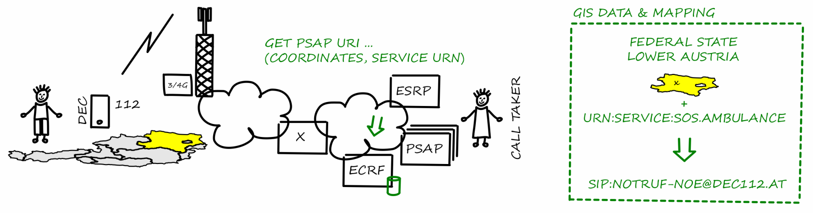
Text der Nachricht

Dangerous Demo 2017

- Current DEC112 SIP/WS/WSS client mainly used for demonstration purposes
- Web-based: log-on page and visual / acoustic indication of incoming message
- DEC112 aims to provide a SIP/TLS endpoint for PSAP integration

DEC112 – ECRF

An ECRF is a LoST protocol server where location information and a service URN serve as input to a mapping function that returns a URI to route emergency calls.

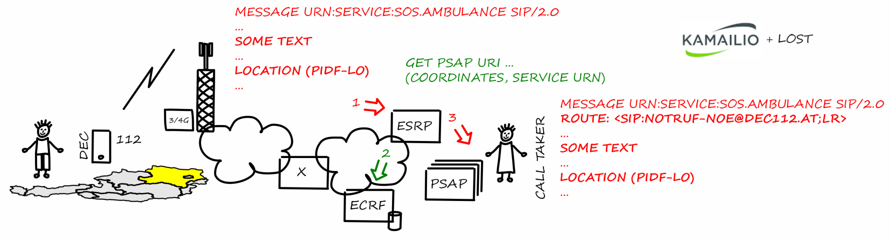


- GIS database (stores polygons and mapping) combined with REST interface

`https://tools.ietf.org/html/rfc5222`

DEC112 – ESRP

An ESRP (Emergency Service Routing Proxy) is a SIP proxy that selects the next hop routing based on location, service URN and policy.



```
MESSAGE URN:SERVICE:SOS.AMBULANCE SIP/2.0
...
SOME TEXT
...
LOCATION (PIDF-LO)
...
```

GET PSAP URI ...
(COORDINATES, SERVICE URN)

```
MESSAGE URN:SERVICE:SOS.AMBULANCE SIP/2.0
ROUTE: <SIP:NOTRUF-NOE@DEC112.AT;LR>
...
SOME TEXT
...
LOCATION (PIDF-LO)
...
```

- Basically, creating a LoST *findService* request and parsing a *findServiceResponse*

Kamailio LoST Module

LoST Module Implementation

- Based on Kamailio 5.x sources ... requires *http_client* or *http_async_client*
- Currently, three functions are exported
  - *lost_query(var)*: parses SIP message (r-uri, Geolocation hdr, multi-part mime - pdf-lo) and returns a LoST *findService* request message → *http_(async_)client*
  - *lost_query_urn(var, var)*: same as *lost_query*, but takes service urn as input (e.g. if emergeny number digits were received or a different urn namespace shall be used)
  - *lost_response(var, var)*: parses LoST *findServiceResponse* and returns *uri* (next hop) and *displayName* ← *http_(async_)client*
- In the case a LoST server can't resolve urn or location, "ERROR" will be returned
- Connection failover and TLS via *http_client*

Code Snippet: kamailio.cfg

```
modparam("http_client", "httpcon", "lostserver=>http://lost-service:8448");
# ...
request_route {
# check for service urn
route(URN);
# ...
route[URN] {
  # we do this for INVITE and MESSAGE
  if(!is_method("INVITE|MESSAGE"))
    return;
  # if its a urn then get the LoST findService query message
  if($rz=~"^urn$") {
    lost_query("$var(fsrequest)");
  }
  # if not set a proper urn and  get the LoST findService query message
  else if($rU=~"^112$") {
    $var(myurn) = "urn:service:sos";
    lost_query_urn("$var(myurn)", "$var(fsrequest)");
  }
  else if($rU=~"^122$") {
    $var(myurn) = "urn:service:sos:fire";
    lost_query_urn("$var(myurn)", "$var(fsrequest)");
  }
  else return;                                                # ... see next slide
```

