AML: Matching SMS with HTTPS
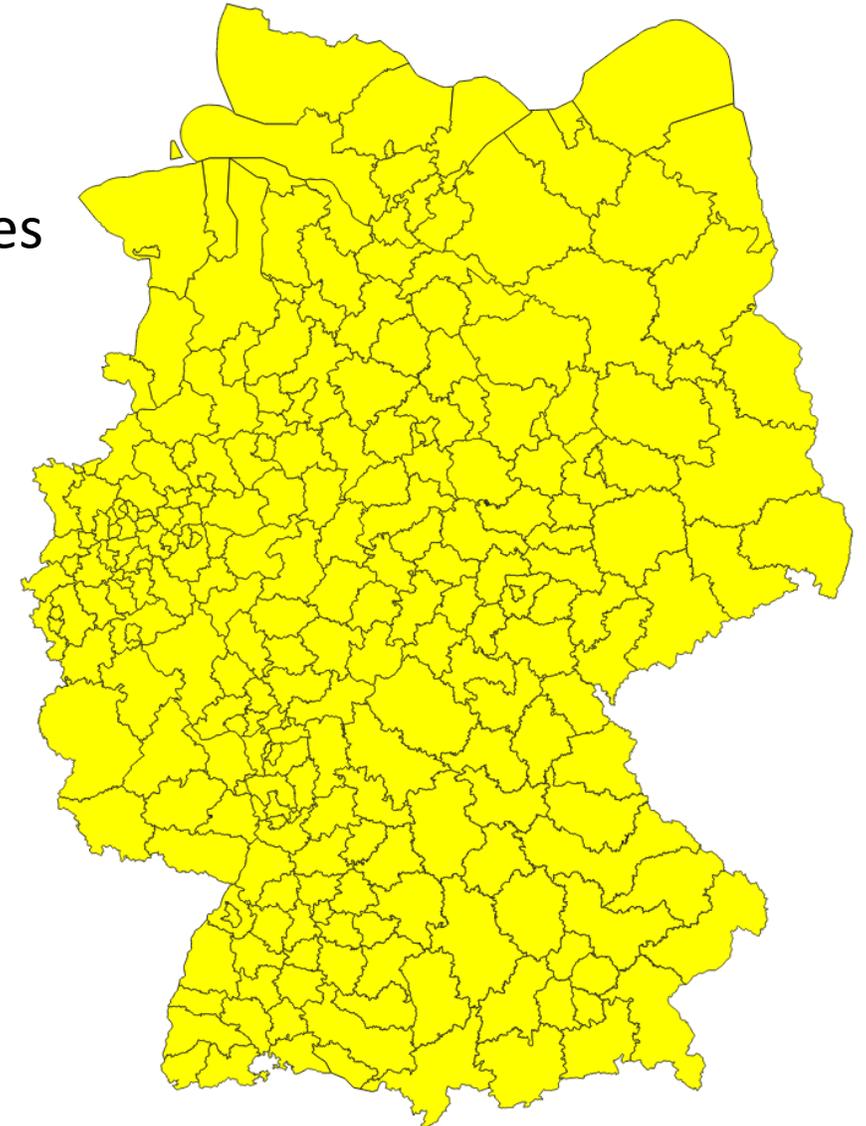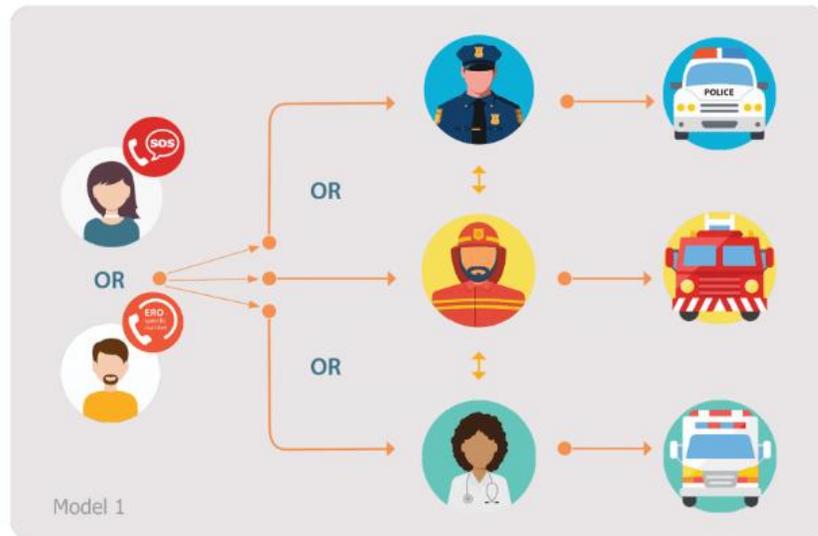
Henning Schmidtpott

