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TECHNICAL SPECIFICATION

**Mobile Standards Group (MSG);
Pan-European eCall end to end and
in-band modem conformance testing;
Prose test specification**

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Mobile Standards Group (MSG).

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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1   Scope

The present document specifies the Pan-European eCall end to end and in-band modem conformance testing.

This is a complete test specification. The following information can be found in the present document:

- the overall test structure;

- the test configurations;

- the conformance requirement and reference to the core specifications;

- the test purposes; and

- a brief description of the test procedure, the specific test requirements and <eventually> short message exchange table;

- the default setting of the test parameters;

- the applicability of each test case.

The present document is valid for a Pan-European (PE) eCall IVS.

2   References

2.1   Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

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The following referenced documents are necessary for the application of the present document.

[1]   CEN EN 16454:2015: "Intelligent transport systems - ESafety - ECall end to end conformance testing".

[2]   ETSI TS 134 123-1: "Universal Mobile Telecommunications System (UMTS); User Equipment (UE) conformance specification; Part 1: Protocol conformance specification (3GPP TS 34.123-1)".

[3]   ETSI TS 102 936-1 (V1.1.1) (2011-04): "eCall Network Access Device (NAD) conformance specification; Part 1: Protocol test specification".

[4]   ETSI TS 102 936-2 (V1.1.1) (2011-04): "eCall Network Access Device (NAD) conformance specification; Part 2: Test suites".

[5]   ETSI TS 126 269 (V13.0.0) (2015-09): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); eCall data transfer; In-band modem solution; Conformance testing (3GPP TS 26.269 version 13.0.0 Release 13)".

[6]   CEN EN 16062:2015: "Intelligent transport systems - ESafety - eCall high level application requirements (HLAP) using GSM/UMTS circuit switched networks".

[7]   ETSI TS 127 007: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; AT command set for User Equipment (UE) (3GPP TS 27.007)".

[8] CEN EN 16072:2015: "Intelligent transport systems - ESafety - Pan-European eCall operating requirements".

[9] ETSI TS 151 010-1: "Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 1: Conformance specification (3GPP TS 51.010-1)".

[10] ETSI TS 136 508: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common test environments for User Equipment (UE) conformance testing (3GPP TS 36.508)".

[11] ETSI TS 124 008: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Mobile radio interface Layer 3 specification; Core network protocols; Stage 3 (3GPP TS 24.008)".

[12] CEN EN 15722:2015: "Intelligent transport systems - ESafety - ECall minimum set of data".

[13] ETSI TR 126 969: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); eCall data transfer; In-band modem solution; Characterization report (3GPP TR 26.969)".

[14] Directive 96/27/EC of the European Parliament and of the Council of 20 May 1996 on the protection of occupants of motor vehicles in the event of a side impact and amending Directive 70/156/EEC or equivalent Regulation No 95 of the Economic Commission for Europe of the United Nations (UN/ECE) Uniform provisions concerning the approval of vehicles with regard to the protection of the occupants in the event of a lateral collision. Addendum 94: Regulation No 95.

NOTE: Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:313:0001:0057:EN:PDF.

[15] ETSI TS 100 910: "Digital cellular telecommunications system (Phase 2+); Radio Transmission and Reception (3GPP TS 05.05)".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI TS 103 321: "Mobile Standards Group (MSG); eCall HLAP Conformance Testing; Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT)".

[i.2] ETSI MSG(14)042005r1: "STF483(eCallHLAPTesting)-Feedback-CEN16454".

[i.3] 3GPP RAN5 PRD 13: "3rd Generation Partnership Project; Technical Specification Group RAN WG5; Permanent Reference Document (PRD); EPS (E-UTRAN & EPC) TC prose specification requirements".

[i.4] ISO 15031-3:2004: "Road vehicles -- Communication between vehicle and external equipment for emissions-related diagnostics -- Part 3: Diagnostic connector and related electrical circuits, specification and use".

[i.5] ETSI TS 134 108: "Universal Mobile Telecommunications System (UMTS); LTE; Common test environments for User Equipment (UE); Conformance testing (3GPP TS 34.108)".

[i.6] ETSI TS 122 011: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Service accessibility (3GPP TS 22.011)".

[i.7]   ETSI TS 123 122: "Digital cellular telecommunications system (Phase 2+); Universal Mobile
               Telecommunications System (UMTS); LTE; Non-Access-Stratum (NAS) functions related to
               Mobile Station (MS) in idle mode (3GPP TS 23.122)".

[i.8]   ETSI TS 126 132: "Universal Mobile Telecommunications System (UMTS); LTE; Speech and
               video telephony terminal acoustic test specification (3GPP TS 26.132)".

3   Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACK	ACKnowledgement
AL	Application Layer
AL-ACK	Application Layer - ACKnowledgement
AL-ACK	Application Layer ACKnowledgement
AT	ATtention
CAN	Controller Area Network
CCFT	Call Cleardown Fallback Timer
CEN	European Committee for Standardization
CM	Communication Management
CRC	Cycle Redundancy Check
CTP	Conformance Test Point
DTX	Discontinous Transmission
ECE	(United Nations) Economic Commission for Europe
EN	European Norm
FDN	Fixed Dialing Number
GERAN	GSM/EDGE Radio Access Network
GMSK	Gaussian Minimum Shift Keying
GNSS	Global Navigation Satellite System
GSM	Global System for Mobile communications
HLAP	Higher Layer Application Protocol
HMI	Human Machine Interface
ICS	Implementation Conformance Statement
IE	Information Element
IGN_ON	IGNition ON
IMSI	International Mobile Subscriber Identity
ISO	International Standardization Organization
IVS	In-Vehicle System
LL	Link Layer
LL-ACK	Link Layer - ACKnowledgement
MM	Mobility Management
MMI	Man Machine Interface
MNO	Mobile Network Operator
MS	Mobile Station
MSD	Minimum Set of Data
MSG	Mobile Standards Group
NACK	Negative ACKnowledge
NAD	Network Access Device
PCM	Pulse Code Modulation
PE	Pan-European
PIXIT	Protocol Implementation eXtra Information for Testing
PLMN	Public Land Mobile Network
PRD	Permanent Reference Document
PSAP	Public Safety Answering Point
RACH	Random Access CHannel
RAN	Radio Access Network
RRC	Radio Resource Control
SDN	Service Dialing Number
SIM	Subscriber Identity Module
SS	System Simulator

