Revised proposal for AECS (eCall) test condition of a new 07 series of amendments to UN Regulation No. 10 (Electromagnetic compatibility)

The text reproduced below was prepared by the experts from Japan with the aim to introduce additional test condition for AECS (eCall) subject to UN Regulation No. 10. This document is a revised version of ECE/TRANS/WP.29/GRE/2023/27. The modifications to the existing ECE/TRANS/WP.29/GRE/2023/27 proposal text are marked in bold and <mark>yellow</mark> for new and strikethrough and <mark>yellow</mark> for deleted characters.

I.   Proposal

Annex 6, paragraph 2.1.1.2., amend to read:

" Emergency calling systems " vehicle test conditions	Failure criteria
[When an emulated or public network is used：	**[When an emulated or public network is used：**
Accident Emergency Call Systems (AECSs) shall be tested over the air transmission for MSD and voice call via a real PLMN or via a network simulator and using a private safety answering point (PSAP).	**The MSD emission assessment shall include the verification of at least the following:** **vehicle location data is transmitted correctly, and** **time stamp is transmitted correctly, and** **vehicle identification number is transmitted correctly.**
A manual triggering and operation assessment after and before the test should be performed.	**The hands-free voice communication assessment (subjective test) shall include verification of the following:**
During the test, the warning signal device (tell-tale that provides a failure indication) should be monitored.	**Voice originating inside the vehicle can be clearly heard by the remote listener with satisfactory intelligibility, and**
SIM call number should be changed to dedicated PSAP number in order to avoid false calls to the emergency services.	**Speech of the remote speaker can be clearly heard in the vehicle with satisfactory intelligibility**

	HMI operation assessment shall include a verification of the emergency call status indication operation: system is processing (accident emergency call is triggered, connection is being set up or data transmission is in progress or completed or voice call is in progress).
==Or when neither emulated nor public network is used：]== ==Emergency calling systems shall be tested by checking the warning signal device of Accident Emergency Call System or OBD DTC code, before, during and after performing tests defined in "50 km/h mode" or in "Brake mode" vehicle test conditions==	==Or when neither emulated nor public network is used：]== ==Incorrect operation of emergency calling systems:== ==・Failure Indication on Warning signal device== ==・OBD DTC code related to emergency calling systems failure indication==

II.   Justification

1. Japan understands the importance of the introduction of EMC testing for eCall systems in UNR10-07 series amendments. On the other hand, we would like to draft that it is essential to consider the requirements of UNR10-07 taking into account the requirements of UNR144 in which the eCall system is specified. (Refer to 1.2. (a) of UNR144, which is attached to this document as Annex 1. UNR144 requirements that need to be taken into consideration in the UNR10-07 requirements study.)

2. UNR144 only requires reception from the Global Aeronautical Satellite System, leaving countries free to determine their own infrastructure requirements for communication methods. Therefore, the mobile environment for eCall in Japan is operated as follows.

   − GSM is already out of service in Japan.

   − 3G will also be out of service in a few years.

   − AECS (eCall) therefore need to be built with 4G and 5G communications.

   − The voice call cannot be communicated by analogue GSM and is communicated digitally, so there is no need to check the quality of the call.

- For these reasons, test conditions other than warning signals and pass/fail criteria need to be discussed in more detail.

- In Japan, unlike AECS (eCall) systems in other countries, there is no simulator and Help-net is connected to an external pseudo-center. It is considered necessary to take such a situation into account.

As mentioned above, Japan's AECS (eCall) system does not have a simulator, and the HelpNet is connected to an external pseudo-center, a situation created by the UNR144's flexibility in communication methods, which should be taken into account in the R10-07 series revision. (Refer to Annex 2 of this document)

3. UNR10 should be an internationally harmonized regulation applicable to non-European countries. For reference, countries with simulators are listed below. These situations occur in compliance with the requirements of UNR144 and need to be taken into account when defining UNR10.

