



KDemo-16-NGeCall

Feature Overview

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Kontron Europe GmbH
Gutenbergstraße 2
85737 Ismaning
Germany
www.kontron.com

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1/Introduction

KDemo-16-NGeCall is a simple and easy-to-use demonstration device to quickly test and evaluate basic NGeCall functionality.

The KDemo-16-NGeCall device is designed to demonstrate a device approval as well as periodical type approval aspects.

The purpose of this document is to introduce you to the key features of the KDemo-16-NGeCall as well as to describe the different operation modes including an output/log example.

NOTE: The device is not a fully compliant IVS as defined by the standards. It comes as a demonstration box without regulatory approvals, but with a similar functionality as an IVS. The KDemo-16-NGeCall device is not intended for use as a commercial product nor is it usable as third party product in any real environment. The application software in the KDemo-16-NGeCall is provided as is under the Creative Commons license model, level 1 (originator's rights). No warranty applies to the KDemo-16-NGeCall device and functionality described.

NOTE: Currently, KDemo-16-NGeCall supports only Windows operating systems. Linux support – even though already mentioned throughout the document – is reserved for future use.

1.1. Document History

Version	Chapter	What is new?
v01	--	Initial document setup.

1.2. Related Documents

For documents describing the NGeCall functionality or test please refer to:

- [1] EN 17240:2024
Intelligent transport systems - ESafety - ECall end to end conformance testing for IMS packet switched based systems
- [2] EN 18052:2025
Intelligent transport systems - ESafety - ECall end to end conformance testing for eCall HLAP in hybrid circuit switched/packet switched network environments
- [3] EN 15722:2020
Intelligent transport systems - ESafety - eCall minimum set of data (MSD)
- [4] EN 16072:2025
Intelligent transport systems - ESafety - Pan-European eCall operating requirements

1.3. Abbreviations

eCall	- any type of emergency or test call to transmit MSD data to a PSAP (legacy PanEU or NG-eCall)
eCall-Only	- special passive mode of an IVS (device is not registered to networks, but scans in background for available networks in case of an eCall shall be started)
ETSI	- European Telecommunications Standards Institute
GSM	- Global System for Mobile communications (2G)
GNSS	- Global Navigation Satellite System
IVS	- In-Vehicle System (device which performs the emergency calls within the vehicle)
Inband	- MSD data transmitted within audio connection (in GSM or UMTS networks)
LTE	- Long Term Evolution (4G)
MSD	- Minimum Set of Data (information data of the vehicle, location, passengers)
NGeCall	- Next Generation eCall (emergency or test eCall transmitting MSD data via VoLTE capable networks within SIP protocol - OUTBAND)
NR5G	- New Radio 5th Generation (5G)
NR5G-SA	- 5G stand alone network (either data only or voice supported within 5G)
NR5G-NSA	- 5G none stand alone network (voice is routed via 4G neighbour cell)
Outband	- MSD data transmitted outside of the connection (in SIP-INVITE message)
PanEU	- first generation of eCall for circuit switched mobile networks like GSM and UMTS (MSD data is transmitted within audio data - INBAND)
PDU	- Protocol Data Unit (ASN.1 encoded MSD data)
PSAP	- Public Safety Answering Point
SIP	- Session Initiation Protocol, communication protocol used for IP-telephony and VoLTE capable networks
TPS	- Third Party Service (type of call which uses eCall-MSD-transmission mechanism to transmit user or service specific data to a service hotline)
UMTS	- Universal Mobile Telecommunications System (3G)
VIN	- Vehicle Identification Number

2/NGeCall Call Types and Modes

2.1. IVS Compatible Emergency NGeCall or Test NGeCall

- Automatic or manual eCall
- Transmit MSD data (version 3 for NGeCall) within call setup (as OUTBAND in SIP-INVITE message)
- Transmit MSD data (versions 1 or 2 for legacy eCall) after call setup within audio data (as INBAND)
- Retransmit MSD data on request of PSAP
- Retransmit MSD data on request of PSAP in callback scenario
- Incoming call is automatically accepted while timer T9 is running
- By default: Call setup and MSD transmission is started on LTE networks (OUTBAND), otherwise fallback
- Fallback: Call setup is started on GSM or UMTS networks, MSD is transmitted within audio connection (INBAND)
- URN for Emergency NGeCall: “urn:service:sos.ecall”, for test NGeCall: “urn:service:test.sos.ecall”
- User can define other URN via SIM-card field EF:SDN-URI