TC   Test Case
TMSI   Temporary Mobile Subscriber Identity
TP   Test Purpose
TTCN   Testing and Test Control Notation
UE   User Equipment
UMTS   Universal Mobile Telecommunications System
USIM   Universal Subscriber Identification/Identity Module
UTRA   UMTS Terrestrial Radio Access

4 Glossary

4.1 Intention of the glossary

For eCall there exists several specifications that use different wording. The main intention of the glossary is to provide background information on the formulations used in the present document, especially in figures 5.2.3-1 to 5.2.3-3, and to prevent ambiguities. The expressions are used throughout the whole document e.g. in the test case section as well. Please note that other documents may contain the same formulation with a different meaning.

The state diagram introduces several categories (see legend in figure 5.2.3-1) according to which the glossary is sorted:

- States are the mirrored states of the IVS as perceived monitored at the tester. A mirror state will remain until there is any tester input/output, internal tester actions/trigger.

- Decisions are alternatives in the process. The tester makes the decision.

- Procedures describe multiple step message exchange between the IVS and the MNO/PSAP/tester. The messages may vary for different Radio Access Technologies used.

- Tester input/output, internal tester actions/trigger are events that enable a state transition. The tester input and tester output are visible on the interfaces between the IVS, the tester and the user interface. The internal tester actions/trigger are not visible on any interface but necessary within the tester to emulate the timers running in the IVS and the PSAP and enable the tester to check for correct behaviour e.g. in case of expiry of a timer. A detailed description of the timers is available in CEN EN 16062 [6], annex A.

4.2 General

PE eCall capable IVS	PE eCall capable IVS are devices that comprise commercial UE functionality as well as eCall service.
PE eCall only IVS	PE eCall only IVS support only eCall service.
PE eCall IVS	The expression PE eCall IVS comprises both kind of devices: PE eCall capable IVS and PE eCall only IVS.

4.3 States

IGNITION OFF	The vehicle ignition is switched off, i.e. the vehicle battery does not supply the IVS module with power. The IVS module is unpowered.
Self-test	The self-test is ongoing within the IVS.
IGNITION ON eCall INACTIVE/IDLE, registered	This is the normal state of the IVS during vehicle operation when no eCall has been triggered. Depending on the device capability the device is either registered to the network (IDLE, registered) for a PE eCall capable IVS or not registered to the network (eCall INACTIVE) for a PE eCall only IVS.
False triggering "eCall activation"	In case the vehicle occupants trigger a manual eCall by mistake they can cancel/abort the call during the time period T1.
Waiting for HMI alert	This state follows T1 expiry and ends with the IVS sending an HMI alert to the vehicle occupants.
In-band modem connected	In this state the mobile network connection is completed and the in-band modem message exchange can start.

Wait for end of initiation signal	Initiation signal transmission is ongoing.
Modems in sync	IVS and PSAP modems are synchronized.
MSD tx done/check whether successful	The MSD transmission is finalized.
E112 - voice call	Successful completion of the procedure "Connect voice" leads to the state "E112 - voice call". The in-band modem connection has switched from data transmission mode to a voice connection.
Call cleared callback possible IDLE registered	In this state the PE eCall IVS stays registered to support callback functionality from the PSAP after an eCall is cleared down.
IGNITION ON/ IDLE, registered Wait for de-registration	Upon T9 expiry the callback functionality is not required any more for PE eCall only IVSs. The next step is the de-registration.
IGNITION ON/ eCall INACTIVE	This state is for eCall only devices similar to the state before an eCall has been triggered. The next step is "Vehicle power off".
IGNITION ON/ IDLE, registered	This state is for eCall capable devices similar to the state before an eCall has been triggered. The next step is "Vehicle power off".

4.4 Decisions

eCall only?	Y: The DUT is a PE eCall only IVS. N: The DUT is a PE eCall capable IVS.
PSAP PULL-mode?	Y: SEND MSD before initiation signal started. N: SEND MSD after initiation signal started. The CEN specifications leave the possibility to the PSAP to send an early SEND MSD.
CEN decision to shortcut LL ACK	Y: Not a valid implementation in the present document. N: Only no is used in the present document. (see note)
Vehicle power off?	Y: The vehicle power is switched off, i.e. the vehicle ignition is turned to off (is not equal to the state "IGNITION OFF"). N: The vehicle power, i.e. the vehicle ignition is turned on. Please note that "Vehicle power off" does not automatically mean that the IVS has no power supply. Depending on the implementation the IVS may have a back-up battery or other mechanism to ensure power supply as CEN requires to support further operation in case an eCall is in progress and the vehicle power is switched off.
De-registered?	Y: PE eCall only IVS is already de-registered. N: PE eCall only IVS is not yet de-registered.
NOTE:	The current situation is that the latest CEN specification foresees first an LL-ACK to be sent and then an AL-ACK. Only upon reception of both the MSD transmission is considered to be successful. Within CEN there are discussions to loosen this requirement and consider the MSD transfer successful with only an AL-ACK sent/received. Since CEN has not published any specification officially supporting the AL-ACK only shortcut throughout the present document the decision is always "N". The diagram contains the option "Y" to make the reader aware of a potential future change.

