Accelerating Verification of the Advanced In-Vehicle Emergency Call System "Hybrid eCall"

Why HYUNDAI MOBIS Has Selected Anritsu's All-in-One Test Solution

HYUNDAI MOBIS Co., Ltd.

All-in-one Anritsu solution enables the efficient testing of Hybrid eCall/NG eCall/eCall systems.

Anritsu's comprehensive technical support contributed to the establishment of a test environment for Hybrid eCall systems while improving their development and verification processes.

HYUNDAI MOBIS

Overview

HYUNDAI MOBIS Co., Ltd., a global automotive parts vendor, is actively integrating Hybrid eCall and Next Generation eCall (NG eCall) capabilities into its products to meet regulatory requirements and drive technological innovation, particularly in the European market. In the early development stages, HYUNDAI MOBIS faced several challenges, including securing test solutions, deepening their understanding of 4G/5G communication technology and related mobile communication protocols for call initiation, and overcoming the limitations of network simulation environments.

As the company recounts, Anritsu's eCall test solution, specifically the eCall Tester MX703330E and Signalling Tester MD8475B, has been instrumental in addressing these challenges during development. By establishing these test environments for Hybrid eCall, leveraging the automated conformance testing and advanced log analysis capabilities, HYUNDAI MOBIS was able to quickly identify the root causes of operational issues. Furthermore, by sharing the test environment between the development and verification teams, they significantly improved the reliability and efficiency of both processes. They have enhanced their Hybrid eCall verification capabilities, ensuring greater safety for the future of mobility through their partnership with Anritsu.

For this article, Anritsu interviewed Mr. Jinseong Lee, a researcher and engineer at HYUNDAI MOBIS's Electronic Control Test Team. Mr. Lee explained how Anritsu solution is utilized in Hybrid eCall and NG eCall-supported products. He also described how advanced test solution have enhanced the quality and safety of eCall-supported products, bringing significant value to the entire development and verification processes.

—— Could you please introduce HYUNDAI MOBIS to our readers?

Lee: HYUNDAI MOBIS is a global automotive parts vendor, striving to lead in the era of smart mobility by focusing on autonomous driving, connectivity, and electrification as our core pillars. We base our business on three major modular automotive components, such as chassis, cockpit, and front-end modules, to deliver a safe and comfortable driving experience, as well as provide the optimal service parts tailored to meet the diverse needs of our customers.

Our vision is to drive innovation in mobility by seamlessly integrating software and hardware, keeping us at the leading edge of the industry's transformation. To realize this vision, we capitalize on our strengths in research, development, and manufacturing. Beyond enhancing smart mobility, we are also proactively entering new fields such as robotics.

—— What are your primary responsibilities?

Lee: I am responsible for the comprehensive verification of the eCall functionality integrated into our company's Data Connectivity Unit (DCU). My primary duties include conducting conformance testing in accordance with EU regulations and ETSI standards, verifying functionality across different network environments, and ensuring interoperability with Public Safety Answering Points (PSAPs).

In addition, I design test scenarios, analyze errors, prepare detailed test reports, and draft the technical evaluation documents required for certification. To facilitate these processes, I utilize Anritsu's advanced test solution to perform simulations and troubleshooting, ensuring thorough verification of the eCall functions. I also collaborate closely with our development team, providing feedback and support to enhance product quality. I am also involved with the verification of the next-generation IP-based eCall functionality, known as NG eCall (Hybrid eCall).

HYUNDAI MOBIS's NG eCall product, which undergoes thorough testing utilizing Anritsu's advanced test solution

—— Could you tell us about your company's products?

Lee: Our products have Hybrid eCall functionality, which supports both traditional Circuit-Switched (CS) networks and the latest IP-based NG eCall networks. While the industry is transitioning from the CS eCall to the more advanced NG eCall, CS-based networks are still in use in certain regions. Therefore, support for Hybrid eCall is essential. This feature enables us to provide highly reliable and uninterrupted service across different networks and allows us to flexibly comply with various regulations, making it a significant strength of our products.

—— On the other hand, how is the situation with NG eCall?

