

ECALL AND NG-ECALL TECHNOLOGY, TRENDS AND CHALLENGE

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2023/04/14

ROHDE & SCHWARZ

Make ideas real



COMPANY RESTRICTED

OUTLINE

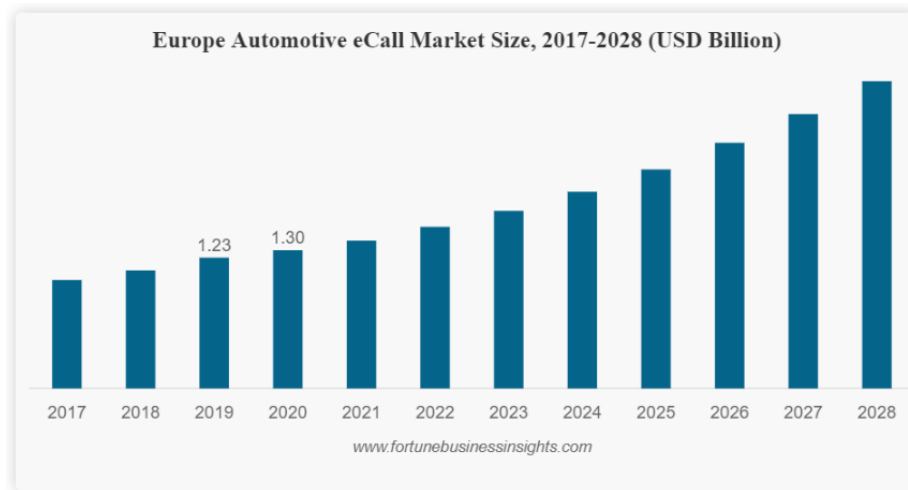
- ▶ eCall & NG-eCall Technology Overview
- ▶ eCall & NG-eCall Regulations and Standards
- ▶ Market Trends and Forecasts
- ▶ Interoperability and V2X
- ▶ Solutions
- ▶ Q&A

ECALL & NG-ECALL TECHNOLOGY OVERVIEW

A feature for cars to improve traffic safety and save lives!



MARKET TRENDS AND FORECASTS



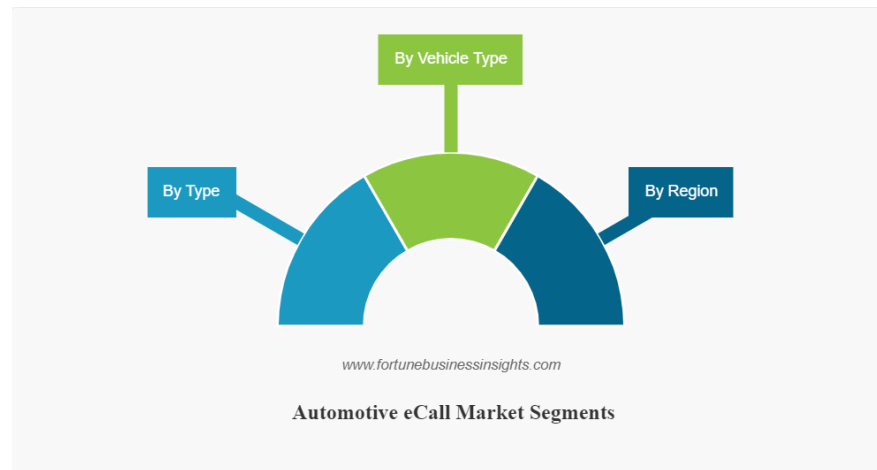
<https://www.fortunebusinessinsights.com/automotive-ecall-market-102047>

KEY COMPANY & MARKET SEGEMENTS

List of Key Companies Profiles:

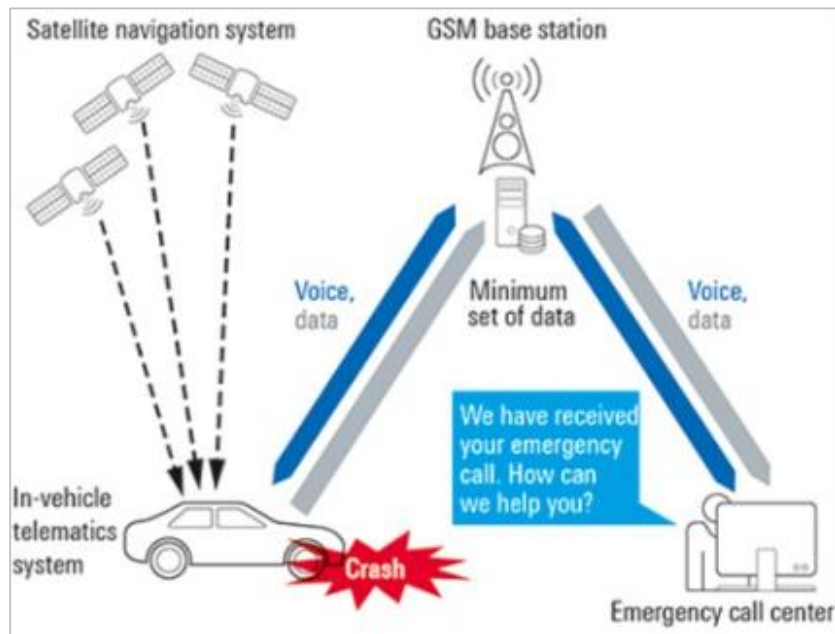
- Continental AG (Hanover, Germany)
- Robert Bosch GmbH (Gerlingen, Germany)
- Telit (London, U.K.)
- [Thales Group](#) (Paris, France)
- [STMicroelectronics](#) (Geneva, Switzerland)
- [u-blox](#) (Thalwil, Switzerland)
- Texas Instruments Incorporated. (Texas, U.S.)
- Valeo (Paris, France)
- Infineon Technologies AG (Neubiberg, Germany)
- Visteon Corporation (Michigan, U.S.)