2.2. Specific Test Calls Supporting a Subset

- Legacy eCall to a public phone number, MSD transmitted INBAND
- Third party service call to a public phone number, MSD transmitted OUTBAND
- Simple voice call to public number

2.3. ECall-Only Mode

- “eCall-Only” mode by user configuration or automatically by using a specific SIM-card with this capability

2.4. Call modes of the eCallDemoApp

CallMode	Description	Inband / legacy	Outband / NGeCall	MSD request	CallBack	CB with MSD request		Fallback*	Redial*	eCallTimer
						2G/3G	4G			
1, 2	Legacy test eCall to a custom number (INBAND)	X	-	X	X	X ¹	-	-	-	T
3, 4	Emergency NGeCall (sos) (OUTBAND preferred, INBAND as fallback)	X	X	X	X	X		X ²	X	T
5, 6	Test NGeCall to a custom number (OUTBAND preferred, INBAND as fallback)	X	X	X	X	X ¹				T
7, 8	Emergency test NGeCall to a URN/number specified in SDN/SDN-URI field of SIM card (i.E. URN:“test.sos.ecall”)	X	X	X	X	X		X	X	T
9	Normal voice call									
11, 12	“Third party service call over IMS” to a custom number	-	X	X	X	-	-	-	-	-

¹ Legacy MSD request only possible if call was established on 2G/3G, not possible with 4G.

² If voice emergency call setup also fails, i.e., missing Emergency flag in SIB1, the device will search endlessly through all RATs to find any operator that is capable to execute a voice emergency call!

3/MSD Data and Modes

3.1. MSD Data Set

- MSD version 1, 2 and 3 supported
- Userdefined MSD-PDU is supported, also invalid MSD-PDUs are supported
- MSD data with full static, dynamic or mixed supported
- Recent location data N-1/N-2 supported with static values, automatically changing recent location values in mixed MSD-Mode (see below)
- Optional data set supported (OID, OAD)
- All MSD data elements can be configured by user in a text configuration file

3.2. MSD Modes

The MSD data consists of static elements of vehicle information data like VIN, propulsion type, vehicle type, etc. and dynamic data elements like MSD identifier, vehicle location, date and time and number of passengers.

For each eCall setup the MSD data is encoded into the PDU format which is finally transmitted to the PSAP. The original values which are used for this encoding are printed out into shell and log file. The user is also able to select a own predefined MSD-PDU.

Dynamic MSD mode:

- The MSD-PDU is created based on the static values from configuration file and all dynamic values are taken from external sensors (location and date and time from GNSS receiver)

Mixed MSD modes:

- The location data is taken from configuration file, date and time from internal RTC (received by network) This mode is useful if the user does not want to attach a GNSS-antenna or does not have a GNSS signal available.
- The location data and date and time is taken from the configuration file. Only the MSD-identifier is created dynamically (incremented for each successful MSD transmission)
- Recent location data values N-1/N-2 are changed automatically 45° clockwise for each MSD transmission to give the user a visible indication for updated MSD-data (i.E. PSAP shows decoded location on a map)

Pure static MSD mode:

- The MSD-PDU is created based only on the given data from configuration file, also the MSD identifier. This mode is only for testing purposes and allows invalid MSD data to be transmitted, i.e., wrong MSD identifier.

PDU mode:

- No MSD is encoded. The predefined MSD-PDU is taken from text configuration file for the MSD transmission. User has to encode own MSD-PDU. Some examples of MSD-PDUs are given in configuration file. Also user can create invalid MSD-PDU data (for testing purposes).

4/User Interface

4.1. Configuration File

All parameters can be configured in one text configuration file. The configuration file contains a predefined set of all settings with remarks to each setting (value range, types of settings). The main categories of settings are:

- Destination phone numbers for test eCalls to PSAP and for a voice destination
- callMode setting and settings related to call behaviour
- MSD-mode setting and MSD-data definitions
- Control setting for testing purposes
- Control setting for the modem functionality (i.E. radio technology preselection)

4.2. Two Push Buttons / LED Interface at the Front Panel

The KDemo-16-NGeCall device can be controlled via two push buttons. There is no need to attach a PC/laptop to it.

