Keysight Technologies
E6950A eCall Conformance Test Solution

Introduction

Emergency Call (eCall) is an in-vehicle road safety system developed to reduce fatalities, injuries and property loss in the event of a road accident by speeding up the emergency response times from the rescue team. An in-vehicle system (IVS) is installed in a vehicle and this IVS will trigger a 112 emergency call, either manually by passengers, or automatically in the event of a serious road accident. Once the IVS module is successfully connected to the most appropriate Public Safety Answering Point (PSAP), a Minimum Set of Data (MSD) is transmitted. This MSD contains the vehicle registration number, GPS location, a timestamp, direction of travel, the number of passengers and triggering mode (automatic or manual). This provides valuable information to enable the rescue team to reach the accident site as soon as possible. Once the MSD has been successfully received a confirmation is sent from the PSAP to the IVS module (ACK) and the connection to the PSAP transfers to a voice call allowing emergency services to speak to the car occupants.

eCall Conformance Test Solution Challenge

eCall Conformance Test Solution is an European Union and Russian Federation initiative created to combine mobile communication and satellite positioning to provide rapid assistance to passengers in the event of a collision.

Generally, an eCall module consists of an embedded computer that continuously monitors the crash sensors and vehicle position via satellite receivers. In the event a crash sensor is activated, the in-band modem will establish a connection to enable data transmission (MSD) to the most appropriate PSAP. A microphone and speaker system enables the driver or passenger to communicate with the PSAP operator. Each of these components plays an important role, hence they need to be tested for functionality in a real world environment to ensure overall system performance.

Testing of eCall modules brings many challenges; hence, the test solution should meet the following minimum viable functionalities:

– IVS modules must comply with eCall standards
– (CEN/ETSI)
– Verify that the IVS modem is able to trigger an emergency call – both automatically and manually, and sets the eCall Flag appropriately
– Send the correct raw MSD data
– Establish a voice connection with the PSAP
– Produce logs of results/ACK/NACKS/timers for troubleshooting
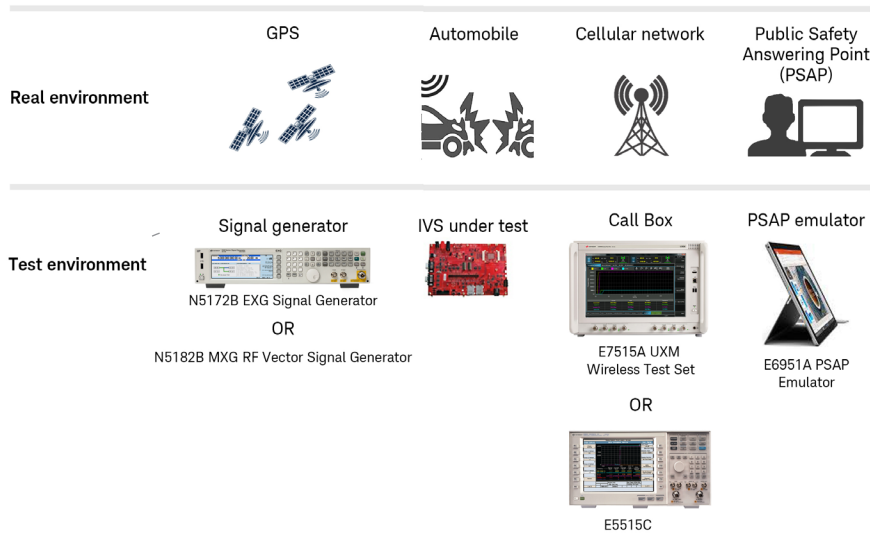– Optionally test audio quality

eCall Conformance Test Solution

The Keysight E6950A eCall Conformance Test Solution performs end-to-end functional and standard-compliance conformance testing of eCall modules, with optional audio performance analysis. The E6951A PSAP Emulator Software simulates a Public Safety Answering Point (PSAP) and controls a UXM or E5515C to emulate a cellular network and EXG to provide GNSS coordinates required by the IVS to compile the MSD. This setup makes it possible to verify if the IVS modem is able to trigger an emergency call, send the correct raw MSD data and establish a voice connection with the PSAP – fully independently of any real-world mobile network.