Integrierte Leitstelle Freiburg · Breisgau-Hochschwarzwald (ILS)

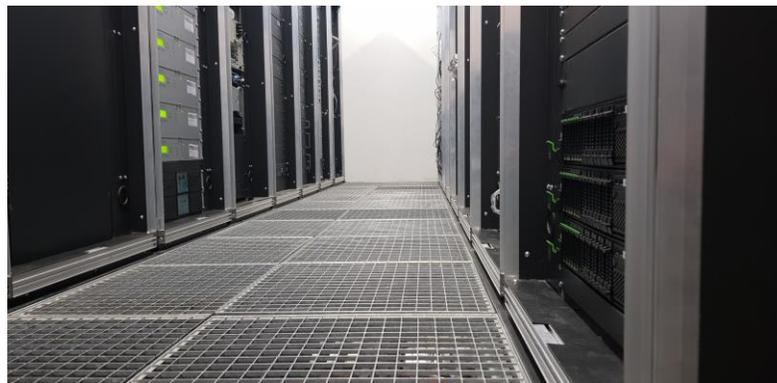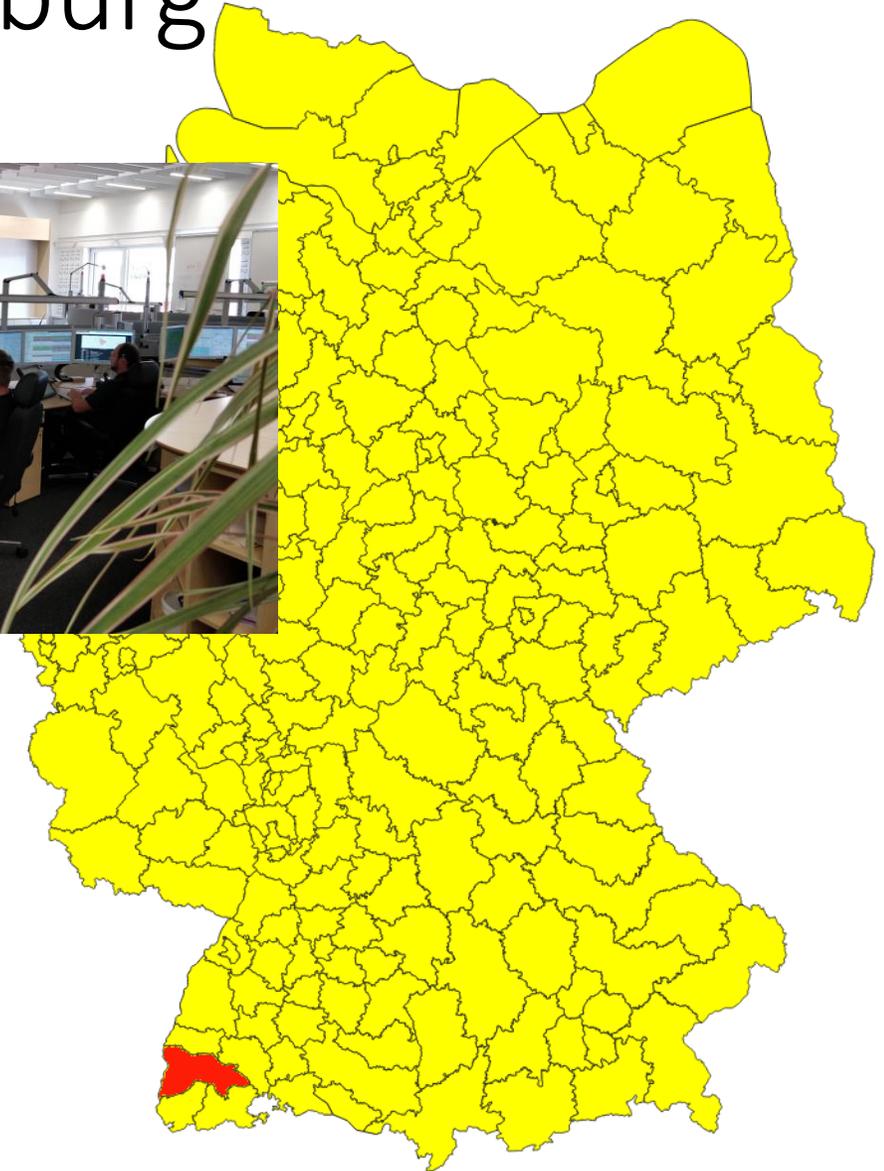Emergency Control Center Freiburg, Germany

