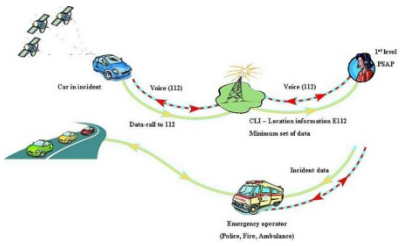
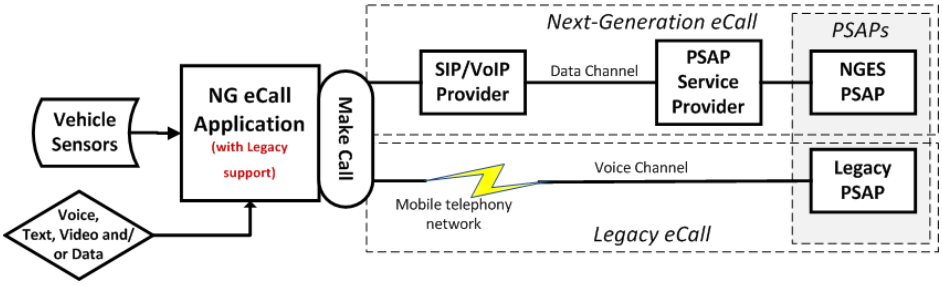
A hybrid CS-IMS solution for an In-Vehicle eCall prototype

Scope:



eCall is an in-vehicle caller device built upon the single European Emergency number (112 and E112) that, in case of a serious accident, automatically creates a voice link to the closest 112 PSAP sending a data message that uses common European standards. The EC set the eCall requirement for all new vehicles until 1st October 2017. Still, today no full integration of eCall modules has been accomplished in PSAP environments.



The eCall concept is currently deployed based on circuit switched emergency calls, specifically for 2G and 3G networks using an in-band modem. As next generation Emergency Services evolve towards a 4G communications framework, the eCall concept will be adapted as an IMS emergency call (current proposed solution for the eCall interface is SIP), hence benefiting from the resource efficient packet based systems.

- Transitioning to next generation emergency calling for eCall, provides an opportunity to vastly improve the scope, breadth, reliability and usefulness of data relative to an accident by allowing it to be transmitted during call set-up, and to be automatically processed by the PSAP and made available to the call taker in an integrated and automated way. Additionally, a PSAP call taker may request a vehicle to take certain actions, such as flashing lights or unlocking doors. Furthermore, vehicle manufacturers are provided an opportunity to take advantage of the same standardized mechanisms for data transmission and request processing (such as telemetry between the vehicle and a service centre for both emergency and non-emergency uses)). Based on a legacy eCall IVS app (developed by by the I-SENSE Research Group (http://i-sense.iccs.ntua.gr/), the NG Pan-European eCall specification [https://goo.gl/uCvKZ5] and a NG eCall IVS app (developed by by the I-SENSE Research Group (http://i-sense.iccs.ntua.gr/))based on IETF ECRIT standards RFC 8147, RFC 8148), **this diploma thesis aims** to design and implement a simple prototype that combines legacy and NG eCall functionality for the IVS client side.

Within this diploma thesis it is expected to study the considerations w.r.t transitioning to NG servises as set by the eCall 3GPP specs and implement a hybrid eCall solution which alternates between legacy eCall and NG eCall based on the system/ area connectivity. Seamless integration of the two solutions for the IVS user shall be acheived.

To facilitate the development and testing the following recources are available:

- IVS eCall SW/HW that enables an NG automated (multimedia) emergency call (open source SIP based Android app as developed in the EU-co-funded NEXES project by the isense laboratory).
- IVS eCall SW/HW that enables an automated legacy emergency call
- Real data acquisition from a research vehicle (equiped with extra accelerometer and GPS antenna) through OBDII gateway.

Required:

- Theoretical background on Mobile Communications and Networks, Multimedia Services
- Some experience with a programming language such as Python, Java, C++

Optional: Any hands-on experience with SIP will be considered an asset.

What you will learn: Familiarity with eCall data framework (mandatory for all new vehciles from April 2018), familiarity with Circuit-switched telephony, VoIP and generally IP data transport protocols and data formats in the IoT context, experience on SIP-based multimedia sharing apps.

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