Code Snippet: kamailio.cfg

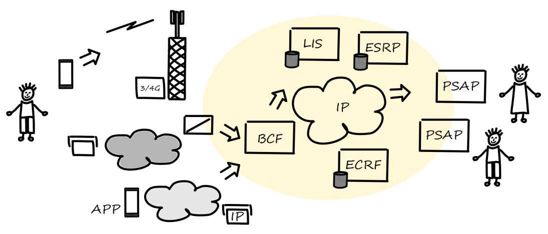
```
                                                          # ... continued
    $var(res) = http_connect("lostserver",
                 "/lost",
                 "application/held+xml",
                 "$var(fsrequest)",
                 "$var(fsresponse)");

    lost_response("$var(fsresponse)", "$var(target)", "$var(display)");
    if($var(target)=~"ERROR") {
      send_reply("400", "Bad Request");
      exit;
    }
#!ifdef FWD_URN
    remove_hf("Route");
    $du = $var(target);
    insert_hf("Route: <$var(target);lr>\r\n", "Via");
    route(RELAY);
    exit;
#!endif
    $ru = $var(target);
    route(LOCATION);
    exit;
  }   # Note that this is just a basic example -- certain other options are possible
```

LoST Module – Next Steps

- Integrate HTTP services via *http_client* API
  - trade-off between flexibility and comfort
  - may be a hybrid approach (e.g. modparam to enable LoST seeker functionality)
- Extended capabilities, like LIS/HELD (identity extension) support to query a LIS if no Geolocation header is provided
- Default values set via module parameter (e.g. default target)
- Testing and go-live (Austrian pilot)
- Finally, contribute the module sources right after the pilot phase

European Standardization

ETSI SC EMTEL



- ETSI SC EMTEL work items: ETSI TS 103 479 & TR 103 480
  Core elements for network independent access to emergency services (TS) and interoperability testing (TR) – proposed publication: Q4/2018
- Definition of core elements (BCF, LIS, ESRP, ECRF, PSAP ...) and interfaces

ETSI Plugtests^{TM} Event

- NG112 Plugtests^{TM} Event #3, 28.01.2019 – 01.02.2019
  ETSI HQ, Sophia Antipolis, France
- Testing components of the NG112 communication chain (ECRF, ESRP, ...) and standard conformance (tools will be provided by ETSI)
- The event is free of charge (supported by European Commission)
- A great opportunity to test the Kamailio *lost* module!

Thank You!

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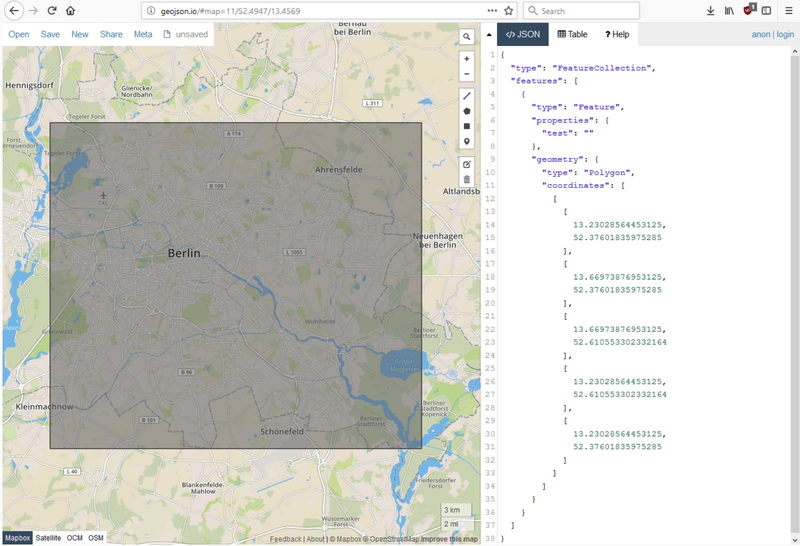
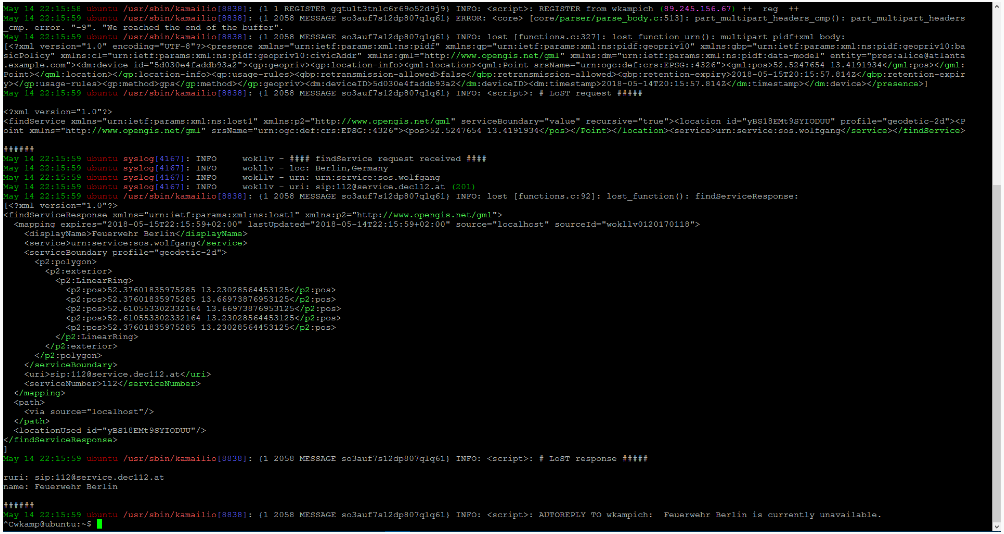
Service Boundary – Berlin Fire Brigade (Example)