Automotive eCall Market Segements

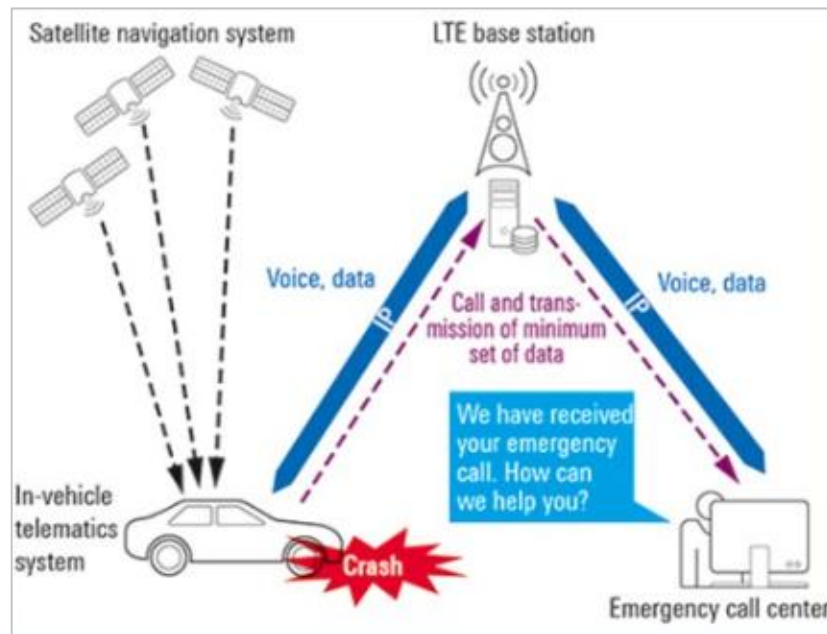


ECALL & NG-ECALL TECHNOLOGY OVERVIEW

Actual EU eCall System – in operation



Next Generation eCall - the successor



2G



Send-MSD: PSAP receives emergency call and triggers MSD transmission (PULL mode), continuously sends start until it detects the first incoming sync frame.

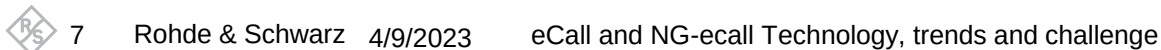
MSD-tx: IVS sends sync frame (dotted) after 3 successfully decoded START messages, MSD RV0 is sent, then MSD RV1 (since IVS first receives NACK, but discontinued after receiving LL-ACK)

NACK: PSAP detects uplink sync and continuously transmits NACK

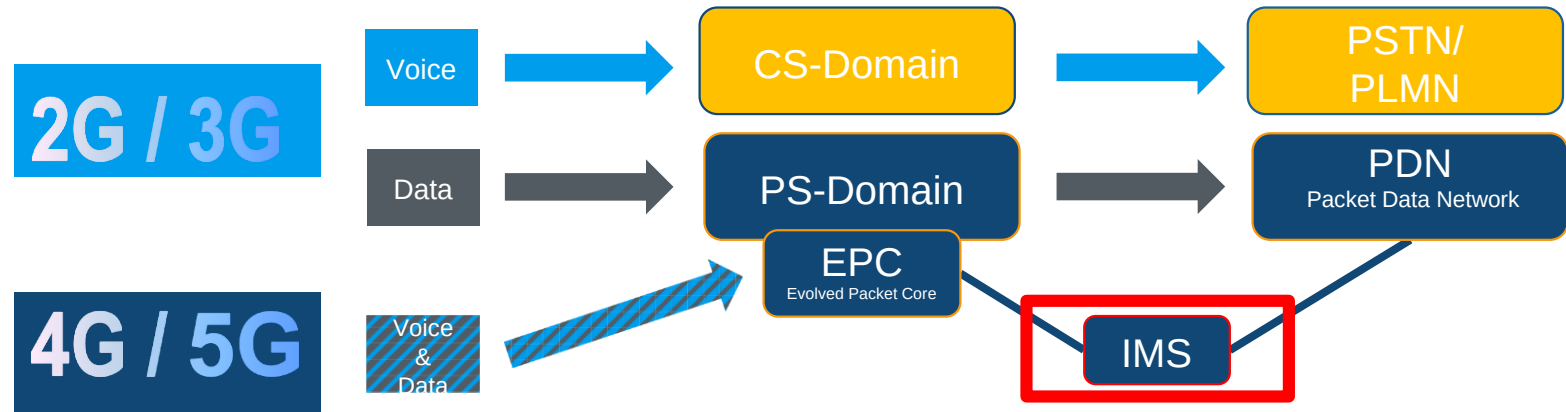
LL-ACK: PSAP tries to decode MSD after complete reception of RV0, and after each data part of subsequent RVs

AL-ACK: After CRC success, PSAP sends 3 ACK messages and then stops transmission => voice channel is un-muted.