4.5 Procedures

Network registration	The messages exchanged between the IVS and the MNO/PSAP/tester during network registration depend on the Radio Access Technology (RAT) applied. After successful completion of the procedure the device is registered.
Call setup	Procedure for call establishment on mobile network level. No in-band modem behaviour is covered by this procedure. This procedure comprises the state "Call established" referred to by several test cases.
Connect voice	After successful transmission of the MSD, the in-band modem connection switches from data transmission mode to a voice connection. This procedure is triggered by "IVS Audio unmuted".
Protocol exchange	Procedure comprising the message exchange necessary for clearing down a call and returning to the state "Call cleared; Callback possible; IDLE, registered".
Normal call (T11)	This procedure represents a normal call (T11) connection in contrast to the emergency call (T12) used for eCall.
De-registration	Procedure for PE eCall capable IVSs to de-register from the mobile network after "Vehicle power off".

4.6   Tester input/output, internal tester actions/trigger

Vehicle power on	The vehicle ignition is turned on. The vehicle power switching is not directly related to the power supply of the PE eCall IVS. Please refer to "Vehicle power off".
Self-test indication OK	After successful completion of the self-test the PE eCall IVS shall provide an indication to the user which is not further specified. The upper tester has to handle the processing of the information.
Trigger meC	Trigger for a manual eCall (note this is a TS12 call).
Trigger aeC	Trigger for an automatic eCall (note this is a TS12 call).
Trigger teC	Trigger for a test eCall (note this is a TS11 call).
Trigger reC	Trigger for a reconfiguration call (note this is a TS11 call)/this kind of trigger is not used within the test cases described in the present document. This kind of call occurs only in the referenced test cases in ETSI TS 151 010-1 [9] and ETSI TS 134 123-1 [2] and is listed here for completeness.
Establish meC	This is a message sent from the upper tester to the IVS in case the upper tester receives a "trigger meC".
Establish aeC	This is a message sent from the upper tester to the IVS in case the upper tester receives a "trigger aeC".
Establish teC	This is a message sent from the upper tester to the IVS in case the upper tester receives a "trigger teC".
Establish reC	This is a message sent from the upper tester to the IVS in case the upper tester receives a "trigger reC".
Cancel meC	The manually triggered call is not started/stopped before any action is performed.
HMI alert	The HMI alerts the user that an eCall is initiated and according establishment procedures start.
Start T1	Starts with "Establish meC".
Stop T1	Stops with "Cancel meC".
T1 expiry	Upon expiry of T1 the state "Waiting for HMI alert" is reached. Duration of T1 is implementation specific and may be 0 second.
Start T2	Call Cleardown Fallback Timer (CCFT), starts with the start of "Call setup".
Stop T2	Stops with "Clear down by PSAP operator or mobile network", i.e. when the PE eCall IVS receives a cleardown command.
T2 expiry	In case T2 (3 600 seconds/1 h) expires during state "E112 voice call" the PE eCall IVS hangs up the call.
Start T3	Starts with the "Initiation signal" being sent.
Stop T3	Stops with the Initiation signal being stopped upon reception of SEND MSD in the PE eCall IVS.
T3 expiry	After T3 (2 seconds) sending of the initiation signal shall be stopped. Expiry of T3 is not further considered in the present document.
Start T4	Started after procedure for "Call setup" is completed (state "Call established" included).
Stop T4	Stops as soon as PSAP receives the initiation signal.
T4 expiry	Expiry of T4 (5 seconds) is not further considered in the present document.
Start T5	Started after procedure for "Call setup" is completed (state "Call established" included).
Stop T5	Stops with "SEND MSD".
T5 expiry	Expiry of T5 (5 seconds) is not further considered in the present document.
Start T6	Start after "LL ACK".
Stop T6	Stop after "AL ACK" and procedure "Connect voice".
T6 expiry	Expiry of T6 (5 seconds) is not further considered in the present document.
Start T7	Start upon "MSD tx" starts.
Stop T7	Stop after "LL ACK".
T7 expiry	Expiry of T7 (20 seconds) is not further considered in the present document.
Start T8	Starts with "SEND MSD".
Stop T8	Stops with successful "MSD Tx" on LL.
T8 expiry	No MSD reception within T8 (20 seconds) is not further considered in the present document.
Start T9	Starts after the voice call is cleared down. T9 is unstoppable.
T9 expiry	Expires T9 (3 600 seconds/60 minutes) after the voice connection is cleared down. Only after T9 expiry PE eCall IVS may deregister. T9 expiry is the regular behaviour, not a failure.
Start T10	Starts after the voice call is cleared down.
Stop T10	Stops upon a new call, e.g. "Call back (by PSAP)".
T10 expiry	Upon expiry of T10 (12 h) PE eCall only IVS will de-register from the network the latest.
SEND MSD	SEND MSD signal is sent from the PSAP to the PE eCall IVS.
Initiation signal	The PE eCall IVS sends the initiation signal also referred to as PUSH-REQ.
Initiation signal stops	The transmission of the initiation signal is stopped.
Stop SEND MSD	The transmission of the SEND MSD is stopped.

MSD tx	The PE eCall IVS transmits the MSD. The signal consists of several repeating pulses.
LL ACK	Link layer acknowledgement is sent to the PE eCall IVS.
AL ACK	Application layer acknowledgement is sent to the PE eCall IVS.
IVS Audio unmuted	The audio functionality of the IVS is unmuted, i.e. the microphone and speaker are connected.
Hang up	The PE eCall IVS hangs up the call if advised to do so by the PSAP operator.
Clear down by PSAP operator or mobile network	Clear down initiated by the PSAP operator or the mobile network.
Vehicle power off	The vehicle ignition is turned off. In case an eCall is in progress, CEN specification foresees that the PE eCall IVS keeps the call ongoing. Hence, the "Vehicle power off" is not directly related to the power supply of the PE eCall IVS.
Call back (by PSAP)	After an eCall is completed the PSAP has the option to call back the PE eCall IVS while T9 is running.
Clear down	Same as "Clear down by PSAP operator or mobile network".
De-register	The earliest after T9 expiry, the latest after T10 expiry, PE eCall only IVSs de-register from the network.
De-registered: = true	The PE eCall only IVS is de-registered which allows the PE eCall only IVS to reach the state IGNITION ON/eCall INACTIVE.