Solution Architecture

The Keysight eCall conformance test solution is based on the following architecture:
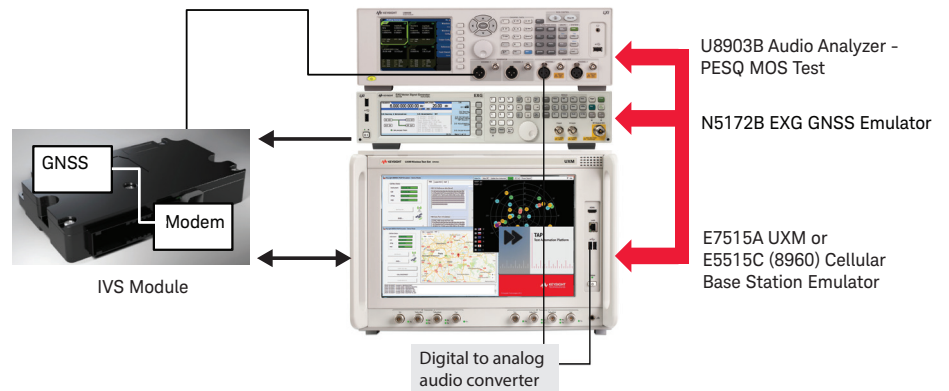
In the test environment, a signal generator provides GNSS coordinates, simulating what the satellite system does in the real environment. The IVS represents the automotive vehicle, while the UXM (or E5515C) is used to emulate a cellular network in the real world mobile network. The PSAP software can run inside the UXM, or on a separate PC when using with E5515C.

The diagram on the right shows a recommended instrument setup for eCall module functionality testing. You have the option to either generate static GNSS signals or dynamic GNSS signals, depending on N5172B EXG configuration. Please refer to the Keysight eCall Conformance Test Solution Configuration Guide for details (literature part number 5992-1726EN).

The E5515C (8960) offers the lowest entry price for an eCall solution.

Keysight also offers an option to include audio performance analysis using the U8903B audio analyzer and DAC (Digital to Analog Converter), as shown in the figure on the right:

The PSAP software runs inside the UXM. It can be optionally run on a separate PC when used with the E5515C.

Hardware Elements

With the eCall conformance test solution, you can leverage your existing/standard lab equipment, with the reassurance that the hardware acquired can be reused for many other tests and applications.

N5172B EXG
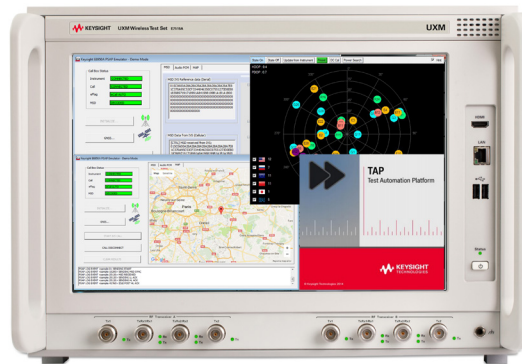
www.keysight.com/find/exg

To help you quickly create signals that meet the needs of specific standards and measurements, the EXG is compatible with Keysight Signal Studio software. Its suite of signal-creation tools addresses cellular communications, wireless connectivity, audio, video, positioning, tracking and general-purpose applications.

E7515A UXM
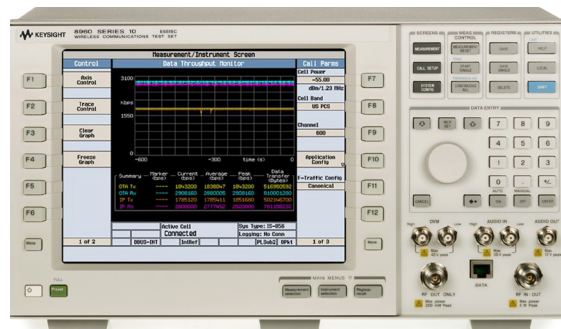
www.keysight.com/find/uxm

The UXM is a highly-integrated signaling test set created for functional and RF design validation in the 4G era and beyond. It provides the integrated capabilities you need to test the newest designs, delivering LTE-Advanced Pro data rates up to 1 Gbps now and handling more complex require-ments later. When the team counts on you to know when a new chipset or UE will pass, count on the UXM to help you make a clear call.