Emergency call handling in Germany

- Two national emergency numbers:
  - 112: Fire and rescue, emergency medical services
  - 110: Police

- 16 federal states
  - 233 PSAPs handling 112 calls

Model 1

Emergency control center Freiburg

- Population ≈ 500.000

- 112 calls/year ≈ 100.000

- Integrated in
  main fire station

- Own data center

AML endpoint Germany

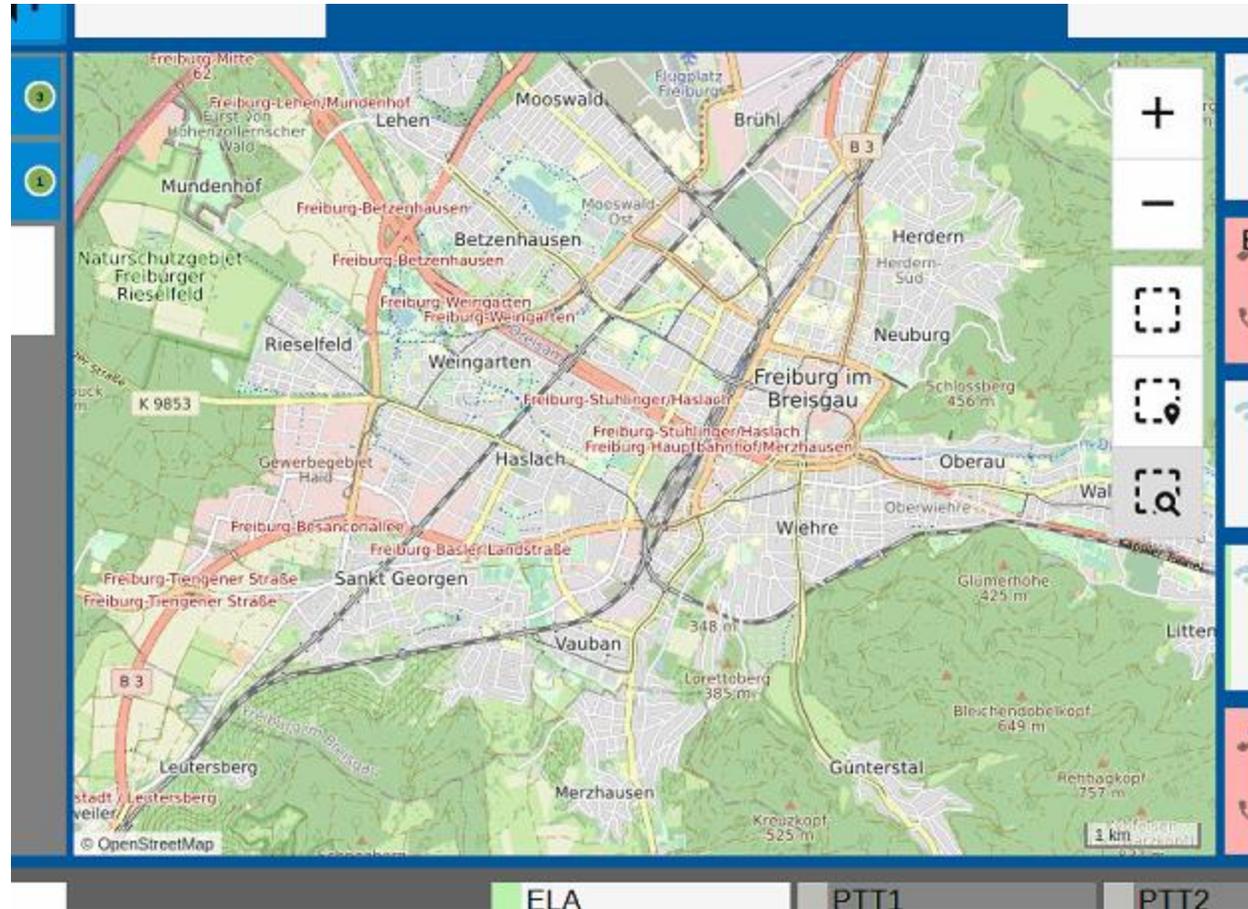- The national AML endpoint is provided by Freiburg Emergency Control Center since 2019.