- Two buttons to start two different predefined eCalls (see call modes)
- Both buttons act also to hang up active calls, if a call is active and if this mode is enabled
- A two colored LED shows operation status for GNSS-location signal and mobile network signal or call status

4.3. Command Line Interface / ADB Shell

By connecting a PC/laptop via USB cable the application inside of the KDemo-16-NGeCall device can also be controlled via a Linux typical command line command. The application is called the “eCallDemoApp”.

The eCallDemoApp uses primarily the configuration text file to predefine all internal settings. The user can overwrite some settings by additional command line parameters. All available parameters are listed by calling the app via help parameter: “./ecalldemoapp -?”.

All output given to the user/into the ADB-shell is also put into the log file.

4.4. Log File and Output

For each start of the KDemo-16-NGeCall device or at least of the eCallDemoApp two log files are created with date and time in the file name. These log files are located in the same sub folder where the configuration text file and the eCallDemoApp itself is located.

- System log file: Contains full output of the eCallDemoApp, see example in Chapter 6/
- GNSS log file: Contains location data only – useful for field test drives

5/Test Support

To support testing, especially testing in an automated environment, some special features are implemented:

5.1. Loop Mode

- A predefined number of eCalls can be performed in a loop
- A wait time between each loop can be configured
- Result message after each loop, if eCall MSD transmission was successfully or not - pass/fail with incremented counter

5.2. Voice Connection Timer

- The maximum voice connection time can be configured until the eCallDemoBox will hang up the call on it's own. Necessary for PSAP testers who have no access to the PSAP user interface to hang up such calls.

5.3. GNSS Log File Formats

- Standard text file with usual GNSS location data values
- GPX file format supported