5   Overview

5.1   Test definition methodology

5.1.1   Derivation of Test Case Descriptions from CEN EN 16454

Some of the test cases contained in CEN EN 16454 [1] have been implemented in ETSI TS 103 321 [i.1]. The implementation was done in TTCN-3. As a result of this activity it has become evident that the test cases are specified in a way which makes difficult to employ these test cases for certification. On the one hand they leave a great degree of freedom to the operator on what steps to perform, and on the other hand clear and unambiguous PASS criteria are missing and left to the test operator to valuate [i.2].

The present document undertakes to refine the test cases contained in CEN EN 16454 [1] in such a way that the intended degree of freedom is "translated" in well-defined possible sequences of test steps which can be derived from the CEN EN 16454 test case. Furthermore the initial conditions are defined more rigidly; this is feasible because the test architecture is defined including the formalization of the messages exchanged between the entities involved in the test system.

5.1.2   Structure of Test Case Descriptions

The test case descriptions consist of the following parts:

- Test Purposes

- Conformance Requirement, in any case including a reference to the TC in [1]

- Test Description

Consisting of:

- Pre-Test Description

- Test Sequence

- Specific message contents

5.1.3   Test Purposes

Defined in the test case section according to [i.3].

5.1.4   Pre-Test Conditions

Defined in the test case section according to [i.3].

5.1.5   Test Sequence

Defined in the test case section according to [i.3].

5.1.6   Final conditions

In order to clean up at the end of test cases, refer to clause 6.3.

5.2   Abstract Test Architecture

5.2.0   Preface

The entities involved in the testing are to be identified and the messages exchanged between them are to be specified.

Different architectures will be needed to deal with the test objects which appear in [1].

5.2.1   Overview

5.2.1.1   IVS Testing

5.2.1.1.1   Test Model IVS

Presently the assumed test model is provided in figure 5.2.1.1.1-1.
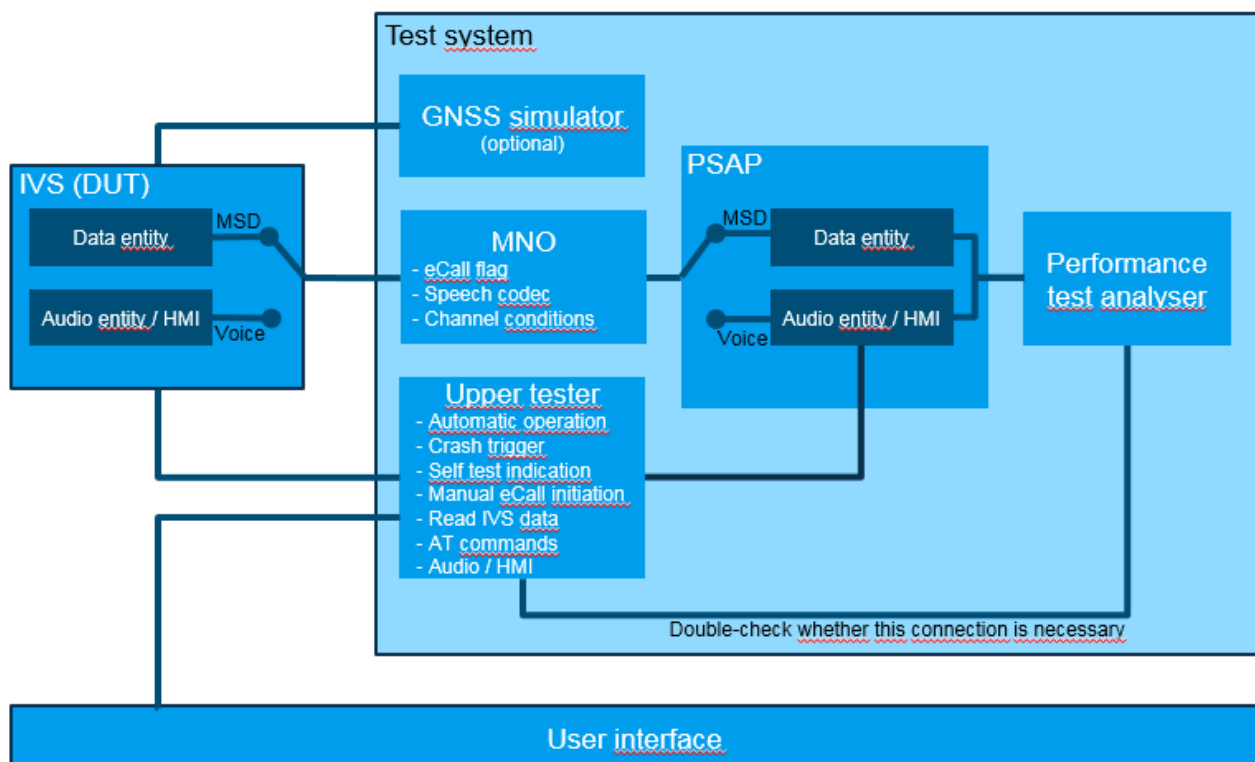
Figure 5.2.1.1.1-1: IVS Test Model

5.2.1.1.2   Interface descriptions

Not only the interfaces external to the tester are provided, but also the internal interfaces are modelled here. Distinction between internal and external interfaces is to be discussed. Doing so should allow not to forget anything.