- Redundancy endpoint in Berlin (passive).

- Over 230 PSAPs have acccess to AML endpoint.

- 60.000 HTTPS messages per day from Android devices.

- 80.000 SMS messages per day from Android and iOS devices.

- 3 messages per call (after 0s, 15s, 30s).

Integration in PSAP application

Integration in PSAP application
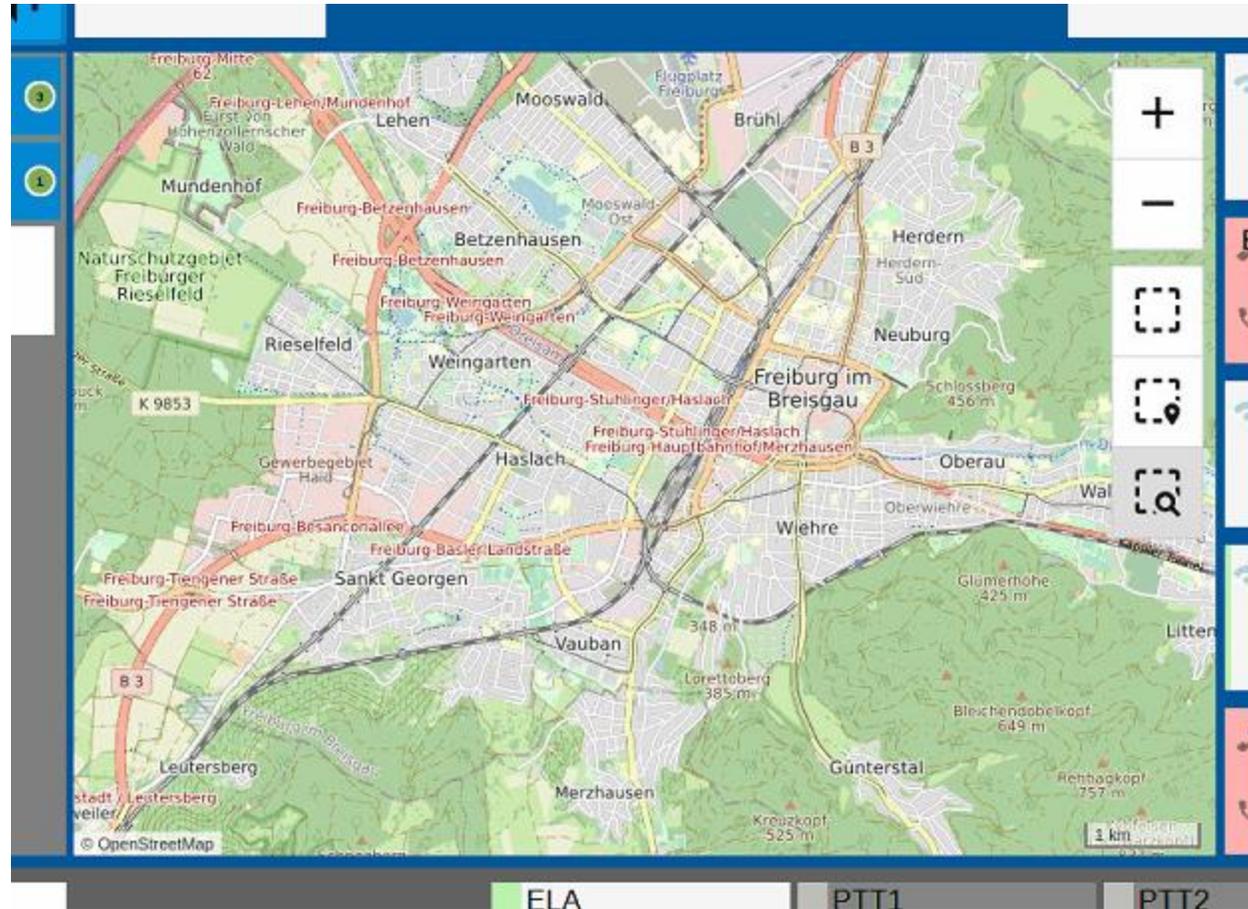
Statistics