6/Sample Output / Log File

The following example shows the output of the eCallDemoApp into the log file and into the ADB shell given to the user. The scenario shows a test NGeCall to a test PSAP (from German vendor OECON). The PSAP is configured to **not** accept the NGeCall MSD but to accept the MSD transmission from following legacy eCall (fallback situation). Finally the PSAP requests another MSD and hangs up the call.

```

/usrdata # ./ecalldemoapp -m 3 -c 5

=====
20260814 06:20:23.423 |> ECallDemoApp v1.4.16 (Aug 13 2026, 07:45:19) Kontron Europe GmbH <|
20260814 06:20:23.423 (TelematicsSDK v1.63.16-100_130)

20260814 06:20:23.423 Cmd: ./ecalldemoapp -m 3 -c 5
20260814 06:20:23.423 No running daemon found. Proceeding with normal start.
20260814 06:20:23.423 [INF] Local device configuration file name: CONFIG.txt
20260814 06:20:23.423 Config: ReadConfig: settings from config file successfully imported.
20260814 06:20:23.423 Config: callModeBtn2 is set to 9
20260814 06:20:23.423 CmdLineOpt -m found: MSD-Mode: 3 (static location, time from RTC)
20260814 06:20:23.423 CmdLineOpt -c found: Call-Mode: 5
20260814 06:20:23.423 Modem: Modem configuration: Vodafone_Global_Commercial-M2M
20260814 06:20:23.423 Major: SIM-card information:
                IMSI: 901289991999884
                ICCID: 89882390001084500173
20260814 06:20:23.423 Major: SDN:
20260814 06:20:23.423 Major: SDN-URI:
20260814 06:20:23.423 Radio: current VoiceServiceState: REG_ROAMING
20260814 06:20:23.423 Radio: Service state change: HOME network (registered), LTE
20260814 06:20:23.423 Phone: IMS registration status: REGISTERED, RAT: LTE
20260814 06:20:23.423 Phone: SMS over IMS: FULL_SERVICE, Voice over IMS: FULL_SERVICE
20260814 06:20:23.423 Telef: check eCall HLAAP Timers status
                T2 HLAAP Timer Status : INACTIVE
                T5 HLAAP Timer Status : INACTIVE
                T6 HLAAP Timer Status : INACTIVE
                T7 HLAAP Timer Status : INACTIVE
                T9 HLAAP Timer Status : INACTIVE
                T10 HLAAP Timer Status : INACTIVE
20260814 06:20:23.423 Phone: ECall operating mode: NORMAL, reason: NORMAL
20260814 06:20:23.423 Phone: Service state change: HOME network (registered), LTE
20260814 06:20:24.424 TelUt: Redial Call Drop values:
                1:5000, 2:60000
20260814 06:20:24.424 TelUt: Redial Call Failure values:
                1:5000, 2:60000, 3:60000, 4:60000
20260814 06:20:25.425 Config: current RTC time used: 2026-08-14 06:20:25 (1786688425)
20260814 06:20:25.425 Telef: No active calls found

20260814 06:20:25.425 Starting autom. emergency NG-test eCall with MSD-Mode: static location
20260814 06:20:25.425 TelUt: ECall MSD-Data:
                MSD-Ver: 3, Msg-ID: 1, Autom Act: 1, Test Call: 1
                Veh.Type: 15* -> Agricultural vehicles (Class R) 15
                Veh.Identity: ECA LLEXAM P LE02025
                Veh.Propuls: Diesel, Hydrogen,
                Timestamp: 1786688425 -> Fri Aug 14 06:20:25 2026
                Trusted Pos: 1, Veh.Dir: 105 -> 210°
                Veh.Locat: -136047294, 521833986 -> maps:
                        https://www.google.com/maps?q=-37.7909,144.954
                Rec.Loc.N1: 1, N1 Loc Delta: 10, 10
                Rec.Loc.N2: 1, N2 Loc Delta: 20, 20
                Num.Passng: 5
                Opt. Data: 1
20260814 06:20:25.425 TelUt: Encoded MSD-PDU:
0331501E71C614A2873C52ABA870010010AFE89A9FACEA5DF90550A7C6A3809A60A82A14850140820042020A5101A005020240
20260814 06:20:25.425 Echlp: ECall request is successful
20260814 06:20:25.425 Call hang up possible by keypress 'x' or button press
20260814 06:20:25.425 Telef: Call request is successful, call index: 1
20260814 06:20:25.425 Telef: Call Info Change: state: Outgoing, idx: 1, dir: outgoing, phone:
+4922828609515
20260814 06:20:25.425 Telef: ECallMsdTransmission Status: OUTBAND MSD TRANSMISSION STARTED (10)
20260814 06:20:25.425 Telef: ECallMsdTransmission Status: OUTBAND MSD TRANSMISSION FAILURE (12)
20260814 06:20:25.425 Telef: Call Info Change: state: Active, idx: 1, dir: outgoing, phone:
+4922828609515
20260814 06:20:25.425 Telef: T2 HLAAP Timer event: STARTED
20260814 06:20:25.425 Telef: T5 HLAAP Timer event: STARTED
20260814 06:20:25.425 Telef: ECallMsdTransmission Status: INBAND MSD TRANSMISSION STARTED (2)
20260814 06:20:25.425 Telef: T5 HLAAP Timer event: STOPPED
20260814 06:20:25.425 Telef: ECallMsdTransmission Status: INBAND SEND-MSD (START) RECEIVED (5)
20260814 06:20:25.425 Telef: T7 HLAAP Timer event: STARTED
20260814 06:20:25.425 Telef: T7 HLAAP Timer event: STOPPED
20260814 06:20:31.431 Telef: ECallMsdTransmission Status: INBAND LL-ACK RECEIVED (6)