Play tone: To test the voice channel in the R&S PSAP implementation a 1kHz sine tone is played.



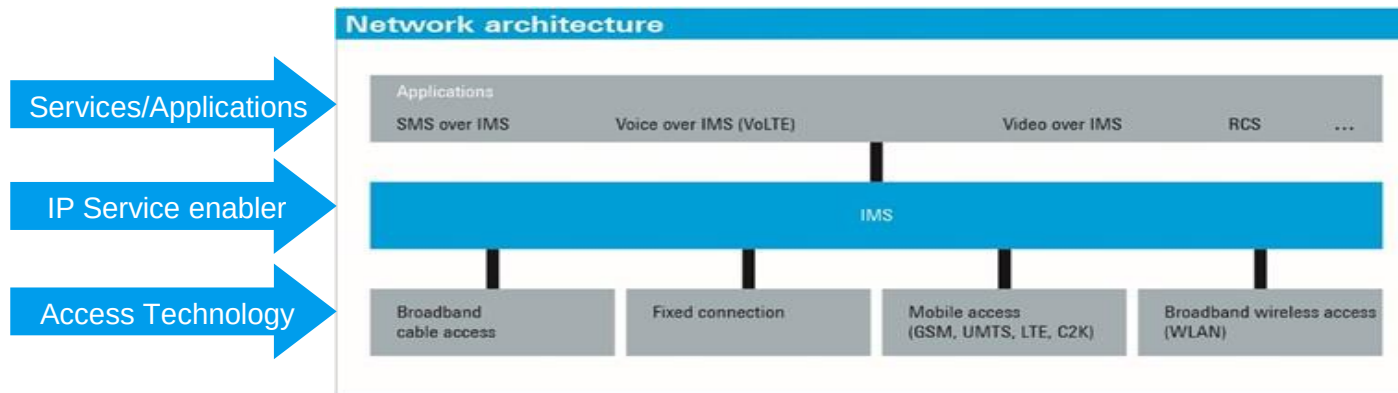
ALL IP-NETWORK INFRASTRUCTURE USING IMS AS SERVICE ENABLER



- ▶ 2G and 3G networks provide a CS domain for phone calls and PS domain for data communication | 4G LTE has been designed as a **fully packet-oriented**, „all-IP“- based, multi-service system
- ▶ **This means: Networks from the 4th generation (LTE / LTE-A/ 5G) on use the internet protocol for all services**

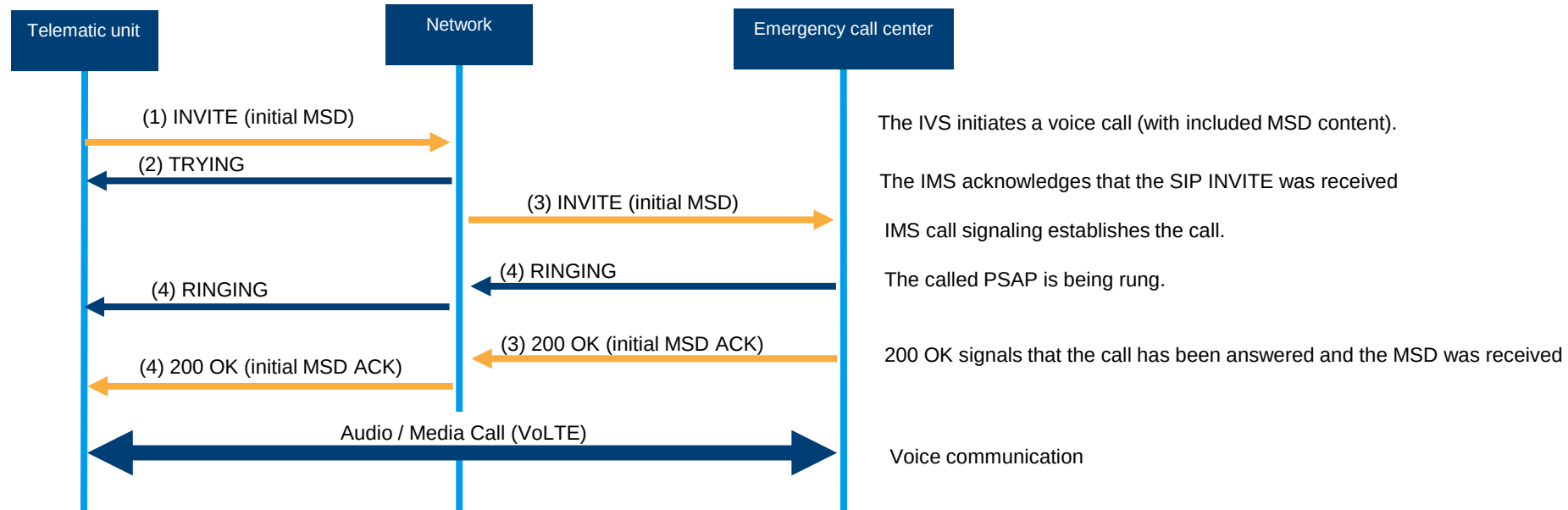
INTRODUCTION IMS – IP MULTIMEDIA SUBSYSTEM DEFINITION

- ▶ IMS is a global access-independent and standards-based IP connectivity and service control architecture that enables various types of multimedia services to end-users using common Internet-based protocols