   Anritsu: European eCall (2G/3G) European NG-eCall (4G LTE) Russian ERA GLONASS Korean eCall (4G LTE)

   Rohde & Schwarz: European eCall (2G/3G) European NG-eCall (4G LTE) Russian ERA GLONASS

   Keysight: European eCall (2G/3G) European NG-eCall (4G LTE) Russian ERA GLONASS

4. As a solution considering the above, Japan will propose additional test condition (without using emulated or public network). We can check eCall systems function by checking warning signal.

   Based on R144 7.5.2/17.5.2/26.5.3/35.7.3 requirements (Refer to 17.5.2. and Table 2 of UNR144, which is attached to this document as Annex 1), if AECS (eCall) systems have malfunction during immunity test, warning signal will be provided.

5. E-call systems function itself was checked by R144. And a warning signal check with the manual trigger button pressed is sufficient to check the functionality of AECS (eCall) systems for before and after performing tests.

6. At the same time, by checking warning signal during the immunity test, it is possible to confirm the operation of AECS (eCall) systems during the immunity test.

7. While considering both UNR144 and UNR10 in preparing the proposal for testing including when an emulated or public network is used, the question remains: "Is it not a problem under the 1958 Agreement to impose testing under R10 for communication module functions and communication antenna functions that are out of scope under R144? " This concern was raised. Therefore, a square bracket in red has been added in the relevant section. Japan would like to confirm this matter at the GRE.

Annex 1 (Reference from UNR144)

1.   Scope

1.2.   It does not apply to:

(a)   Communication module functionality and communication antenna functionality, unless otherwise prescribed in this Regulation;

17.   Requirements

17.1.   General

Upon reception of a triggering signal, the AECD shall send data and establish voice connection with the PSAP.

If the sending of data failed, then the AECD shall retry sending the data.

If the AECD has successfully sent the data and then loses the voice connection, it shall try to re-establish voice connection.

In the case it was not possible to establish voice connection and/or send data using PLMN, the AECD shall store the data in non-volatile memory and attempt re-transmission of the data and to establish a voice connection.

17.2.   The effectiveness of AECD shall not be adversely affected by magnetic or electrical fields. This shall be demonstrated by compliance with the technical requirements and transitional provisions of UN Regulation No. 10, 04 series of amendments or any later series of amendments.

17.5.2.   A warning signal shall be provided in case of AECD internal malfunction. Visual indication of the AECD malfunction shall be displayed while the failure is present. It may be cancelled temporarily, but shall be repeated whenever the ignition or the vehicle master control switch is being activated (whichever is applicable).

17.5.2.1.   The manufacturer shall provide the Type Approval Authority with an explanation and technical documentation which shows, in overall terms, how the malfunction indication strategy is achieved. This documentation shall be maintained by the manufacturer and shall be made open for inspection by the Technical Service at the time of the type approval.

This shall at least cover the following items:

Table 2

Template of information for self-test function

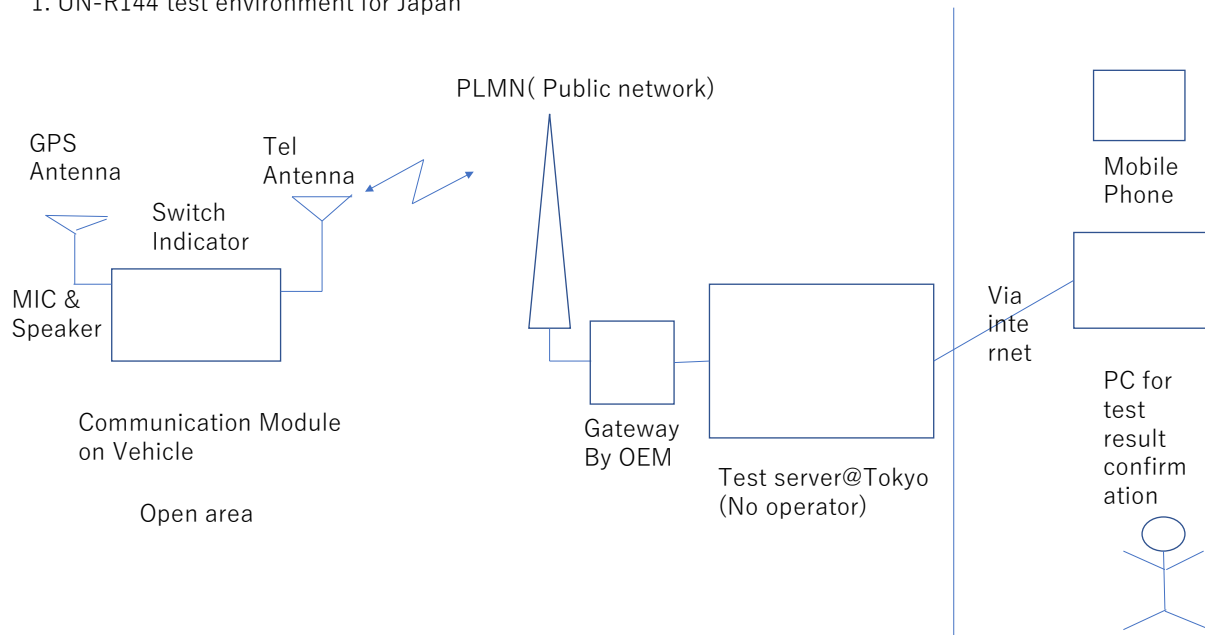| Item		Note
Component	*Failure type*	
Control module	Internal failure	Internal failure means e.g. hardware failure, watch-dog, software checksum, software image integrity, …
Communication module	Electrical connection / module communication failure	A failure in the module can be detected by the absence of digital communication between the control module and the communication module.
	internal failure	Item necessary because it is a basic function: a failure implies that the AECS cannot perform its function.
GNSS receiver	Electrical connection / module communication failure	
	Internal failure	
Mobile network antenna	Electrical connection	
GNSS antenna	Electrical connection	
CCU	Electrical connection	e.g. crash detection sensor system, triggering device, …
	Internal failure	If not in good condition, then the automatic emergency call is not possible. If CCU internal failure verification is not part of AECD approval (Part Ib), then it shall be subject to AECS approval (Part II).
Power supply	Electrical connection	Dedicated battery is connected.
SIM	not present	This item only applies if a removable SIM card is used.
Back-up power supply (if fitted)	The state of charge, threshold for warning at the discretion of the manufacturer	Failure if the state of charge is at a critical level according to the manufacturer.

17.5.2.2.   Test procedure

Self-test function verification test

17.5.2.2.1.   The following test shall be performed on an AECD on a representative arrangement of components.

17.5.2.2.2.   Simulate a malfunction of the AECD system by introducing a critical failure in one or more of the items monitored by the self-test function according to the technical documentation provided by the manufacturer. The item(s) shall be selected at the discretion of the Technical Service.

17.5.2.2.3.   Power the AECD up and verify that the AECD warning signal device illuminates or the electrical signal is generated, whichever is relevant.

17.5.2.2.4.   Power the AECD down and restore it to normal operation.

17.5.2.2.5.   Power the AECD up and verify that the AECD warning signal device does not illuminate or extinguishes shortly after illuminating initially, or the electrical signal is not generated shortly afterward or is cancelled after being generated initially, whichever is relevant.

Annex 2

AECS test condition for Japan

1. UN-R144 test environment for Japan

PLMN(Public network)

GPS
Antenna

Tel
Antenna

Switch
Indicator

Mobile
Phone

MIC &
Speaker

Via
inte
rnet

Communication Module
on Vehicle

Gateway
By OEM

PC for
test
result
confirm
ation

Test server@Tokyo
(No operator)