Interface IVS - MNO:

- Non-transparent messages: having significance for the communication between IVS and MNO only

- Transparent messages: transiting through the MNO without being modified (contents)

Interface IVS - PSAP Data:

- Transparent at the MNO, e.g. MSDs

Interface IVS - PSAP Voice:

- Transparent at the MNO

Interface IVS - Crash Trigger:

- Not considered in the present document

Interface IVS - Upper tester:

- To trigger actions at the IVS (issue an eCall, turn on the ignition, etc.)

Interface MNO - PSAP Data:

- Non-Transparent only at the MNO

Interface MNO - PSAP Voice:

- Always transparent

5.2.1.2   PSAP Testing

For further study.

5.2.2   Interface Specifications

5.2.2.1   IVS Testing

5.2.2.1.0   Preface

IVS and Tester share 3 interfaces which are handled by different sub-functionalities in the Tester (figure 5.2.1.1.1-1):

- IVS and Upper Tester

- IVS and MNO

- IVS and GNSS Simulator

5.2.2.1.1   IVS and Upper Tester

The following MMI commands are used.

Table 5.2.2.1.1-1: MMI commands

Command	Parameters	
	Name	Value
"CHECK SELF TEST INDICATION OK"	(none)	
"CANCEL ECALL"	(none)	
"CALLBACK IVS"	(none)	
"CHECK_IVS_AUDIO_MUTED"	(none)	
"CHECK_IVS_AUDIO_UNMUTED"	(none)	
"CHECK_ENTERTAINMENT_AUDIO_MUTED"	(none)	
"CHECK_ENTERTAINMENT_AUDIO_UNMUTED"	(none)	
"VEHICLE_POWER"	"STAT"	<on, off>
"AUDIO"	"STAT"	<on, off>
"CHECK_HMI_ALERT"	"STAT"	<on, off>
"INSERT_USIM"	"TEXT"	<insert, remove>
NOTE 1: The (non-CHECK) commands do not trigger a response at the Upper Tester interface, but cause effects which are detectable elsewhere.		
NOTE 2: The CHECK commands imply reception of a response. It is out of scope of the present document how this response is received. However, if the tester logs provide traceable evidence this supports e.g. certifiers in their evaluation of the reliability of results received. As a general rule, results obtained by a human operator may be considered as less reliable than results obtained by some machine type device.		

The AT commands in ETSI TS 127 007 [7] shall be used. Table 5.2.2.1.1-2 provides some examples.

Table 5.2.2.1.1-2: AT commands

Command	Parameters	
	Name	Value
"TRIGGER ECALL"	+CECALL	<type_of_eCall>
"HANG_UP_CALL"	+CHUP	

It is recommended to use a diagnosis plug according ISO 15031-3 [i.4] (ideally CAN bus) to enable communication between IVS and tester (e.g. to retrieve data from the IVS).

5.2.2.1.2   IVS and MNO

Two types of messages are transported across this interface:

- Signalling messages required to connect the IVS to the network and get the IVS registered.
  These messages shall be as defined in the specification, ETSI TS 124 008 [11].

- The connection between MNO and PSAP is realized inside the tester. As this interface is not subject of testing the message exchanged across this interface are not relevant here.

- Higher layer messages which are exchanged between IVS and PSAP across an inband modem connection .
  The network connection allows a transparent connection between both entities. Only the following messages are defined between IVS and PSAP in the HLAP.

Table 5.2.2.1.2-1: Inband modem messages

Message	Explanation	
	Direction	Comment
SEND MSD (START signal)	-> IVS	
PUSH-REQ	-> PSAP	Initiation signal
MSD TX	-> PSAP	Composite message using incremental redundancy
LL ACK	-> IVS	
AL ACK (Positive)	-> IVS	
AL ACK (Call Clear Down)	-> IVS	
NACK	-> IVS	

5.2.2.1.3   IVS and GNSS Simulator

This functionality is optional and not employed for the time being. Therefore the message exchange across this interface is not yet defined.

5.2.2.2   MNO Testing

For further study.

5.2.2.3   PSAP Testing

For further study.

5.2.2.4   TPS-eCall Testing

For further study.

