

Development of Test Solution for Next-Generation eCall

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[Summary]

In Europe and other countries, eCall (emergency call) systems have long been operated to speed up life-saving assistance by automatically alerting emergency services when a car accident occurs. As mobile networks transition from W-CDMA/GSM to LTE/NR, a new NG eCall (Next Generation eCall) standard has been developed and type approval based on NG eCall has become mandatory from January 2026 in Europe. To obtain type approval, in-vehicle modules must pass the NG eCall conformance test (EN 17240:2024 standard). Since eCall relies on emergency call functionality, pre-verification using real mobile network connections is impractical, making a simulator-based test environment essential. Anritsu offers an NG eCall test solution in compliance with the NG eCall conformance test. Meanwhile, Europe has growing demand for Hybrid eCall—a combination of NG eCall and legacy eCall—aimed at expanding network coverage. Alongside this, demand for simulator-based test environments is also growing. Anritsu was the first company in the industry to provide a test solution supporting the Hybrid eCall conformance test (EN18052:2025 standard).

1 Introduction

The original eCall system was developed in Europe and various countries subsequently built their own systems based on the European standard. While there are multiple standards for eCall, the basic process is that when eCall is triggered, an emergency call is made between the in-vehicle system (IVS) and the Public Safety Answering Point (PSAP).

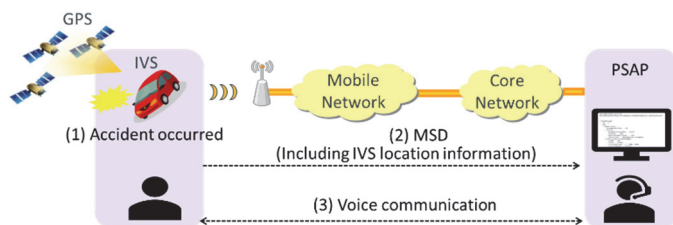


Figure 1 eCall Outline

(1) Accident Occurrence

When an accident occurs, an eCall-equipped vehicle automatically initiates an emergency call to the PSAP, triggered by the strong impact or sudden stop.

(2) MSD Message Sent

Accident data known as the MSD (Minimum Set of Data), which includes the vehicle's location, is transmitted to the PSAP, which then uses the received information to support rescue assistance.

(3) Voice Call

Once the MSD transmission is complete, a voice call is established with the PSAP using the microphone and speaker in the vehicle.

European eCall uses W-CDMA/GSM as its communication standard, transmitting MSD and voice data over PSTN (Public Switched Telephone Network). eCall has been mandatory in all newly registered vehicles in Europe since January 2018.*

NG eCall (Next Generation eCall) is being developed as a replacement for the conventional eCall system, with type approval under NG eCall becoming mandatory from January 2026. It uses LTE/NR (New Radio) as its communication standard and uses SIP (Session Initiation Protocol) and RTP (Real-time Transport Protocol) for communication with PSAPs. These upgrades offer improved voice quality and greater data reliability. Meanwhile, due to incomplete LTE network coverage in parts of Europe, as well as the extended continued operation of W-CDMA/GSM networks, there is growing interest in Hybrid eCall — a technology that combines NG eCall with conventional eCall to bridge the gap between the two systems.

Since eCall handles emergency calls, pre-deployment testing over live mobile networks is difficult. As a result, there is strong demand from automobile makers, in-vehicle device vendors, and module vendors for a simulator environment that can be used for testing purposes. To address this need, the following eCall test solutions have been developed. While eCall, NG eCall, and Hybrid eCall are all systems standardized in Europe, other countries have also developed their own variants based on the European standards. One example is South Korean eCall.

Table 1 eCall Test Solution Support Status

Region	Name	Support Status
Europe	eCall	Supported
Europe	NG eCall	Supported
Europe	Hybrid eCall	Supported
S. Korea	South Korean eCall	Supported

This paper describes the details of NG eCall and Hybrid eCall development in Europe which have been the focus of recent attention.

* Existing eCall provisions were abolished in January 2026 when EU NG eCall became mandatory.

2 Standards

The standards for eCall, NG eCall, and Hybrid eCall in Europe are developed by CEN (European Committee for Standardization) and ETSI (European Telecommunications Standards Institute). In-vehicle module vendors must pass the conformance tests defined by CEN/ETSI to demonstrate that the eCall functionality implemented in their modules complies with these standards. The conformance test standards are divided into test items for in-vehicle systems and test items for PSAPs. Our developed NG eCall and Hybrid eCall test solutions satisfy both sets of test items.