Open area
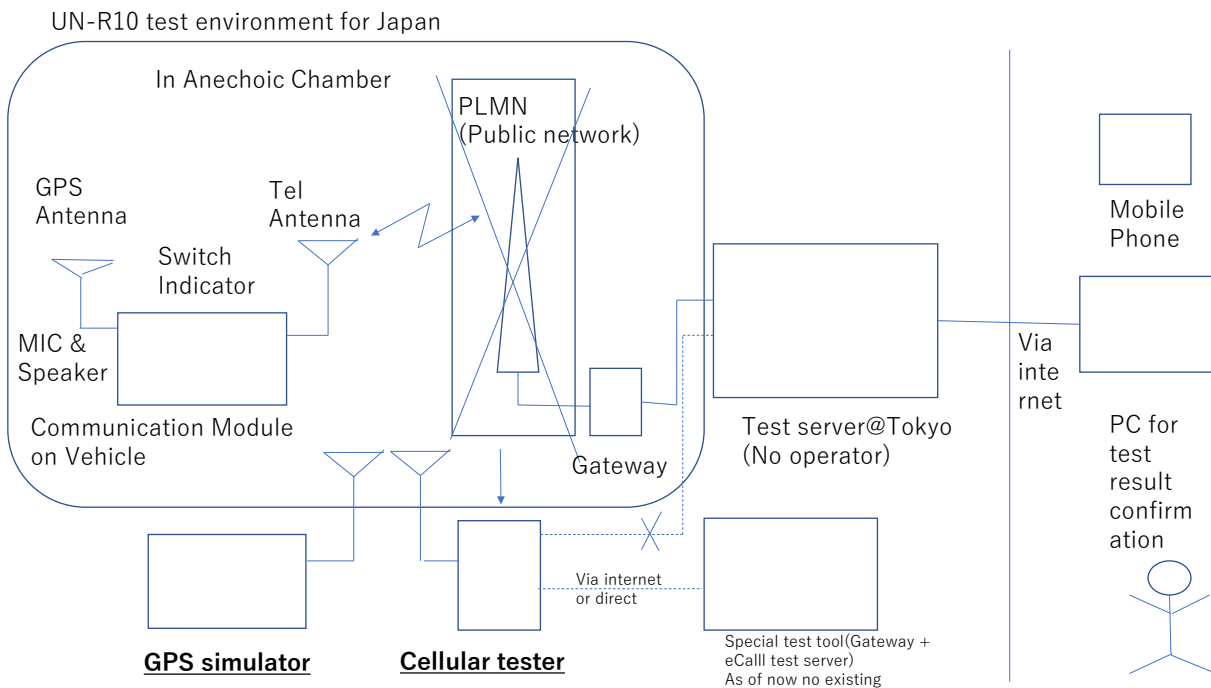
1. Preparation
   -Communication module for test server
     This access point is different from production sever
   -Registration
     KDDI, OEM(telematics service), Helpnet(eCall center)

2. Procedure
   -Change communication module for UN-R144 test
   -Operation check(GPS and MSD data check)
   -Witness test
     manual trigger
     MSD data check(by PC) and then voice communication check by mobile phone.
      (we cannot use voice communication on test server)

 Note: after manual trigger, communication module is waiting for call back from some one for 30minutes.

UN-R10 test environment for Japan

In Anechoic Chamber

PLMN
(Public network)

GPS
Antenna

Tel
Antenna

Switch
Indicator

MIC &
Speaker

Communication Module
on Vehicle

Gateway

Test server@Tokyo
(No operator)

Mobile
Phone

Via
inte
rnet

PC for
test
result
confirm
ation

GPS simulator

Cellular tester

Via internet
or direct

Special test tool(Gateway +
eCalll test server)
As of now no existing

Different points from UN-R144 test condition
-In the anechoic chamber, no public network. So cellular tester and GPS simulator are necessary.
-There is no handy test server. We need to connect eCall through cellular tester to Test server.
-To connect Test server, eCall communication need to go thorough Gateway system.
-Cellular tester cannot connect gateway system directly for security reason.

Challenge items for UN-R10
-Test server availability. Many company will use this test server.
-Test server has no operator. Just checking MSD and protocol. No voice communication function.
  How to confirm vpice communication quality.
-Japanese eCall system is different from other eCall system.
 It is difficult to connect cellular tester to public network directly for one OEM system.
 each OEM has their own telematics service, based on this telematics service OEM realize eCall system.
-It is hard to make simulator. As of now there is no simulator for Japanese UN-R144.
-If they need to use simulator, someone need to make special simulator which is not existing.