Mobile emergency calls received
by PSAP in Freiburg with AML
location in %
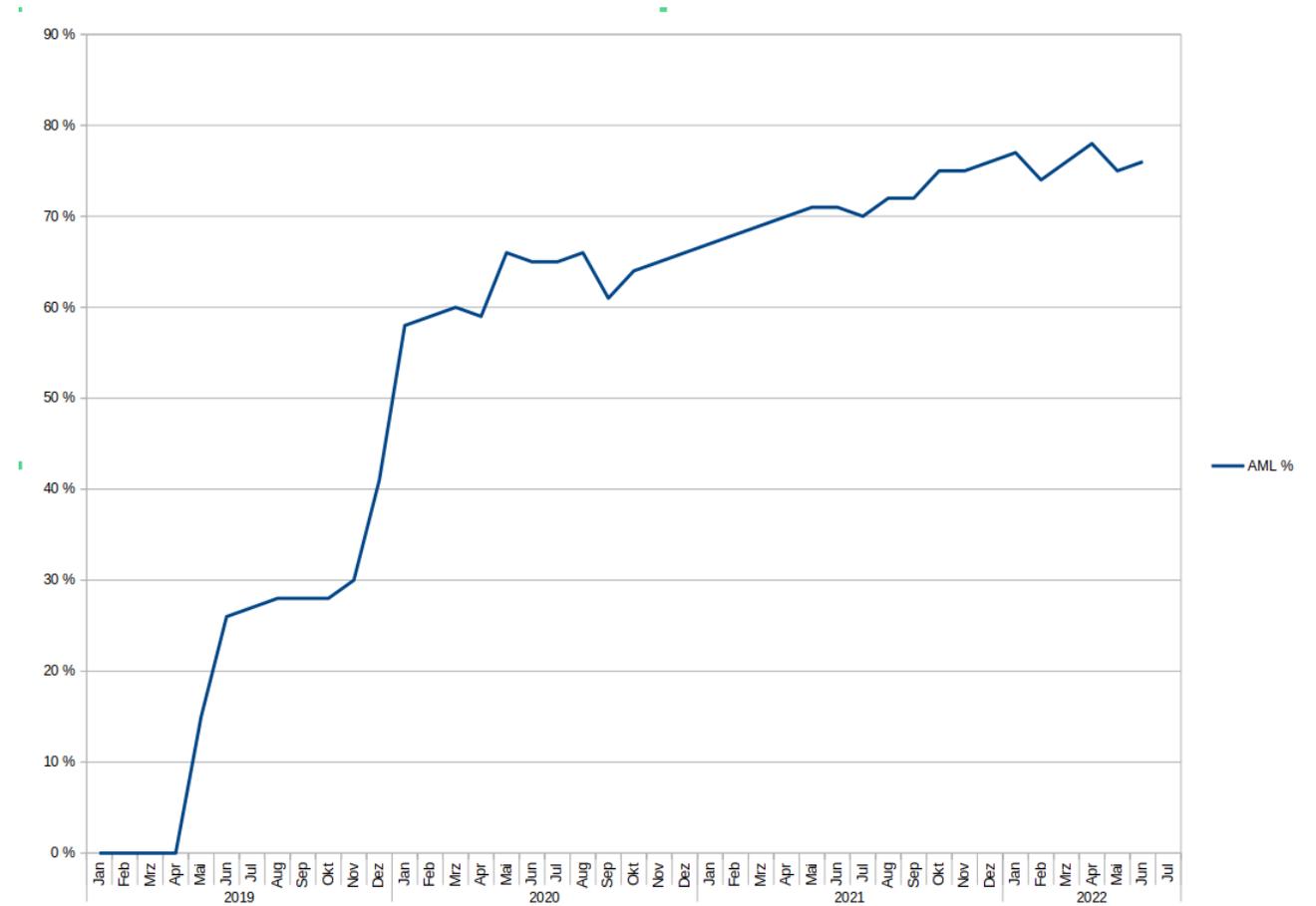
AML in a privacy friendly way