E5515C 8960 Series 10 Wireless Communications Test Set

www.keysight.com/find/e5515c

The E5515C 8960 wireless communications test set is the world's most trusted solution for 2G and 3G wireless device manufacturing and RF design and verification.
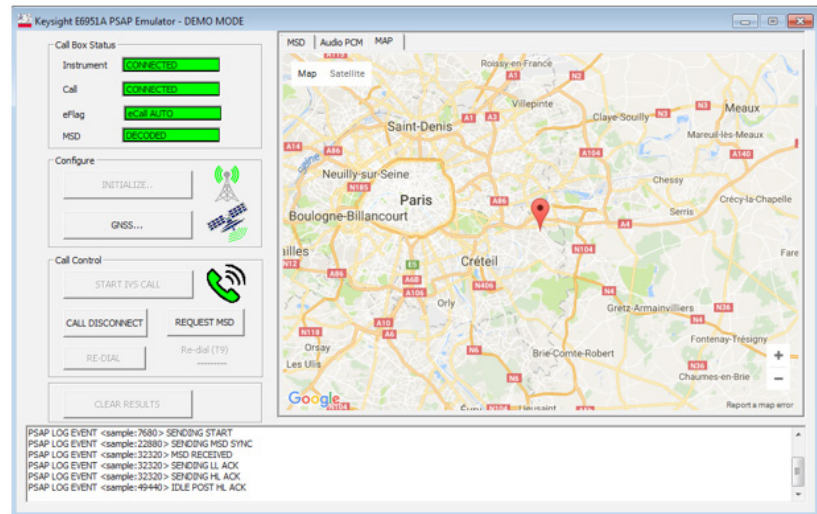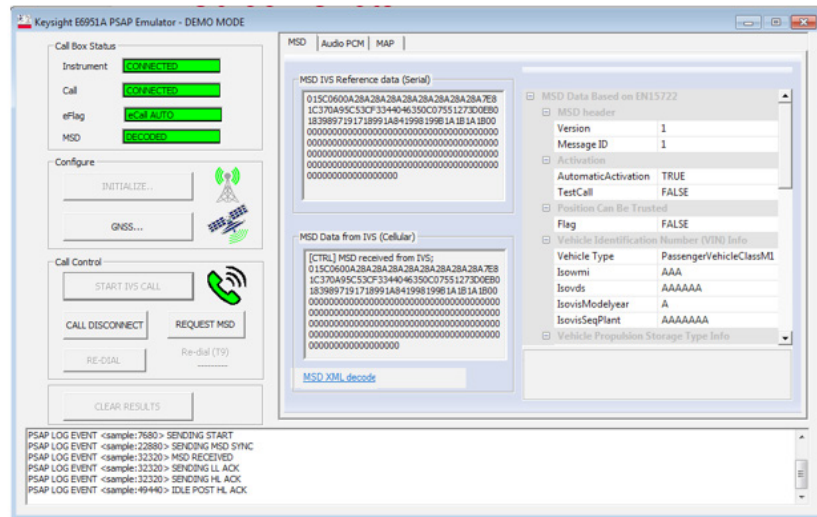
U8903B Audio Analyzer

www.keysight.com/find/u8903b

Make multi-functional and higher performance audio measurements with the U8903B audio analyzer. With extremely low residual distortion of < -110 dB, the U8903B allows you to measure the most demanding audio devices with high accuracy. Perform audio measurements via a *Bluetooth*® link with the new *Bluetooth* option, and make the highest resolution two-channel measurements available when you expand your bandwidth to 1.5 MHz. With these options and more, the U8903B audio analyzer offers you a configurable audio test solution to meet your specific audio application needs.
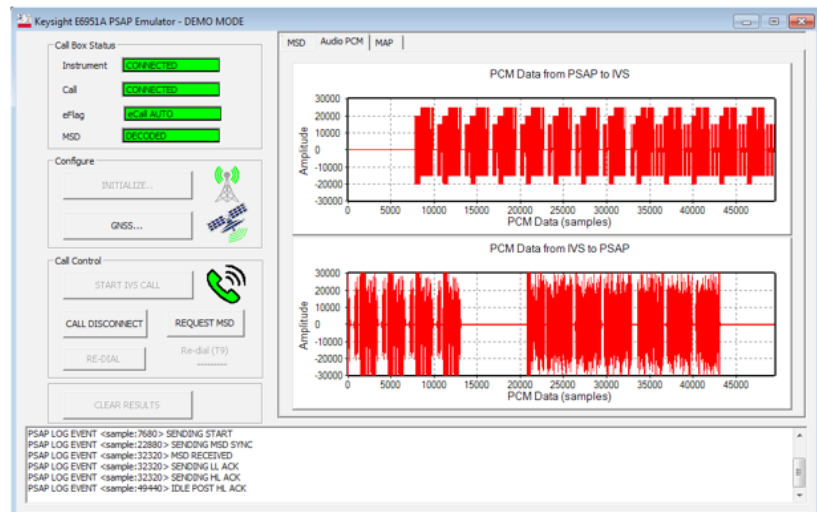
Software Elements

E6951A Public safety answering point (PSAP) software can be installed in the UXM or run separately on a PC. It is used to decode MSD data and respond to the IVS.

- Software has a simple UI and each button is activated only when it is required.
- Simply hook up and run - message details covering when IVS is in eCall communication will be displayed.
- You can check every MSD line item to verify that IVS is reporting accurately.

E6951A PSAP software also can indicate location using decoded MSD data, with zoom in/zoom out and movable drag functions.

E6951A PSAP Audio: Audio PCM data displaying and recording

Evolving

Our unique combination of hardware, software, support, and people can help you reach your next breakthrough. We are unlocking the future of technology.

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