5.2.3   State diagram

Derived from CEN EN 16454 [1]. Subsequent state diagram is related to the Permanent Reference Document of the Technical Specification Group RAN WG5 from the 3GPP RAN5 PRD 13 [i.3].
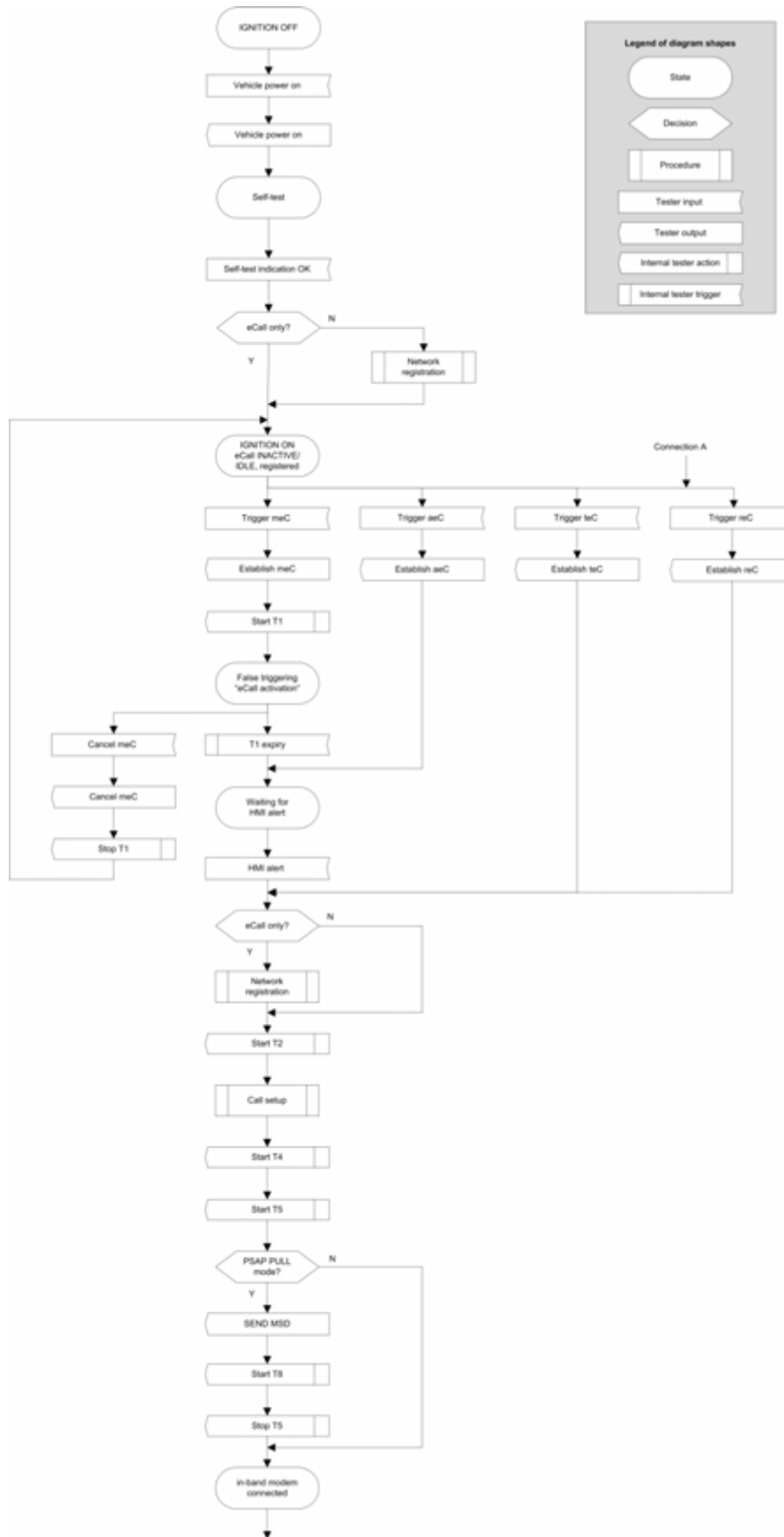
Figure 5.2.3-1: State diagram - part 1
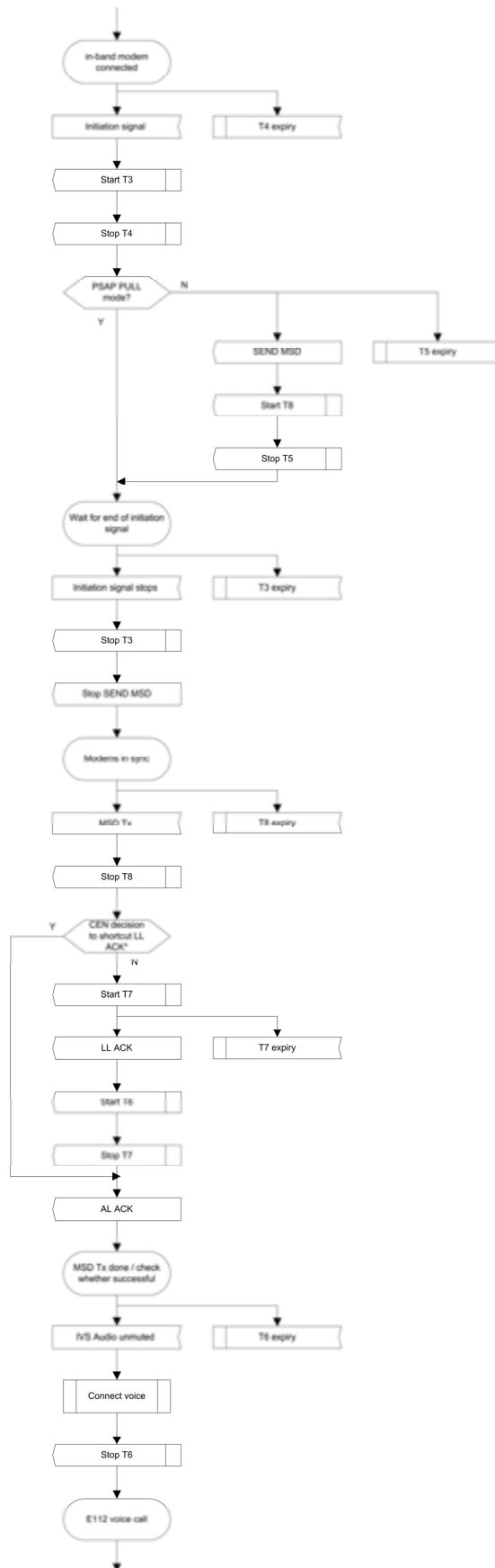
Figure 5.2.3-2: State diagram - part 2
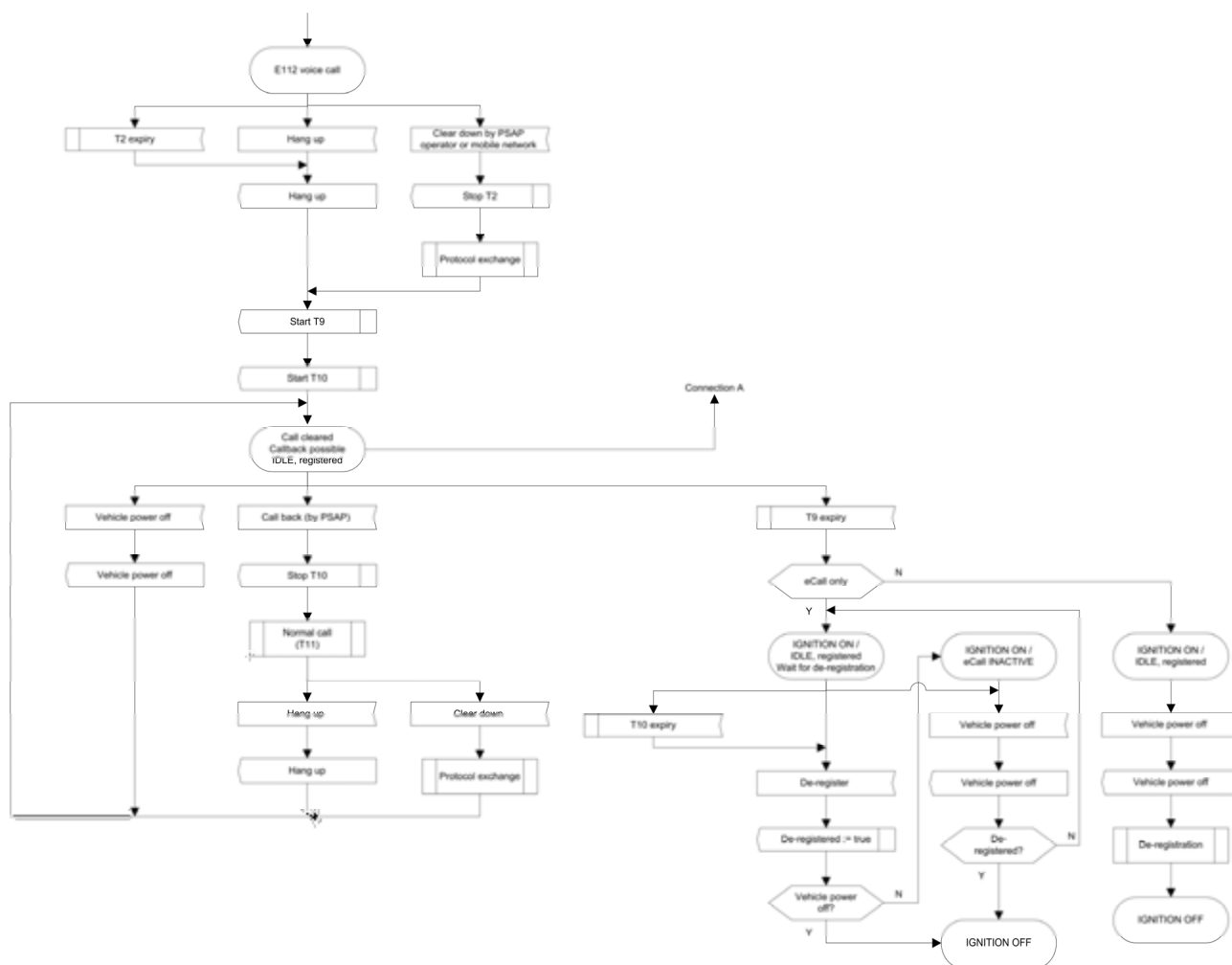
Figure 5.2.3-3: State diagram - part 3