- ▶ IMS is the enabler for VoLTE, SMS over IMS and new value adding services...
- ▶ ... so a perfect base for the Next Generation eCall (NGeCall)

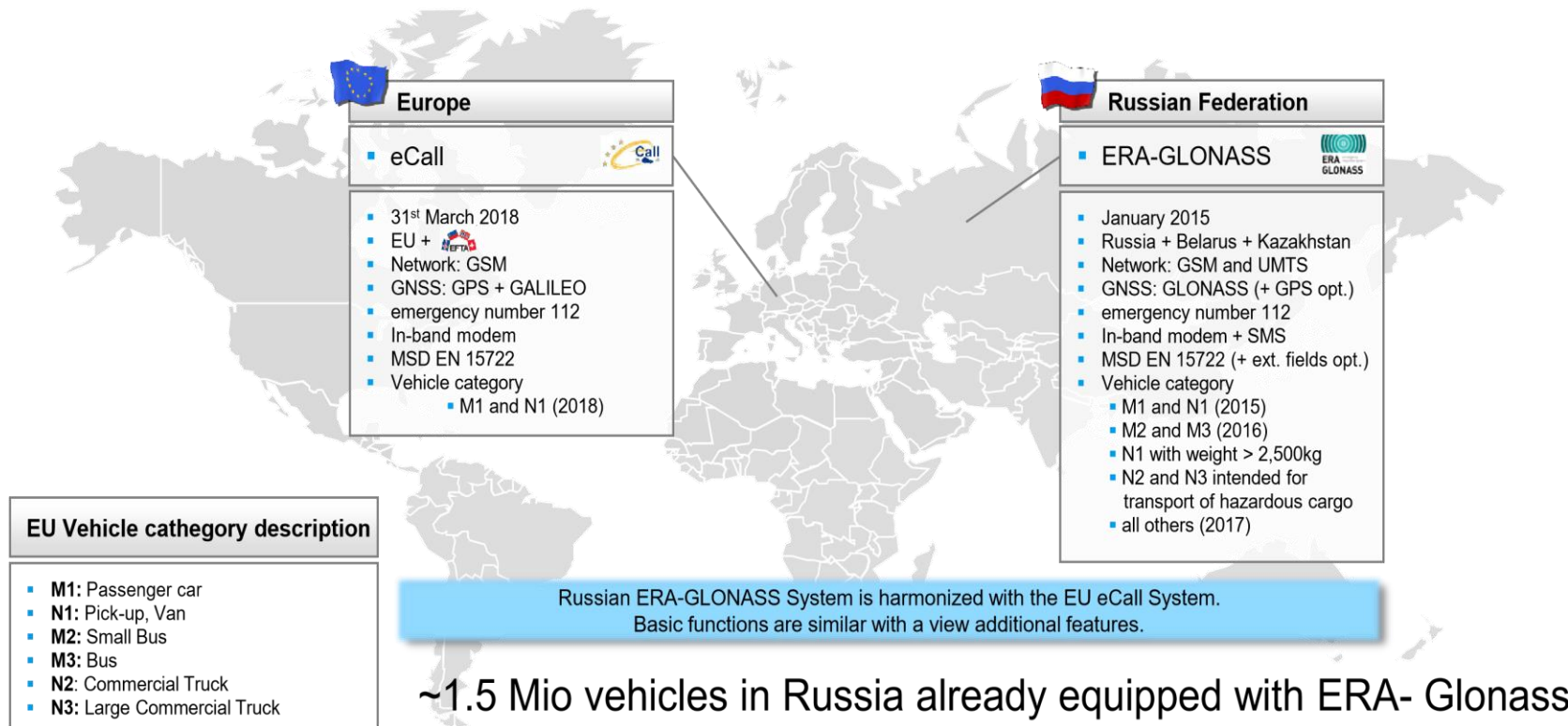
NGECALL: MSD TRANSFER IN SIP INVITE (CALL SETUP)



Note: Prerequisites were fulfilled before!

ECALL & NG-ECALL REGULATIONS AND STANDARDS

Overview emergency call systems and details



eCALL MANDATES AND OUTLOOK

					
Region / Country	Europe & adopted by Turkey and Israel	Russia + Belarus + Kazakhstan	United Arab Emirates	Saudi Arabia	South Korea
Authority	Ministry of transportation Member States	EAEU Economic Commission	Telecommunications Regulatory Authority (TRA)	Saudi Standards, Metrology, and Quality Organization (SASO)	Intelligent Transport Systems Korea
Regulation Standard	Regulation (EU) 2015/758 + 2017/79	TP TC 018 GOST 33xxx	GSO 2021 Model Year UAE.S 5019:2018	SASO 2944:2020	ITSK-00106-1 /4 ITSK-00117-1 /2
eCall or Emergency	eCall	eCall	eCall	eCall	eCall
Mandate	Yes	Yes	Yes	Yes	No
Date	03/2018	01/2015 Russia 01/2017 EAEU	Expected Model Year > 2024 onward 	Model Year 2025 (i.e. mid 2024)	n/a
Technology as of Q4'22	2G/3G In-Band Modem	2G/3G In-Band Modem + SMS	IMS eCall 4G (NG eCall)	IMS eCall 4G (NG eCall)	IMS eCall 4G/5G KeCall
Comments	- IMS eCall 4G/5G (NG eCall) announcements expected in coming quarters - Trucks & commercial vehicles currently not included.	- Trucks, Bus and other Vehicles are included - Audio Testing based on GOST requirements	2G sunset driving transition to IMS eCall Link1 , Link2	see link	- Currently there is no mandate in Korea, further information is expected in 2023

