Relevance of GNSS Simulation Performance for Emergency Call Testing Applications

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Emergency Call (eCall) systems will be mandatory in to every new car model built from 31 March 2018 and onwards [1]. It represents a solution for in-vehicle road safety which automatically calls the emergency services (pan European 112 emergency number) in case of a serious accident, even if the driver/passengers are unconscious, or by manual activation of an SOS button. According to some estimates, eCall could reduce emergency response times by 40 percent in urban areas and by 50 percent in rural areas.

A Minimum Set of Data (MSD) is transmitted as part of the eCall communication procedure between the in-vehicle system (IVS) and the relevant Public Safety Answering Point (PSAP). This data contains the exact geographic location of the vehicle, the direction of travel, the triggering mode (automatic or manual), the Vehicle Identification Number and other information to enable the emergency response teams to quickly locate and provide medical and other life-saving assistance to the accident victims.

In view of the European Commission delegated regulation 2017/79 [2], the European GNSS Agency (GSA) has launched an eCall testing campaign, together with interested eCall device manufacturers, to stimulate eCall products enabled with the European Geostationary Navigation Overlay System (EGNOS) and Galileo satellite navigation systems tested accordingly to their compatibility with the proposed regulation, [3]. From these guidelines, it is clear that positioning and navigation systems will be crucial for eCall functioning.

The solution being explored in this paper acts as low-cost functional testing validation platform for IVS units of European-compliant eCall standardized communications. The complete testbed includes GNSS signal simulation, emulation of a GSM/GPRS/UMTS base-station and PSAP built around NI USRP devices, together with LabVIEW and Linux-based applications for the main user interface. Further, it will be exemplified how the GNSS signal simulation is being accomplished within laboratory/factory environments and demonstrating recent capabilities made available for Android devices, [4], may contribute onto the performance assessment, by allowing processing of raw measurements from the in-built GNSS receiver in common smartphones.
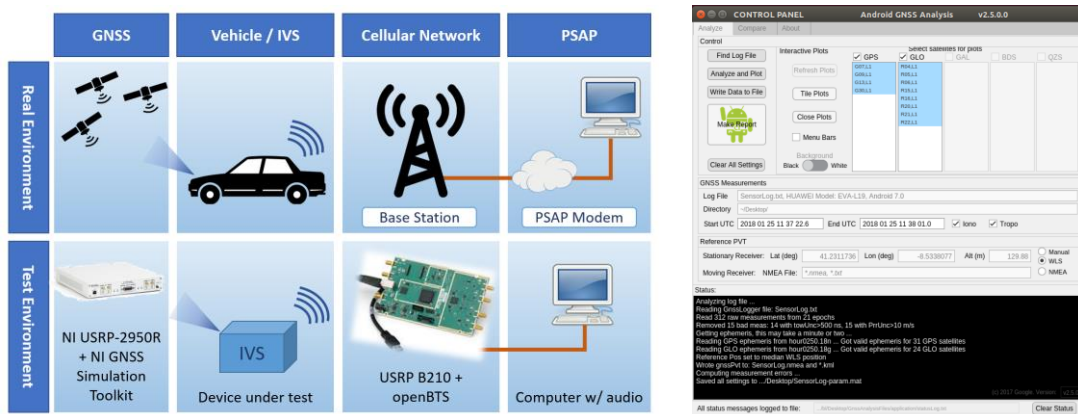

Figure 1. Overview of a functional test solution for eCall units (left) and GNSS analysis tool for Android (right)

1. White Paper, European Commission, "European Parliament makes eCall mandatory from 2018," *European Commission News*, Sophia Antipolis, 7 May 2015.

2. European Commission Delegated Regulation (EU) 2017/79, 12 September 2016.

3. White Paper, European GNSS Agency, "EGNOS/Galileo eCall Conformance Testing in EU Commission Delegated Regulation 2017/79," December 2017.

4. White Paper, European GNSS Agency, "Using GNSS Raw Measurements on Android Devices," 16 January 2018.