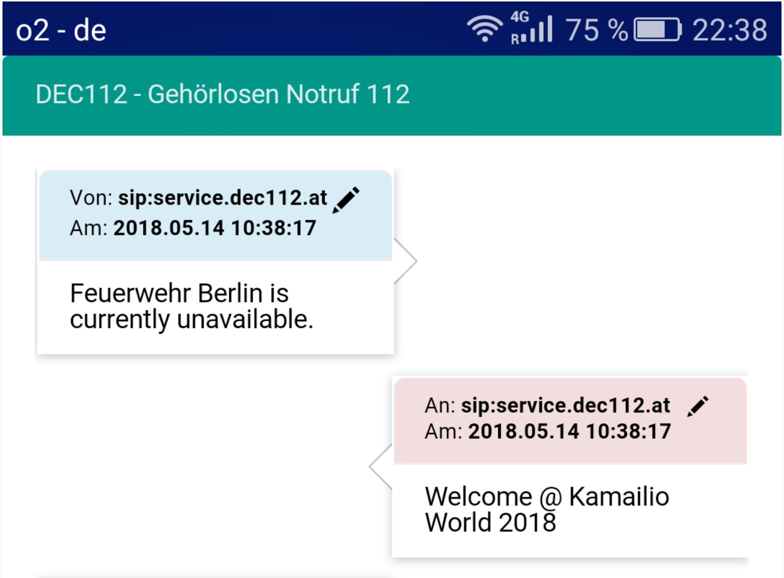
```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "properties": {
        "test": ""
      },
      "geometry": {
        "type": "Polygon",
        "coordinates": [
          [
            [
              13.23028564453125,
              52.37601835975285
            ],
            [
              13.66973876953125,
              52.37601835975285
            ],
            [
              13.66973876953125,
              52.610553302332164
            ],
            [
              13.23028564453125,
              52.610553302332164
            ],
            [
              13.23028564453125,
              52.37601835975285
            ]
          ]
        ]
      }
    }
  ]
}
```