UN ECE R10 Rev7 (expected in 2023) will require EMC eCall testing

UN ECE R144 is an Global eCall standard ; Japan have an eCall requirement based on UN ECE R144, but eCall support is not mandated

ECALL STANDARDS EVOLVE

General eCall requirements

- ▶ [EN 15722:2020](#) Intelligent transport systems - ESafety - eCall minimum set of data
- ▶ [EN 16072:2015](#) Intelligent transport systems - ESafety - Pan-European eCall operating requirements

Legacy eCall

- ▶ [EN 16062:2015](#) Intelligent transport systems - ESafety - eCall high level application requirements (HLAP) using GSM/UMTS circuit switched networks
- ▶ [EN 16454:2015](#) Intelligent transport systems - ESafety - eCall end to end conformance testing

NGeCall

- ▶ [CEN/TS 17184:2018](#) Intelligent transport systems - eSafety - eCall High level application Protocols (HLAP) using IMS packet switched networks
- ▶ [CEN/TS 17240:2018](#) Intelligent transport systems - ESafety - eCall end to end conformance testing for IMS packet switched based systems

NGECALL STANDARDS

Scope	Spec
IP Multimedia Subsystem (IMS) emergency session	3GPP TS 23.167
General Packet Radio Services (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access	3GPP TS 23.401
IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP)	3GPP TS 24.229
Next-Generation Pan-European eCall	IETF rfc8147
Additional Data Related to an Emergency Call	IETF rfc7852
Next-Generation Vehicle-Initiated Emergency Calls	IETF rfc8148
Intelligent transport systems - eSafety - eCall High level application Protocols (HLAP) using IMS packet switched networks	CEN TS 17184
End-to-end conformance test specification for IMS based packet switched systems	CEN TS 17240

CERTIFICATION STATUS FOR CMW-KA09X VERSION 4.0.0

COMMISSION DELEGATED REGULATION (EU) 2017/79 of 12 September 2016

2.7.1.2. The dedicated PSAP test point during the test procedures shall be a PSAP simulator under the control of the technical service, compliant with the applicable EN standards and certified in accordance with EN 16454. It shall be equipped with an audio interface to allow voice communication tests.

CETECOM **CETECOM**

CERTIFICATE OF CONFORMITY

Certificate Number:	Rohde & Schwarz GmbH & Co. KG Mühlenterrasse 19 80775 München Germany
Certification Number:	CMW-2017-004
Product Description:	Conformance Test Solution for eCall
Product Identification:	CMW-KA094
Certificate Issued By:	CETECOM GmbH Carl-Neuberg-Str. 19 40211 Düsseldorf Germany Phone: +49 208 9151-0 Fax: +49 208 9151-400 Email: info@cetecom.com
Scope of Assessment:	CEN EN 16454:2015 chapter 7.5 annex A presented PSAP - PE and PSAPs
Conclusion:	Based on the test documentation found in the Technical Review Report (page 12) the above assessment is compliant with the essential requirements according to the scope of assessment.
Validity:	Changes of technical specifications or relevant modifications of the product may result in new assessment and/or the withdrawal of this certificate. The validity of this certificate will be checked yearly by CETECOM. The certificate is only valid in conjunction with the Certification Requirement (page 2) and the Technical Review Report (page 1).
Certification is valid provided that the equipment has met the requirements of the assessment document. This certificate is issued on condition that the equipment complies with the requirements of the assessment document.	
Place, date of issue:	2017-12-15
Exam:	CETECOM GmbH
Microsoft Office / Quality Manager:	

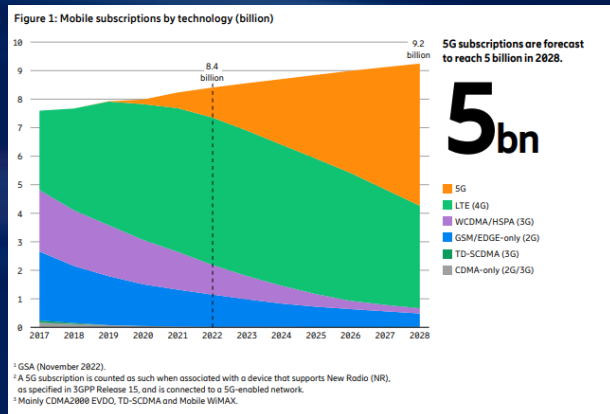


CMW-KA094 Conformance Test Solution for eCall

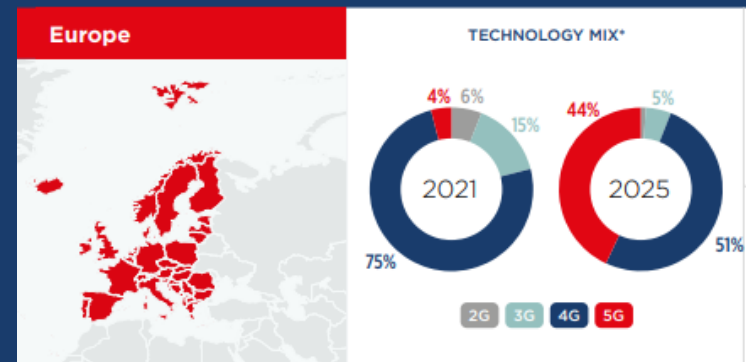
Version 4.0.0 - Certified by CETECOM

The Rohde & Schwarz solution for the EU-wide emergency call system complies with the standard CEN EN 16454:2015, which is a prerequisite for testing according to the COMMISSION DELEGATED REGULATION (EU) 2017/79.