- Delete all data on the endpoint after 1 hour

- Refuse not necessary data like IMSI, device model, …

- device number is only stored as hash value in database

Location data flow

HTTPS / SMS

HTTPS

Caller
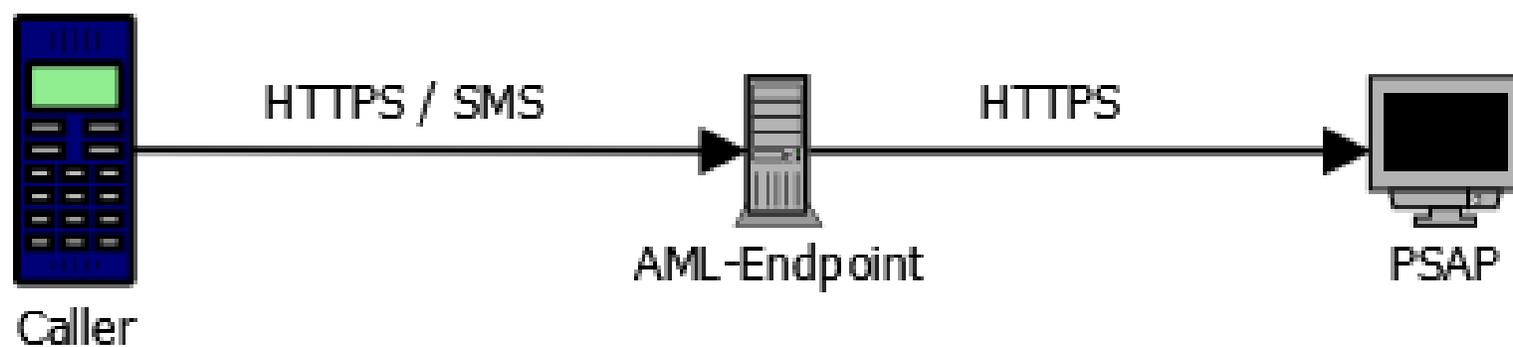
AML-Endpoint

PSAP

Location data process
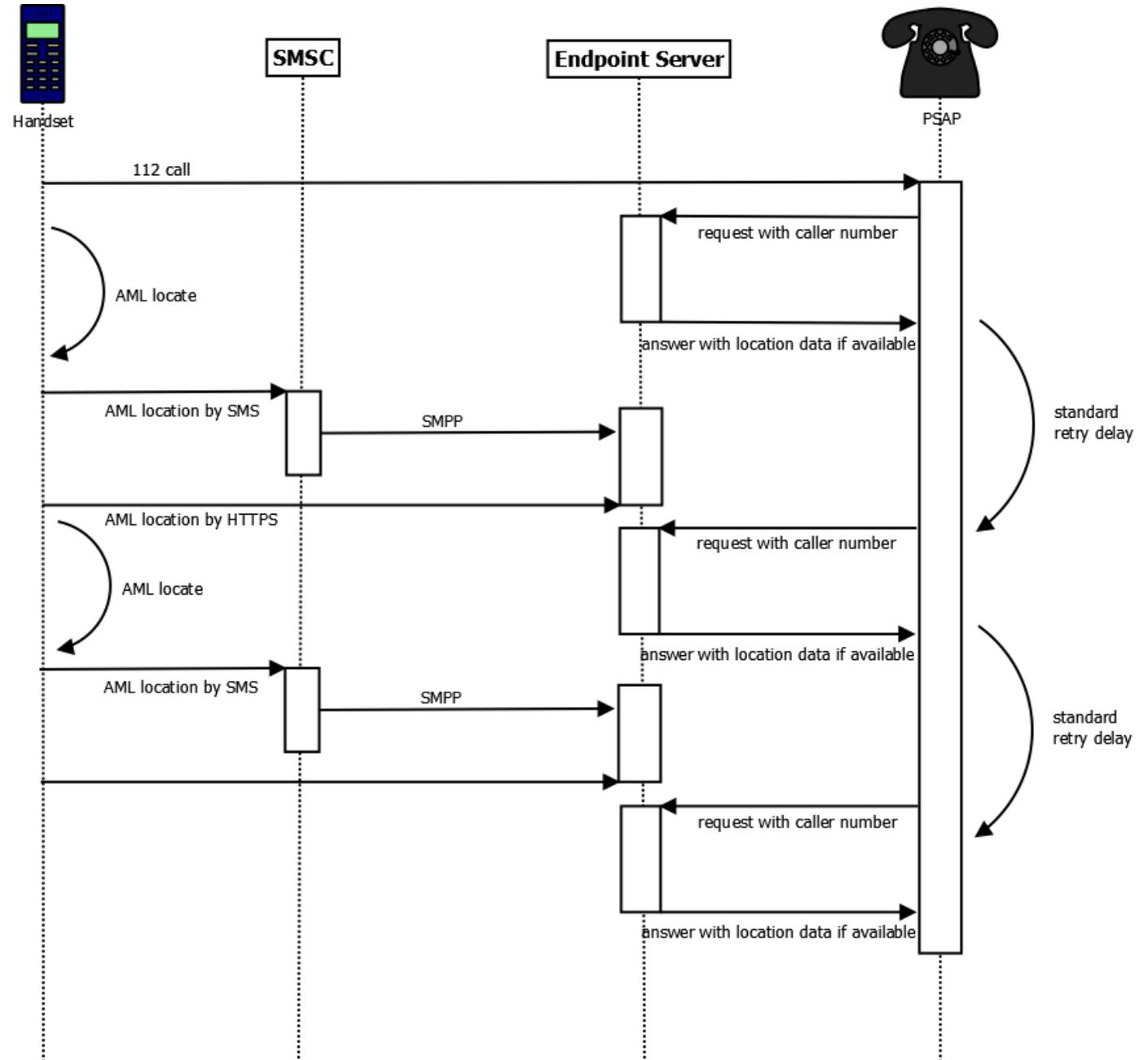
Access to location data by API

- PSAP starts request to AML endpoint

- caller number as request parameter

- AML endpoint sends answer with location data for the requested caller number back to PSAP

=> Correct device number is significant!

Security issues with HTTPS?

risk	measure
Malicious code injection, SQL injection	Check ELS data for compatibility. Refuse incompatible data. Examples: Characters in device_number may only include numbers and plus (e.g. +49171234567890) Characters in location_latitude may only include a dot(.) and numbers (e.g. 7.364758).
DDoS attack	General practice like server redundancy, monitoring, use backbone protection from provider, isolate HTTPS-Server from SMS-Server
Fake/prank data	No problem unless the ELS data is associated to a real emergency call.

Matching HTTPS and SMS

- Use device_imei as key

SMS
device_number = '+49123456789'
device_imei = '9876543210'

HTTPS
device_number = '0'
device_imei = '9876543210'