Lee: We have also adopted NG eCall. As I mentioned earlier, the conventional eCall is based on 2G/3G CS technology, but 2G and 3G networks are being phased out across Europe. Furthermore, starting in 2026, all new vehicle models offered in EU member states that undergo type-approval testing will be required by EU regulations to implement NG eCall using 4G networks. Compared to the original eCall, NG eCall enables faster voice calls and allows the simultaneous transmission of the Minimum Set of Data (MSD). This greatly improves emergency response capabilities. To maintain service continuity and enhance future safety features, we believe that NG eCall implementation is essential and are therefore incorporating it into our products.

—— Could you share the reasons why you selected Anritsu's test solution for Hybrid eCall verification?

Lee: There were two main reasons why we selected Anritsu's testing solution.

1) Comprehensive Hybrid eCall testing with an all-in-one test solution

Previously, separate test solutions were required to evaluate Hybrid eCall, NG eCall, and eCall. However, by combining Anritsu's software-based eCall Tester MX703330E with the Signalling Tester MD8475B hardware, all three types, that is, Hybrid eCall, NG eCall, and eCall, can now be evaluated using a single, comprehensive test solution. This reduced both our initial investment and operational burden, making the required verification process much more efficient.

2) Enhanced collaboration and efficiency using the same test solution as our development team

Sharing the test solution with our development team makes it much easier to reproduce issues and identify their root causes. Additionally, Anritsu's clear setup guides have significantly accelerated our software update and debugging processes. As a result, we have made smooth progress in developing high-quality eCall systems.

—— What technical challenges did you face in verifying Hybrid eCall? How did you overcome them?

Lee: During the verification of Hybrid eCall, we encountered and overcame several technical challenges:

1) Accessing a Suitable Verification Environment for Hybrid eCall

One major challenge was obtaining the necessary test solution for Hybrid eCall verification. Thanks to Anritsu's support, we gained early access to their MX703330E, MD8475B, and beta firmware versions. This early access enabled us to conduct verifications before the official software release, to confirm Hybrid eCall-related software updates during development, and execute conformance tests. The test solution has significantly improved our software quality.

2) Building Expertise in 4G/5G Mobile Communications and SIP Signaling

In addition to our own research, we deepened our understanding by utilizing Anritsu's test solution. By analyzing the operation of the Session Initiation Protocol (SIP) protocol using the Sequence Log feature of the test solution, we gained a practical understanding. Furthermore, we organized setup procedures based on the provided manuals and repeatedly conducted network simulations with on-site support and phone consultations with Anritsu's staff. Thanks to this support, we steadily acquired the mobile communications knowledge required for eCall verification.

3) Simulating Different Network Environments for Evaluation

By leveraging the Handover functionality and cell configuration capabilities of the MX703330E and MD8475B, including signal strength adjustment, ECL settings, and service in/out controls, we were able to simulate a wide range of network scenarios. This enabled us to recreate an evaluation environment that closely reflects real-world operation, allowing us to respond promptly and effectively verify the software.

—— After implementing Anritsu's test solution, what changes did you observe in your development and verification processes?

Lee: Unfortunately, we do not have quantitative data at this time, but I would be happy to share our experiences from a qualitative perspective.

1) Seamless Compatibility Between DCU and Testing Environment

First and foremost, the compatibility between our DCU and the test environment has been exceptionally high. We encountered no significant issues interfacing the product with our hardware. The test environment was configured quickly, and we achieved stable operation right from the initial phase of implementation. Additionally, by introducing the Hybrid eCall Option, we have been able to conduct reliable, repeated testing in the laboratory. As a result, we have not only developed a normal testing environment, but we have also been able to create a semi-normal environment, expanding our evaluation scope and greatly increasing our flexibility.

2) Automation of Conformance Testing

Furthermore, we have achieved automation of the conformance testing. The test scenarios were constructed using SmartStudio Manager (SSM) MX847503A. This has also allowed us to automate our network simulations. We can provide rapid, reliable test results and evidence, therefore contributing to the enhancement of development efficiency and product quality.