THE INFRASTRUCTURE CHANGES!



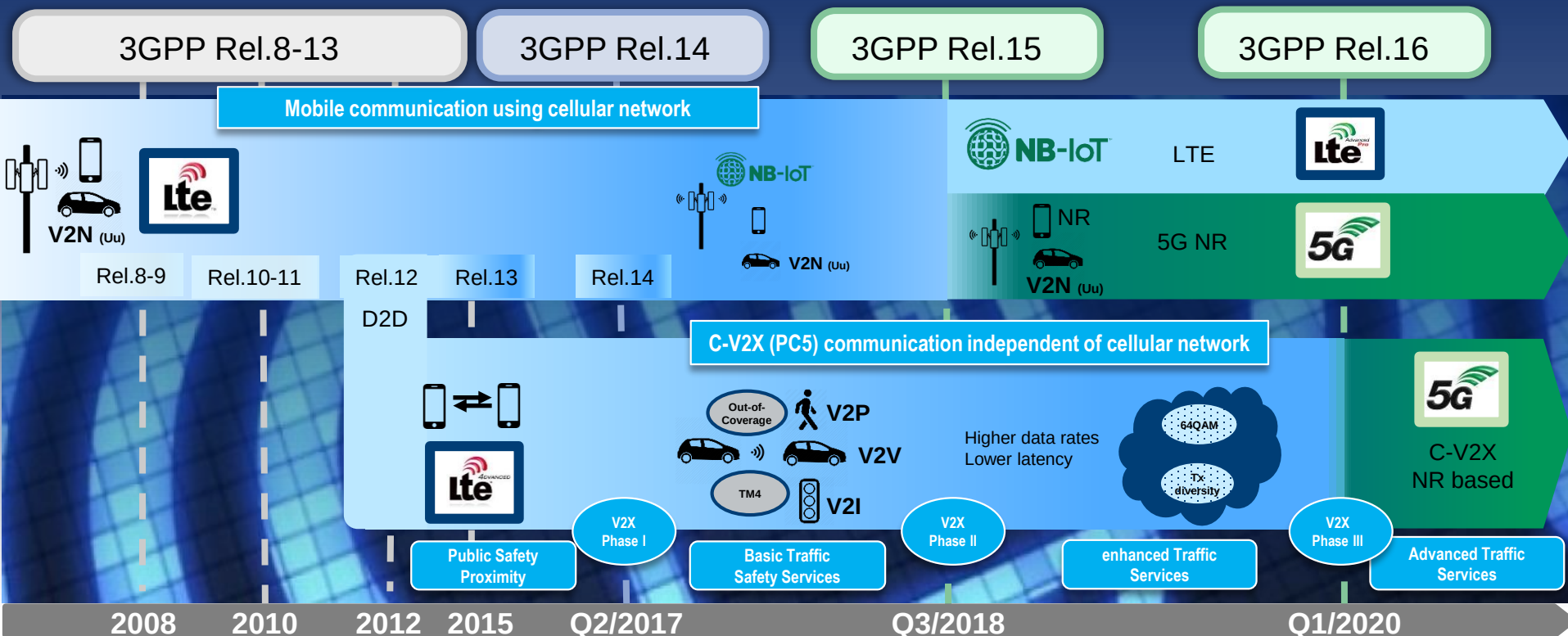
Source: Ericsson Mobility Report November 2022



Source: GSMA Report The Mobile Economy 2022

- Mobile radio standards evolve rapidly Rel.16, 17, 18 etc....
- The networks evolves to 4G and 5G technology – fully IP-based infrastructure (no CS domain anymore)
- Several operators announced the shut down of their GSM or WCDMA network and want to re-farm the GSM frequencies for LTE or 5G
- 4G coverage is better than 2G/3G in many regions already today
- 5G is already being deployed in many regions

INTEROPERABILITY AND V2X C-V2X ON THE WAY TO 5G NR



CASE STUDY

EU NG eCALL - STATUS

Legal Basis for NG eCall

Currently there is no legal basis (e.g. EU regulation) available for NG eCall approval

- In a NG eCall workshop in **March 2021** European Commission (EC) announced to provide an updated EU regulation in **April 2022**

- updated EU regulation should contain an eCall adaptation towards LTE and 5G
- grace period of **2-3 years** expected before NG eCall becomes mandatory for new vehicle types
- EC presentation is available here:

https://docbox.etsi.org/Workshop/2021/202103NGeCall_webinar/Gilles_Carabin_eCall_evolution.pdf

- In a NG eCall conference call in **March 2022** the EC informed about launch of a support study
 - study should support the evolution of the EU eCall legal framework
 - study should contain recommendations to revise the EU regulations for eCall
 - online questionnaire was available until **July 2022**
 - study results should be available in **October 2022**

Updated EU regulation(s) for NG eCall approval expected **earliest in 2023**

activities ongoing

5G was included

2-3 years lead time

additional study

Study results Dec 2022

EU decision earliest 2023



CASE STUDY

STUDY RESULT – DEC 2022



► Study Results Phase 1 statements – *Presented 12/2022 source: 20221213_NGeCall_webinar_results_1st_phase.pdf*