2.1 EN17240:2024 Specification

EN17240:2024 is the conformance test standard for European NG eCall. Since NG eCall must be fitted to all newly registered vehicles from January 2026, in-vehicle systems must pass the EN17240:2024 in-vehicle system test items prior to vehicle type approval testing.

2.2 EN18052:2025 Specification

EN18052:2025 is the conformance test standard for European Hybrid eCall. Although fitting of Hybrid eCall to all newly registered vehicles has yet to be mandated (as of December 2025), in-vehicle systems manufacturers are very interested due to its effectiveness in expanding coverage, and demand for testing is increasing. While EN17240:2024 testing is conducted in an environment with only LTE cells, EN18052:2025 testing is conducted in an environment with both LTE cells and either W-CDMA or GSM cells.

3 Market and Customers

The eCall test solution is primarily used for in-vehicle system conformance testing (e.g. EN17240, EN18052).

Users: Automotive manufacturers, in-vehicle device vendors, module vendors

Use Case 1: In-vehicle system conformance testing (EN17240, EN18052)

Use Case 2: In-vehicle system eCall functional testing (mobility, semi-normal testing)

Use Case 3: Vehicle type approval testing

4 eCall Test Solution System Configuration

The eCall test solution consists of the MX703330E simulating the PSAP functions, the MD8475A/B, MT8000A, and MX800070A simulating mobile communication network base stations, and the MX847503A test automation tool.

The MX703330E test functions are compatible with different eCall standards, so users can test based on their specific standard. The MD8475B and MT8000A pseudo-base stations support W-CDMA/GSM/LTE and LTE/NR, respectively.

The MX847503A tool automates manual test operations and PASS/FAIL evaluation; test execution is automated by running test packages incorporating various test sequences. We are developing test packages supporting in-vehicle system conformance tests, including NG eCall and Hybrid eCall.

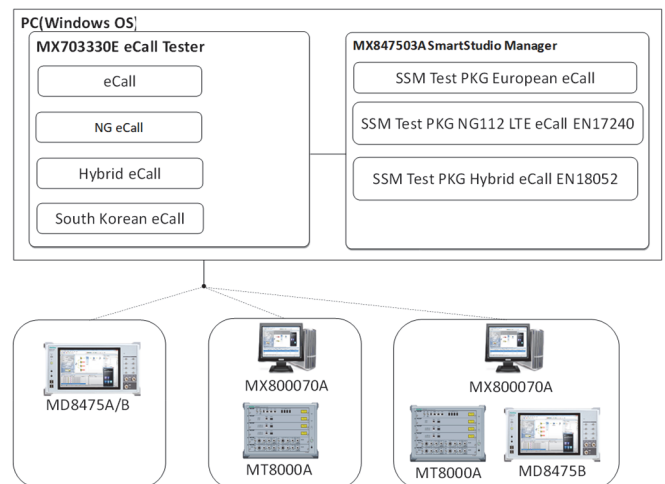


Figure 2 eCall Test Solution System

5 NG eCall Test Solution

The following three functions are the key technical requirements for an NG eCall test solution meeting the NG eCall conformance test standard (EN17240:2024).

- Pseudo-base station function
- PSAP NG eCall Semi-Normal Function
- PSAP NG eCall In-band Function

5.1 Pseudo-base Station Function

When an in-vehicle system connects to an LTE cell, the base station transmits control signals necessary for connecting the in-vehicle system to the LTE cell. These control signals are called Broadcast Information. It includes the “eCall over IMS Supported (ECL)” parameter defined in 3GPP TS36.331 Release 14 and later. The ECL parameter indicates whether an LTE cell supports NG eCall connectivity. NG eCall conformance test items verify that the behavior of the in-vehicle system changes according to the value of this ECL parameter. To address this, we implemented a function in the pseudo-base station equipment that enables transmission of Broadcast Information with configured ECL parameter.

When an in-vehicle system requests connection to an LTE cell, the LTE cell may reject the connection sometimes. NG eCall conformance test items verify the behavior of the in-vehicle system when connection is rejected. To support this test function, we implemented a connection rejection function on the pseudo-base station side. Figure 3 shows a reference example. The pseudo-base station responds to a connection request from the in-vehicle system (NAS: PDN Connectivity Request message) by returning a connection rejection (NAS: PDN Connectivity Reject message), thereby rejecting the connection.