3) Clear Log Supporting Collaboration with Development Team

In addition, when issues occur, reviewing the sequence and message logs of the test solution allows us to immediately determine whether the issue is due to device settings or the hardware itself. This capability enables us to quickly and accurately provide feedback to our development team, significantly reducing the time required for root cause analysis and problem resolution.

—— Did you face any challenges when integrating the existing systems in your laboratory with the MX703330E?

Lee: We received tremendous support from Anritsu from the program installation stage, which allowed us to establish the test environment very smoothly. One unexpected issue was that the USIM card initially provided for the device was not compatible with Test eCall.

The conformance test and product functionality verification required us to perform Test eCalls. Anritsu responded swiftly by supplying us with a USIM card that supported Test eCall functionality. As a result, the issue was resolved quickly, and we managed to continue our testing without delay. Additionally, we did not encounter any significant problems with compatibility with our existing DCU evaluation setup. We remain extremely satisfied with the overall experience.

—— Could you share your impressions and thoughts on the strengths of Anritsu's test solution, based on your experience with implementing them?

Lee: I believe the greatest appeal of Anritsu's test solution lies in its high reliability and stability. Anritsu's solution, including the MD8475B, is widely recognized for its long-standing use in multiple fields and its industry-leading stability. In our own verification processes, the reliability of the solution has allowed us to focus on analyzing hardware issues, which has been a tremendous help.

Additionally, we have been very impressed with Anritsu's technical support during the establishment and operation of our test environment, as it has been both prompt and precise. For example, Anritsu is always receptive to our requests, such as preparing USIM cards and developing tools for generating conformance test reports for us. This robust support system is a major reason why our engineers feel confident that Anritsu is a dependable partner that they can turn to immediately, enabling them to proceed with their work with peace of mind.

—— What additional expectations do you have for Anritsu's support?

Lee: We hope to see further expansion of Anritsu's official offline training programs covering tester operation and basic knowledge. Currently, we learn how to operate the tester through on-site support, telephone and email communications, and the manuals provided by Anritsu's representatives. However, sometimes our understanding remains fragmented. To gain a deeper understanding, we feel that practical offline training and easy-to- follow quick guides would be invaluable. With this kind of training behind them, engineers introducing new solutions would be able to do so with significantly less initial setup time while being more proficient with the equipment, leading to more efficient utilization.

—— Could you share any particularly memorable experiences or episodes from this collaboration?

Lee: One episode that stands out to me is the provision of a reporting tool, including testers' logs. The initial conformance test reports could not be presented as objective evidence to certification bodies and relevant departments, so further improvements were needed. When we asked Anritsu to enhance the reports, they listened carefully to our needs. Upon delivery of the Hybrid eCall Option firmware, Anritsu had updated the reporting tool so that we could create highly reliable reports that included logs from the MX703330E. As a result, we were able to present our verification results more clearly and convincingly. This was a huge benefit of our collaboration.

The NG eCall verification environment, utilizing Anritsu's test solution, and Mr. Jinseong Lee, who kindly participated in the interview

—— In which areas do you expect HYUNDAI MOBIS to further collaborate with Anritsu in the future?

Lee: We have high expectations for the following points in particular:

1) Promoting Test Automation

We are currently prioritizing the stabilization of manual testing. Looking ahead, we plan to introduce automated verification using SSM functionality where feasible, gradually. In doing so, we look forward to technical support from Anritsu, drawing on their automation expertise and providing flexible assistance that addresses challenges at the site. We hope Anritsu will proactively collaborate with us on our new initiatives so that, together, we can build a partnership that enables mutual growth.

2) Exploring Additional Evaluation Functions

Beyond the eCall functionality, we recognize the potential of Anritsu's test solution to support evaluation features, including SMS transmission and throughput measurement. While we are still finalizing the details of these functions, we are eager to proactively consider utilizing them to maximize the value of the equipment. In doing so, we aim to broaden the scope of evaluation, enable a more multifaceted analysis of product performance, and ultimately contribute to the development of even higher-quality products.

Anritsu's test solution plays a vital role in addressing challenges and improving operational efficiency for engineers involved in the certification of automotive eCall systems. Through ongoing collaboration between our companies, we look forward to creating new value for the automotive industry.