- Safety has been improved thanks to eCall (urban and interurban areas)
- According to ACEA, 26.89% of M1 + N1 vehicles have eCall systems (by end of 2022)

Recommendations:

- *All new vehicles (not only new types) should integrate the eCall service to speed up the market penetration*
- MNOs should be integrated into the eCall regulation
- Regulation should be technology neutral (**means 4G + 5G + maybe others**)

► Cost aspects of the transition and recommendation – *analysis by Roland Berger*

- Scenario that provides the most efficient transition to NGeCall → **Switch directly from CS Networks to PS Networks**
- In this scenario Next Generation eCall will be dependent on PS networks coverage
- Switch from CS to PS systems Regulation should enter into force between 2025 and 2027
 - The sooner the related actions are applied, the larger the global benefits (in costs) will be
 - For OEMs/suppliers, costs of new units are lower (compared to a parallel system approach)
- All new vehicles should be included in the new regulation and thus integrate an eCall (motorcycles, busses, trucks)

CMX500 NGeCALL – MILESTONE PLANNING

APPLICATION TEST SOLUTION

NGeCall 5G

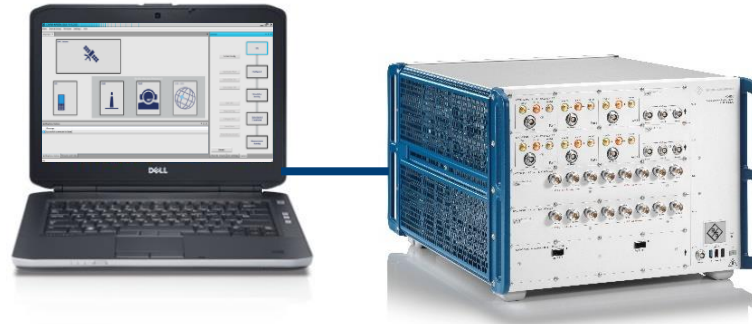
CMX-KA098 (beta)

- 5G cell configuration and **CMXremote**
- IMS MSD transmission via SIP invite support
- MSD decoding according to CEN EN 15722:2020
- Enables VoNR Voice Communication for NGeCall

NGeCall 4G

Part of CMX-KA098

- 4G cell configuration and **CMXremote**
- IMS MSD transmission via SIP invite support
- MSD decoding according to CEN EN 15722:2020
- Enables VoLTE Voice Communication for NGeCall
- ...



Q1/2023

June 2023

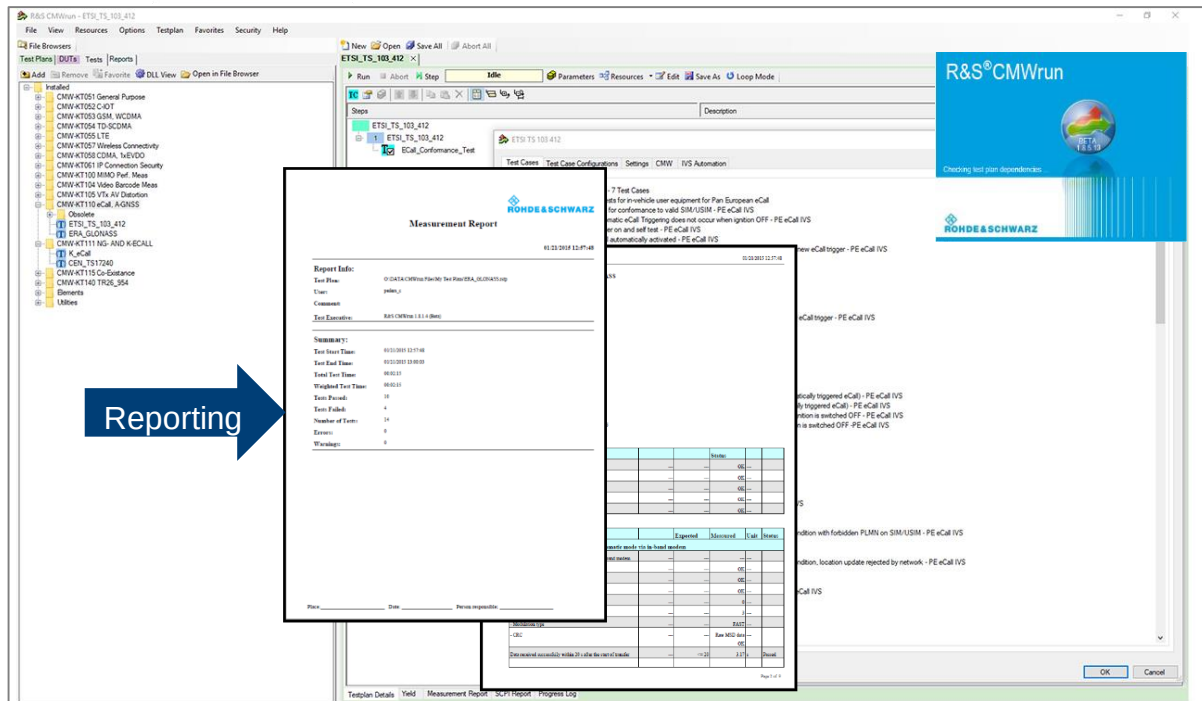
5G NGECALL – CMX-KA098 PSAP EMULATOR WITH CMX500 SUPPORT FOR 5G (AND 4G)

5G PSAP enabler for NGeCall

- Same software environment
- Controls CMX500 for 5G
- Enables result interpretation for 5G NGeCall
- Enables VoNR Voice Communication for NGeCall
- more...