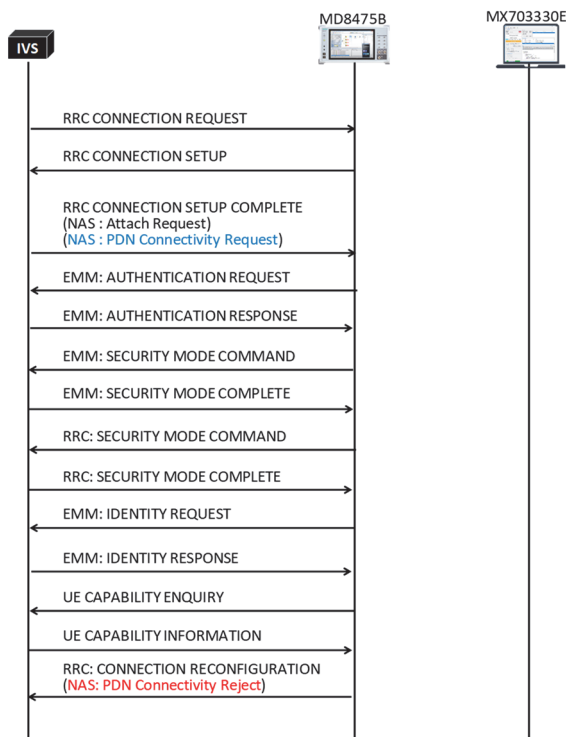


Figure 3 Connection Rejection Function

5.2 PSAP: NG eCall Semi-Normal Function

When an in-vehicle system requests an NG eCall connection to a PSAP, the PSAP may reject the connection sometimes. NG eCall conformance test items verify the behavior of the in-vehicle system when connection is rejected; this testing is called “NG eCall semi-normal testing”. The NG eCall connection request from the in-vehicle system to PSAP is made via SIP. To support this test function, the NG eCall semi-normal test function has been implemented in the MX703330E. Figure 4 shows the sequence when NG eCall connects normally.

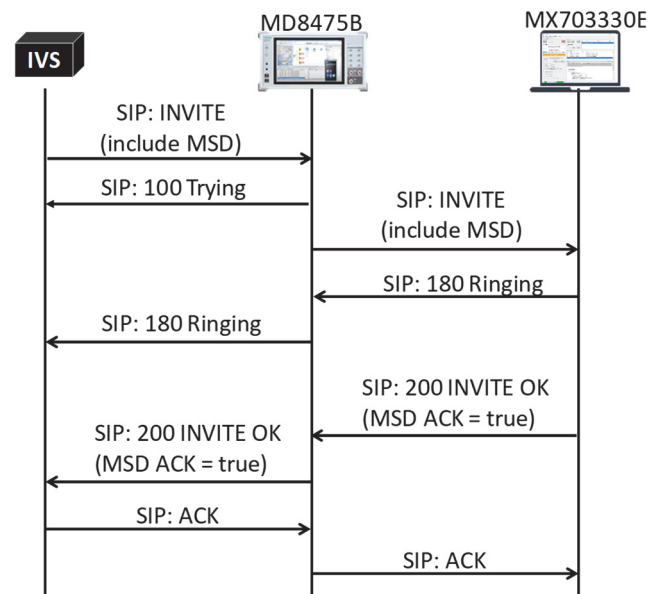


Figure 4 Normal NG eCall Sequence

Figure 5 shows an example of the sequence when the NG eCall semi-normal function is used. The PSAP returns SIP: 486 Busy in response to an NG eCall connection request (SIP: INVITE) from the in-vehicle system, thereby rejecting the connection.

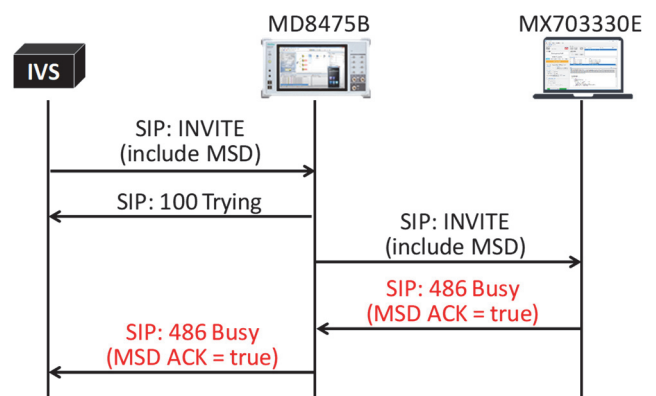


Figure 5 NG eCall Semi-Normal Sequence

5.3 PSAP: NG eCall In-band Function

While the in-vehicle system supports both legacy eCall and NG eCall, the PSAP may only support legacy eCall. The in-vehicle system first attempts to connect to the PSAP using NG eCall, but upon receiving a specific connection rejection message from the PSAP, it switches to legacy eCall while remaining on the LTE network and attempts to continue communication. In this case, both the in-vehicle system and the PSAP modulate the MSD into audio data using the “in-band modem” used by legacy eCall, map it to RTP, and transmit it. This behavior is called “NG eCall In-band.”