5.3   Specification in TTCN

The present document is a prose text specification for Pan-European eCall end to end and in-band modem conformance testing derived from CEN EN 16454 [1]. It does not contain any TTCN-3 but can be used as a basis for future TTCN-3 development.

5.4   Capabilities

PE eCall IVS can support different capabilities which effect the test case applicability:

- PE eCall capable IVS vs. PE eCall only IVS

- GSM only IVS vs. GSM and UMTS IVS

- IVS including back-up battery vs. IVS not including back-up battery

- exchangeable or reconfigurable SIM/USIM vs. embedded and non-configurable SIM/USIM

- the IVS can distinguish different crash types or not

Some capabilities depend on the integration status. If test cases are passed in an earlier integration status they can be assumed to be passed in the more complex environment. To optimize testing time it is recommended to use an IVS without back-up battery except for the test cases explicitly testing the back-up battery.

5.5   Test Case Selection

For further study.

5.6   Test Configuration Parameters

5.6.1   eCall Type Suffix

The following eCall types can be triggered (see clause 6.1.2.2):

- Automatic eCall

- Manual eCall

- Test eCall

- Reconfiguration Call

    NOTE: Reconfiguration Call is not used by the test sequences in the present document.

The applicable preambles for a test case are specified in the "Pre-test conditions" section. Several preambles can apply to a given test case, to differentiate between concrete versions of executed test cases the following suffixes will be used:

- **ta -** trigger automatic eCall (preamble 2)

- **tm -** trigger manual eCall (preamble 3)

- **tt -** trigger test eCall (preamble 11)

Even if only one preamble is applicable the eCall type suffix should be specified. The suffix only refers to the eCall initiation in the preamble, subsequent eCall triggers in the test sequence shall specify the eCall type.

    EXAMPLE: Test case CTP 1.1.14.1 (see clause 7.1.1.30) is applicable for three eCall types, which implies that the test case shall be instantiated by using the appropriate suffix, leading to three possible tests:

    -   ctp_1_1_14_1_ta - uses preamble 2;

    -   ctp_1_1_14_1_tm - uses preamble 3;

    -   ctp_1_1_14_1_tt- uses preamble 11.

5.7   TTCN Implementation

The TTCN Implementation allows to check for consistency and completeness of the description. It can be used as basis for a subsequent implementation.

5.8   Execution Guidelines

If derivates of CEN TCs allow to select different TCs then there should be clear rules under which circumstance which derived test is allowable. Such guidelines may differ when a certification test is to be run and when some "field" test is to be performed.

The hooks are to be provided in the TTCN.

6 Generic Procedures

6.0 Preface

All signalling and protocol tests shall use the reference environments specified in ETSI TS 136 508 [10]. Where a test requires an environment that is different, this is specified in the test itself.

6.1 General

6.1.1 General assumptions

The following assumptions are made concerning the initial conditions (prerequisites). Preambles rely on these assumptions being fulfilled. They may therefore add further conditions or specify conditions in more detail, or exceptionally state which restrictions are to be applied.