Endpoint SMS

Endpoint HTTPS

select device_number from DB
where device_imei = '9876543210'

Android
SMS

insert SMS data
in DB

add/overwrite device_number
in HTTPS dataset

yes

row exists?

insert HTTPS
data in DB

no

update device_number
on all rows
where
device_imei = '9876543210'

insert HTTPS
data in DB
(in this case with possible
missing or wrong device_number)

DATABASE

Example dataset

HTTPS

location_time	device_number	location_latitude	location_longitude	location_accuracy	location_altitude	device_languages	device_imei	...
2022-06-28 15:00:00	0	49.654321	7.123456	29	129	de-DE,pl-PL	35249411446	

SMS

location_time	device_number	location_latitude	location_longitude	location_accuracy	location_altitude	device_languages	device_imei	...
2022-06-28 15:00:00	b81a97f74e8e15190c	49.654321	7.123456	29			35249411446	

HTTPS & SMS after merge

location_time	device_number	location_latitude	location_longitude	location_accuracy	location_altitude	device_languages	device_imei	...
2022-06-28 15:00:00	b81a97f74e8e15190c	49.654321	7.123456	29	129	de-DE,pl-PL	35249411446	

Roaming

- HTTPS is a easy solution to provide AML for roaming caller.
- Data volume is very small so the costs are not significant.
- About 5% of all HTTPS datasets we receive are from roaming caller.