The NG eCall conformance tests include test items to verify that the NG eCall In-band functionality of the in-vehicle system operates correctly. To support this test item, the MX703330E implements the NG eCall In-band functionality. Figure 6 shows the behavior of the in-vehicle system and the MX703330E during the transition from NG eCall to NG eCall In-band.

When using Hybrid eCall, both eCall connection requests and NG eCall connection requests are sent from the in-vehicle system to the PSAP. Therefore, the PSAP must simultaneously listen for both types of connection requests. To meet this requirement, we implemented a simultaneous standby function in the MX703330E. Additionally, to allow users to easily check the connection status of the PSAP, we implemented a function to display the connection status on the MX703330E PSAP Status screen.



Figure 7 MX703330E PSAP Status Screens

6 Hybrid eCall Test Solution

Testing Hybrid eCall conformance (EN18052:2025 standard) in a simulated environment, requires a pseudo-base station supporting LTE, W-CDMA/GSM, and NR. A simulation environment satisfying the standard requirements was constructed by combining the MD8475B supporting W-CDMA/GSM/LTE with the MT8000A supporting NR/LTE.

7 NG eCall/Hybrid eCall Conformance Test Package

The NG eCall conformance tests (EN17240:2024 standard) and Hybrid eCall conformance tests (EN18052:2025 standard) contain a large number of test items, and each test procedure is complex. The test automation tool MX847503A handles external control of the MX703330E.

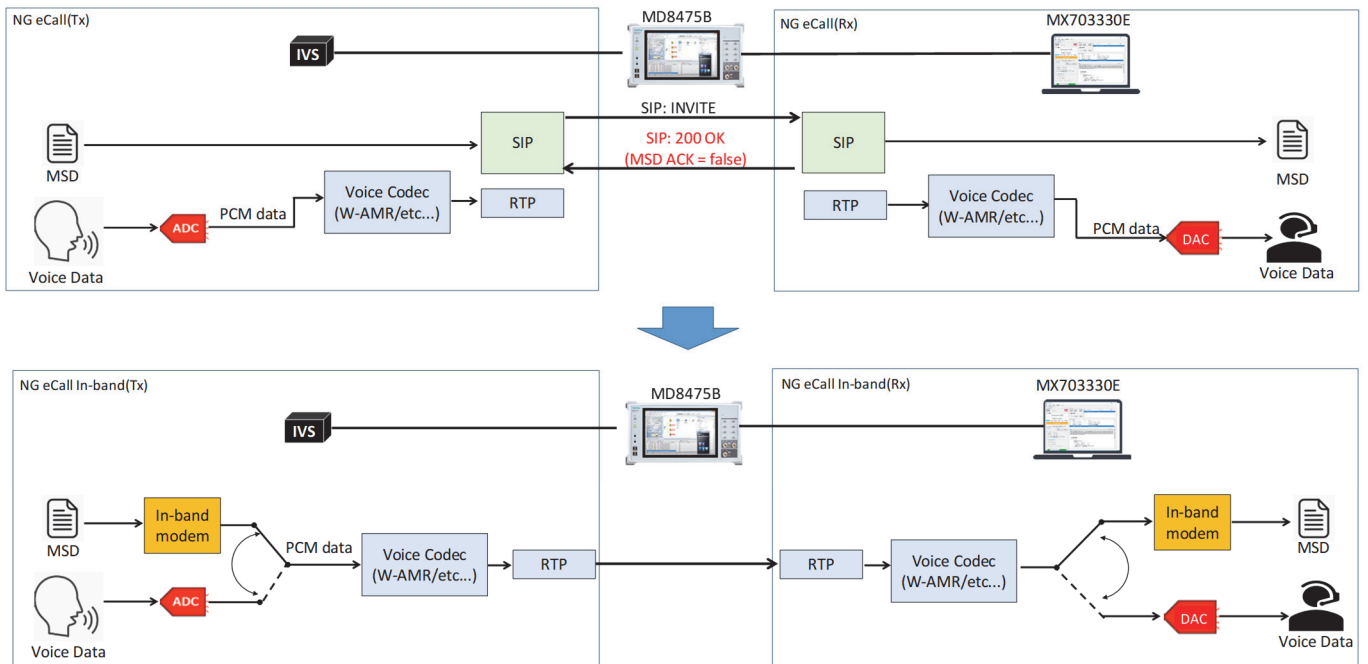


Figure 6 NG eCall In-band Operation

Automated eCall testing is achieved by creating the MX703330E GUI operation and test verification procedures as test cases that run on the MX847503A. This collection of MX847503A test cases is called a test package. We have developed a test package product supporting both the NG eCall conformance tests (EN17240:2024 standard) and the Hybrid eCall conformance tests (EN18052:2025 standard).