Logging – Berlin Fire Brigade (Example)



```
May 14 22:15:58 ubuntu /usr/sbin/kamailio[8838]: {1 1 REGISTER gqtu1t3tnlc6r69o52d9j9} INFO: <script>: REGISTER from wkampich (89.245.156.67) ++  reg  ++
May 14 22:15:59 ubuntu /usr/sbin/kamailio[8838]: {1 2058 MESSAGE so3auf7s12dp807qlq61} ERROR: <core> [core/parser/parse_body.c:513]: part_multipart_headers_cmp(): part_multipart_headers
_cmp. error. "-9". "We reached the end of the buffer".
May 14 22:15:59 ubuntu /usr/sbin/kamailio[8838]: {1 2058 MESSAGE so3auf7s12dp807qlq61} INFO: lost [functions.c:327]: lost_function_urn(): multipart pidf+xml body:
[<?xml version="1.0" encoding="UTF-8"?><presence xmlns="urn:ietf:params:xml:ns:pidf" xmlns:gp="urn:ietf:params:xml:ns:pidf:geopriv10" xmlns:gbp="urn:ietf:params:xml:ns:pidf:geopriv10:ba
sicPolicy" xmlns:cl="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr" xmlns:gml="http://www.opengis.net/gml" xmlns:dm="urn:ietf:params:xml:ns:pidf:data-model" entity="pres:alice@atlanta
.example.com"><dm:device id="5d030e4faddb93a2"><gp:geopriv><gp:location-info><gml:location><gml:Point srsName="urn:ogc:def:crs:EPSG::4326"><gml:pos>52.5247654 13.4191934</gml:pos></gml:
Point></gml:location></gp:location-info><gp:usage-rules><gbp:retransmission-allowed>false</gbp:retransmission-allowed><gbp:retention-expiry>2018-05-15T20:15:57.814Z</gbp:retention-expir
y></gp:usage-rules><gp:method>gps</gp:method></gp:geopriv><dm:deviceID>5d030e4faddb93a2</dm:deviceID><dm:timestamp>2018-05-14T20:15:57.814Z</dm:timestamp></dm:device></presence>]
May 14 22:15:59 ubuntu /usr/sbin/kamailio[8838]: {1 2058 MESSAGE so3auf7s12dp807qlq61} INFO: <script>: # LoST request #####

<?xml version="1.0"?>
<findService xmlns="urn:ietf:params:xml:ns:lost1" xmlns:p2="http://www.opengis.net/gml" serviceBoundary="value" recursive="true"><location id="yBS18EMt9SYIODUU" profile="geodetic-2d"><P
oint xmlns="http://www.opengis.net/gml" srsName="urn:ogc:def:crs:EPSG::4326"><pos>52.5247654 13.4191934</pos></Point></location><service>urn:service:sos.wolfgang</service></findService>

######
May 14 22:15:59 ubuntu syslog[4167]: INFO     wokllv - #### findService request received ####
May 14 22:15:59 ubuntu syslog[4167]: INFO     wokllv - loc: Berlin,Germany
May 14 22:15:59 ubuntu syslog[4167]: INFO     wokllv - urn: urn:service:sos.wolfgang
May 14 22:15:59 ubuntu syslog[4167]: INFO     wokllv - uri: sip:112@service.dec112.at (201)
May 14 22:15:59 ubuntu /usr/sbin/kamailio[8838]: {1 2058 MESSAGE so3auf7s12dp807qlq61} INFO: lost [functions.c:92]: lost_function(): findServiceResponse:
[<?xml version="1.0"?>
<findServiceResponse xmlns="urn:ietf:params:xml:ns:lost1" xmlns:p2="http://www.opengis.net/gml">
  <mapping expires="2018-05-15T22:15:59+02:00" lastUpdated="2018-05-14T22:15:59+02:00" source="localhost" sourceId="wokllv0120170118">
    <displayName>Feuerwehr Berlin</displayName>
    <service>urn:service:sos.wolfgang</service>
    <serviceBoundary profile="geodetic-2d">
      <p2:polygon>
        <p2:exterior>
          <p2:LinearRing>
            <p2:pos>52.37601835975285 13.23028564453125</p2:pos>
            <p2:pos>52.37601835975285 13.66973876953125</p2:pos>
            <p2:pos>52.610553302332164 13.66973876953125</p2:pos>
            <p2:pos>52.610553302332164 13.23028564453125</p2:pos>
            <p2:pos>52.37601835975285 13.23028564453125</p2:pos>
          </p2:LinearRing>
        </p2:exterior>
      </p2:polygon>
    </serviceBoundary>
    <uri>sip:112@service.dec112.at</uri>
    <serviceNumber>112</serviceNumber>
  </mapping>
  <path>
    <via source="localhost"/>
  </path>
  <locationUsed id="yBS18EMt9SYIODUU"/>
</findServiceResponse>
]
May 14 22:15:59 ubuntu /usr/sbin/kamailio[8838]: {1 2058 MESSAGE so3auf7s12dp807qlq61} INFO: <script>: # LoST response #####

ruri: sip:112@service.dec112.at
name: Feuerwehr Berlin

######
May 14 22:15:59 ubuntu /usr/sbin/kamailio[8838]: {1 2058 MESSAGE so3auf7s12dp807qlq61} INFO: <script>: AUTOREPLY TO wkampich:  Feuerwehr Berlin is currently unavailable.
^Cwkamp@ubuntu:~$
```

Screenshot – Berlin Fire Brigade (Example)



Von: **sip:service.dec112.at**
Am: **2018.05.14 10:38:17**

Feuerwehr Berlin is currently unavailable.

An: **sip:service.dec112.at**
Am: **2018.05.14 10:38:17**

Welcome @ Kamailio World 2018