



NXP automotive telematics on-board unit platform

A standard approach to eCalling

In a move to help save lives on the road, automated 'emergency call' or eCall is becoming a required vehicle option for new cars in a number of European countries in 2009. The eCall project aims to make emergency service response to road accidents as fast as possible, by transmitting GPS coordinate and other information to local services in the event of a collision. NXP supports this by offering a flexible, cost efficient platform which enables the most crash-proof eCall OBU (On-Board Unit) concept.

The European Commission (EC) officially launched the eSafety initiative in April 2002. This project brings together the EC, industry, public authorities and other stakeholders to accelerate the development, deployment and use of Intelligent Vehicle Safety Systems including eCall. By using information and communication technologies these systems should increase road safety and reduce the number of fatal accidents. A memorandum of understanding has already been signed by the majority of EU countries and an increasing number of non-EU countries.

Current estimates suggest annually there are around 43,000 deaths across Europe's road networks. Experts believe this could be reduced significantly if rescue teams were able to arrive at the scene of the accident quicker. This is especially true in accidents that occur late at night or on minor roads, where injured drivers and / or passengers are sometimes not discovered until hours later. Or in the event of a driver suffering a medical emergency such as a heart attack, where they cannot inform rescue services of their location. Vehicles fitted with eCall systems provide one way to ensure that assistance can be immediately alerted with an accurate location.

How does it work?

According to the eCall memorandum of understanding, in-vehicle eCall is an emergency call generated either manually by vehicle occupants or automatically via activation of in-vehicle sensors linked via automotive networks such as CAN. When activated, the in-vehicle eCall system will establish a voice connection directly with the relevant PSAP (Public Safety Answering Point) using the E112 emergency number. This call can be to either a public or a private eCall center operating under the regulation and / or authorization of a public body. At the same time, a minimum set of incident data (MSD) such as location, time and vehicle identifier will be sent to the eCall operator receiving the voice call.

To ensure system reliability, data transmission should be via an in band modem solution supported by ETSI (European Telecommunications Standards Institute) and MNOs (Mobile Network Operators). Systems should also offer the potential to be upgraded later to provide a Full Set of Data (FSD) such as blood type, number of passengers, car brand, etc.

A robust and cost-effective solution

Until recently, a prohibitive issue has been the cost of installing telematics systems in cars capable of supporting eCall functionality (e.g. by communicating with crash sensors). Based on our advanced Automotive Telematics On board unit Platform (ATOP), NXP's eCall concept supports both EU standards and proprietary implementations and removes the cost barrier.

By reusing high volume mobile phone technologies, this telematics platform concept delivers a very cost-effective solution supporting both in-band modem and GSM enabled eCall concepts. And as a fully integrated solution consisting of GSM/GPRS, GPS and security functions, it also greatly simplifies system integration. All relevant RF functionality is included, allowing designs requiring virtually no in-depth RF expertise, as the unit only needs to be hooked up to an external antenna. The system also features extremely flexible SIM support, addressing current uncertainties over how exactly these systems will be finally implemented.

To further ease design challenges, the solution provides an industry standard software interface based on mobile JAVA J2ME CLDC1.1 MIDP2.0 allowing safe, flexible and easy integration of customer applications.

The on-board unit helps system integrators meet the most stringent automotive requirements. For example, it is shock resistant and withstands both very high and very low temperatures. ATOP's minimal size (30 x 25 x 2 mm) allows the slimmest product implementations and as a dedicated 'black box' it offers the highest levels of robustness, enabling the most crash proof OBU concept, essential for eCall applications.

ATOP comes with fully integrated power management. Due to the advanced CMOS technologies used in ATOP, it is highly efficient and will allow long term operation even when running on back-up batteries.

With its multiple interfaces ATOP allows a flexible integration in a wide variety of car architectures. As a standalone solution, only very limited additional circuitry is required. Using the built-in USB, CAN and UART interfaces, ATOP can be integrated into navigation / infotainment systems or connectivity boxes, allowing design teams to focus on integration of the multiple air interfaces.

Multi-SIM services

Industry expectations are that an OBU platform will support multiple services in parallel, for example eCall, bCall (breakdown call) and voice calls as well as other end-user services. Specific business to business (B2B) services may require their own dedicated SIM, so any OBU platform must be able to support multiple SIMs.

In addition to supporting the traditional physical SIM for driver initiated phone services via a hardware SIM interface, NXP's ATOP platform fully supports contactless and virtual SIMs. To solve roaming issues, rather than a dedicated hardware SIM, it is also possible to use a software or virtual SIM. In this scenario, the OBU can automatically check and download a dedicated local SIM for each defined OEM or service / mobile operator of choice in each country. Our Common Criteria (CC) level 5 based SmartMX controllers provide the secure environment to download virtual SIMs and support automotive qualified multi-application environments.

The security design will also enable to securely store the very personal Full Set of Data (FSD) protecting privacy and only releasing information when required.

Support for additional secure services

NXP's platform enables eCall applications that are easy and flexible to integrate with guaranteed, highly robust and private functionality. It also offers the freedom to easily incorporate value-added and secure services for future use cases. The platform's Near Field Communication (NFC) interface allows interaction with NFC enabled infrastructure allowing various contactless card transactions and services. And with its unique security architecture, ATOP is ready to deal with future demands for road tolling as well as other secured paid services such as parking and billing services.

To deliver guaranteed privacy enhancements and secure and authenticated services, ATOP will be Common Criteria certified. One of the keys to providing secure service delivery is the capabilities of the SmartMX controller. This core supports a wide range of components including the multi-application software environment (Sandbox) that guarantees interoperability and secure co-existence of multiple parallel telematics applications.

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Date of release: June 2008

Document order number: 9397 750 16563

Printed in the Netherlands