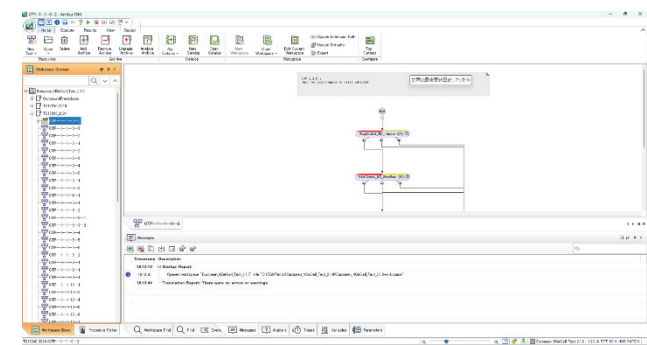


Figure 8 Test Case Execution Screen (EN17240:2024)

The test package saves test results as log data and can generate test reports from that log data. Reports can be output and saved in PDF format.

TS17240_2024 Test Report				
Test Title:CTP--1--1-18--7				
Model Name:				
Test Date:2025/07/25 11:43:04				
Author:				
Test Result:FAIL				
Test Items:	No.	Test Item	Result	Remark
	1	Initiate an automatic eCall	-	
	2	IVC sends a SIP INVITE message, which contains MSD with additional data from Euro NCAP TB 040:2022	-	
	3	Answer the call	-	
	4	Format for the additional data complies with Euro NCAP TB 040:2022, clause 6.3.2 and Annex A 2	Pass	
	5	Content of the oid field is set to 8.1	Pass	MSD No.1
	6	Contents of the named mandatory additional data fields are correct and comply with Euro NCAP TB 040:2022, clause 6.3.2 and Annex A 2	Fail	MSD No.1
		Contents of the named optional field is correct (if included) and complies with Euro NCAP TB 040:2022, clause 6.3.2 and Annex A 2		
MSD Items:				
MSD No.1				
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100				
	Field	Data	Remark	
	messageId	3		
	messageIdentifier	1		
	automaticActivation	TRUE		
	testCall	FALSE		
	positionCanBeTrusted	TRUE		
	vehicleType	passengerVehicleCategoryM1		
	isocmi	RM9		
	isocvda	VDSYDS		
	isocvdaModelYear	Y		
	isocvdaPlant	A123456		
	gasolineTankPresent	TRUE		
	dieselTankPresent	FALSE (Default)		
	compressedNaturalGas	FALSE (Default)		
	liquidPropaneGas	FALSE (Default)		
	electricEnergyStorage	FALSE (Default)		
	hydrogenStorage	FALSE (Default)		
	otherStorage	FALSE (Default)		
	timestamp	1576205301		
	positionLatitude	173881200		
	positionLongitude	41822520		
	vehicleDirection	30		
	latitudeDeltaM1	0		
	longitudeDeltaM1	0		

Figure 9 Test Report (EN17240:2024)

8 Conclusions

To meet growing demand for NG eCall and Hybrid eCall testing, which are becoming the mainstream in Europe, Anritsu has developed an eCall test solution supporting both

the NG eCall conformance tests (EN17240:2024 standard) and the Hybrid eCall conformance tests (EN18052:2025 standard). Furthermore, a test package has been developed as a test automation solution that enables users to perform conformance tests easily.

eCall is an important system for enabling rapid assistance in the event of a traffic accident. Development and adoption of new standards is expected to accelerate as transportation infrastructure continues to advance across countries worldwide. Anritsu is continuing efforts to build a safe mobile society by anticipating global safety requirements and standards trends and providing test solutions.

References

- 1) EN17240:2024 Intelligent transport systems - ESafety - ECall end to end conformance testing for IMS packet switched based systems
- 2) EN18052:2025 Intelligent transport systems - ESafety - ECall end to end conformance testing for eCall H LAP in hybrid circuit switched/packet switched network environments

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