```

Test NG-eCall is started,

1st MSD data is prepared and content shown in detail,

MSD is encoded to PDU and transmitted within call setup

PSAP is not able to receive the MSD which results in a transmission failure

Device switches to inband transmission, MSD is transmitted successfully

```

20260814 06:20:31.431   Telef:      T6  HLAAP Timer event: STARTED
20260814 06:20:33.433   Telef: MSD is transmitted Successfully (0)
20260814 06:20:33.433   Telef: ECallMsdTransmission Status: INBAND SUCCESS (0)
20260814 06:20:33.433   Telef:      T6  HLAAP Timer event: STOPPED
20260814 06:20:54.454   Telef: OnMsdUpdateRequest - Request to send new MSD received from PSAP
20260814 06:20:54.454   TelUt: ECall MSD-Data:
                                MSD-Ver:      3, Msg-ID: 2, Autom Act: 1, Test Call: 1
                                Veh.Type:      15* -> Agricultural vehicles (Class R) 15
                                Veh.Identity:   ECA LLEXAM P LE02025
                                Veh.Propuls:    Diesel,Hydrogen,
                                Timestamp:      1786688425 -> Fri Aug 14 06:20:25 2026
                                Trusted Pos:    1, Veh.Dir: 105 -> 210°
                                Veh.Locat:      -136047294, 521833986 -> maps:
                                https://www.google.com/maps?q=-37.7909,144.954
                                Rec.Loc.N1:     1, N1 Loc Delta: 0, 10
                                Rec.Loc.N2:     1, N2 Loc Delta: 0, 10
                                Num.Passng:     5
                                Opt. Data:      1
                                TelUt: Encoded MSD-PDU:
0331502E71C614A2873C52ABA870010010AFE89A9FACEA5DF90550A7C6A3809A60082A00828140820042020A5101A005020240
20260814 06:20:54.454   Telef: ECallMsdTransmission Status: INBAND SEND-MSD(START) RECEIVED (5)
20260814 06:20:54.454   Telef:      T7  HLAAP Timer event: STARTED
20260814 06:20:54.454   Telef: ECallMsdTransmission Status: INBAND MSD TRANSMISSION STARTED (2)
20260814 06:20:57.457   Telef:      T7  HLAAP Timer event: STOPPED
20260814 06:20:57.457   Telef: ECallMsdTransmission Status: INBAND LL-ACK RECEIVED (6)
20260814 06:20:57.457   Telef:      T6  HLAAP Timer event: STARTED
20260814 06:20:59.459   Telef: MSD is transmitted Successfully (0)
20260814 06:20:59.459   Telef: ECallMsdTransmission Status: INBAND SUCCESS (0)
20260814 06:20:59.459   Telef:      T6  HLAAP Timer event: STOPPED
20260814 06:21:11.471   Telef: Call Info Change:      state: Ended,      idx: 1, dir: outgoing, phone:
+4922828609515
20260814 06:21:11.471   Telef: Call release cause: Normal (16)
20260814 06:21:11.471   Telef: eCall redial not performed, reason: call connected successfully
(#0)
20260814 06:21:11.471   Telef:      T9  HLAAP Timer event: STARTED
20260814 06:21:11.471   Telef:      T2  HLAAP Timer event: STOPPED
20260814 06:21:11.471   autom. emergency NG-test eCall has finished, audio still running
20260814 06:21:12.472   autom. emergency NG-test eCall has finished.

20260814 06:21:13.473   Telef: check eCall HLAAP Timers status
                                T2  HLAAP Timer Status : INACTIVE
                                T5  HLAAP Timer Status : INACTIVE
                                T6  HLAAP Timer Status : INACTIVE
                                T7  HLAAP Timer Status : INACTIVE
                                T9  HLAAP Timer Status : ACTIVE
                                T10 HLAAP Timer Status : INACTIVE

20260814 06:21:13.473 |> Application ECallDemoApp closed. <|
=====
/usrdata #

```

PSAP requests another MSD,

2nd MSD data is prepared and shown in detail,

MSD is encoded to PDU and finally transmitted



About Kontron

Kontron is a global leader in IoT/Embedded Computing Technology (ECT) and offers individual solutions in the areas of Internet of Things (IoT) and Industry 4.0 through a combined portfolio of hardware, software and services. With its standard and customized products based on highly reliable state-of-the-art technologies, Kontron provides secure and innovative applications for a wide variety of industries. As a result, customers benefit from accelerated time-to-market, lower total cost of ownership, extended product lifecycles and the best fully integrated applications.

For more information, please visit: www.kontron.com

Global Headquarters

Kontron Europe GmbH

Gutenbergstraße 2
85737 Ismaning, Germany
Tel.: +49 8214 4086-0
info@kontron.com

www.kontron.de