New Option **CMX-KA098** 5G NGeCall



Reporting

The ability to verify compliance with standards at an early design stage makes it possible to take corrective action and optimize an IVS module in a timely manner.

- ▶ Simplifies conformance tests for eCall and ERA-GLONASS & LTE NGeCall
- ▶ “ready to use” test plans for automated testing
- ▶ Test creation, parameterization, execution, analysis and test reporting with pass/fail indication in a single tool
- ▶ Following conformance test specifications are supported:
 - eCall (CEN , ETSI)
 - ERA-GLONASS (GOST(R))
 - NGeCall (CEN)
 - GNSS (EU2017/79 /UNECE 2016/07 / GOST 33471
- ▶ Available Options:
 - R&S[®]CMW-KT110, KT111
 - SMBV-K360, SMBV-K361

R&S ECALL / ERA-GLONASS / NGECALL PSAP EMULATOR CMW-KA094/095/96

R&S@CMW-KA094/095/096



Key Features:

- PSAP simulation for eCall (KA094) and ERA-GLONASS (KA095) over GSM and UMTS and NGeCall over LTE (KA096) testing
- Measure MSD transmission time & time since call establishment etc.
- MSD decoding
 - according to CEN EN 15722:2020 and GOST R 54620/ GOST 33467 for every redundancy version and for every uplink data part
- Optional recording of un-decoded signal from IVS
- Optional audio connection to CMW-Z50 or external audio analyzer
- Details on PUSH and SYNC indications
 - Timing, Count
- Optional fixed position GPS/GLONASS simulation with SMBV or SMW100A
- ERA-GLONASS SMS Protocol support
- NGeCall over LTE and IMS support
 - Rel.14 NGeCall Flag indication
 - MSD transmission in SIP invite etc.

Benefits of using the Rohde & Schwarz PSAP simulator

- Controlled environment without influence of network operator
- Reproducible test conditions and results
- Possibility to test real ecall with emergency number 112 ← *high risk in live network*

R&S 5G NGECALL PSAP EMULATOR CMX-KA098

R&S®CMX-KA098



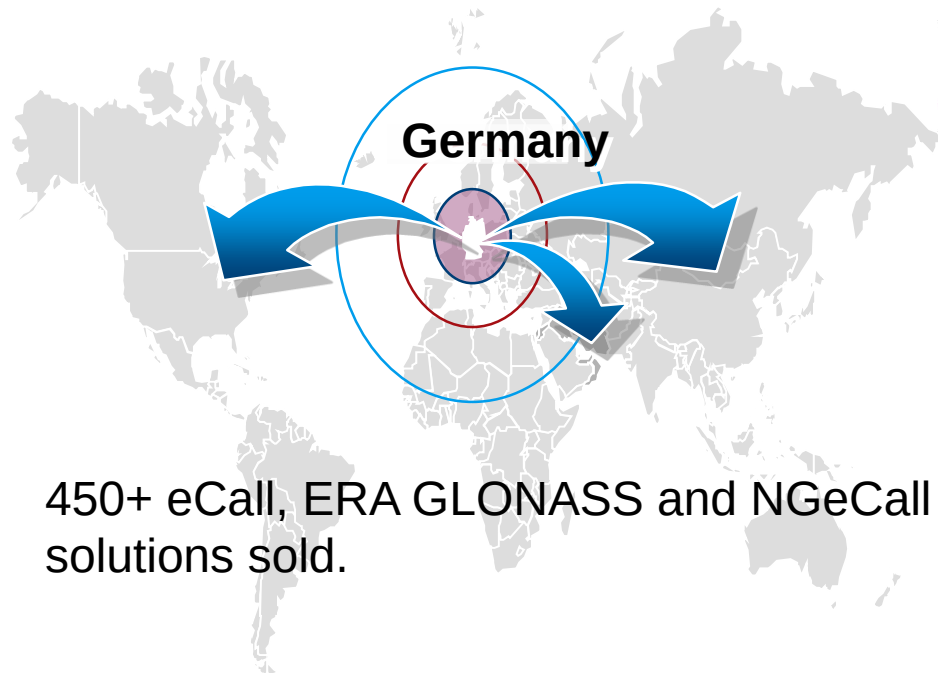
Key Features:

- PSAP simulation for 5G NGeCall (KA098)
- With remote control of R&S CMX500
- With remote control of SMBV or SMW100A for GNSS positioning
- Measure MSD transmission etc.
- MSD decoding
 - according to CEN EN 15722:2020
- Optional recording IP Communication in PCAP from/to IVS<->PSAP
- Optional audio connection (loopback mode)
- Optional fixed or moving position GPS/GLONASS simulation with SMBV or SMW100A
- NGeCall over 5G and IMS support
 - MSD transmission in SIP invite etc.
 - Position evaluation
 - ...

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- Controlled environment without influence of network operator
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- Possibility to test real ecall with emergency number 112 ← *high risk in live network*

OUR CONTRIBUTION



450+ eCall, ERA GLONASS and NGeCall solutions sold.



**R&S eCall / ERA-GLONASS / NGeCall
Conformance Test Solution for eCall**



Q&A