Prerequisites:

- MNO and PSAP Test Points are available
- USIM is configured
- no eCall is ongoing
- no IVS errors
- automatic eCall is enabled
- test call number is available
- IVS data access is established
- Crash trigger is enabled

In order to avoid unnecessary repetitions of e.g. the self-test, two preamble states are distinguished:

- IGN_OFF
- IGN_ON

The initial preamble state is IGN_OFF:

- Mobile environment is configured so that IVS is in (good) Mobile Coverage
- IVS is ignited (vehicle power is switched on)
- self test is performed
- IVS is network registered if not an eCall Only device

The resulting preamble state is IGN_ON.

A previously run test case may leave the UE in this state.

6.1.2 Generic procedures

6.1.2.0 Preface

These procedures serve as building blocks which can be used in preambles, test bodies and postambles.

6.1.2.1   Procedure for network registration

UMTS:

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	RRC Connection establishment. The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to: Registration.	-	-	-	-
2		-->	LOCATION UPDATING REQUEST	-	-
3		<--	LOCATION UPDATING ACCEPT	-	-
4		-->	TMSI REALLOCATION COMPLETE	-	-
5	RRC Connection release.	-	-	-	-
NOTE 1: Step 3 may be with type IMSI attach. Then step 4 will not have to be done. To be checked.					
NOTE 2: Authentication procedure is done.					

GSM:

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	RRC Connection establishment. The SS verifies that the MS sends RACH Request with "Establishment cause" set to Location updating.	-	-	-	-
2		-->	CHANNEL REQUEST	-	-
3		<--	IMMEDIATE ASSIGNMENT	-	-
4		-->	LOCATION UPDATING REQUEST	-	-
5		<--	LOCATION UPDATING ACCEPT	-	-
6		-->	TMSI REALLOCATION COMPLETE		
7		<--	CHANNEL RELEASE		
8	RRC Connection release.				
NOTE 1: Step 4 may be with type "Normal location updating" or "IMSI Attach".					
NOTE 2: Authentication procedure likely has to be done					

6.1.2.2   Procedure for eCall establishment

The procedure is parametrized with the type of eCall.

Possible values:

- automatic eCall

- manual eCall

- test eCall

- reconfiguration eCall

UMTS:

Sequence for automatic or manual eCall

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1	-	-	-	-
2	UE is made to initiate an eCall of the requested type in accordance with manufacturer's instructions (see note)	-	-	-	-
3	UE performs RRC procedure with cause "Emergency call"	-	-	-	-
4	The CM service type IE indicates "emergency call establishment"	-->	CM SERVICE REQUEST	-	-
5		<--	AUTHENTICATION REQUEST	-	-
6		-->	AUTHENTICATION RESPONSE	-	-
7	SS starts RRC security procedure			-	-
8		-->	EMERGENCY SETUP (see note)	-	-
9		<--	CALL PROCEEDING	-	-
10		<--	ALERTING	-	-
11		<--	CONNECT	-	-
12		-->	CONNECT ACKNOWLEDGE	-	-
NOTE: The type of eCall is a parameter to this procedure.					

Sequence for test eCall and reconfiguration eCall

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1	-	-	-	-
2	UE is made to initiate an eCall of the requested type in accordance with manufacturer's instructions (see note)	-	-	-	-
3	UE performs RRC procedure with cause "originatingConversationalcall"	-	-	-	-
4	The CM service type IE indicates "originating conversational call"	-->	CM SERVICE REQUEST	-	-
5		<--	AUTHENTICATION REQUEST	-	-
6		-->	AUTHENTICATION RESPONSE	-	-
7	SS starts RRC security procedure			-	-
8		-->	SETUP (see note)	-	-
9		<--	CALL PROCEEDING	-	-
10		<--	ALERTING	-	-
11		<--	CONNECT	-	-
12		-->	CONNECT ACKNOWLEDGE	-	-
NOTE: The type of eCall is a parameter to this procedure.					

GSM:

Sequence for automatic or manual eCall

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1	-	-	-	-
2	UE is made to initiate an eCall of the requested type in accordance with manufacturer's instructions (see note)	-	-	-	-
3	UE sends RACH Request with "Establishment cause is emergency call establishment"	-->	CHANNEL REQUEST	-	-
4		<--	IMMEDIATE ASSIGNMENT	-	-
5	The CM service type IE indicates "emergency call establishment"	-->	CM SERVICE REQUEST		
6		<--	CM SERVICE ACCEPT	-	-
7	SS starts RRC security procedure			-	-
8		-->	EMERGENCY SETUP (see note)	-	-
9		<--	CALL PROCEEDING	-	-
10		<--	ALERTING	-	-
11		<--	ASSIGNMENT COMMAND	-	-
12		-->	ASSIGNMENT COMPLETE	-	-
13		<--	CONNECT		
14		-->	CONNECT ACKNOWLEDGE		
NOTE:	The type of eCall is a parameter to this procedure.				

Sequence for test eCall and reconfiguration eCall

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1	-	-	-	-
2	UE is made to initiate an eCall of the requested type in accordance with manufacturer's instructions (see note)	-	-	-	-
3	UE sends RACH Request with "Establishment cause is originating call establishment"	-->	CHANNEL REQUEST	-	-
4		<--	IMMEDIATE ASSIGNMENT	-	-
5	The CM service type IE indicates "originating call establishment"	-->	CM SERVICE REQUEST		
6		<--	CM SERVICE ACCEPT	-	-
7	SS starts RRC security procedure			-	-
8		-->	SETUP (see note)	-	-
9		<--	CALL PROCEEDING	-	-
10		<--	ALERTING	-	-
11		<--	ASSIGNMENT COMMAND	-	-
12		-->	ASSIGNMENT COMPLETE	-	-
13		<--	CONNECT		
14		-->	CONNECT ACKNOWLEDGE		
NOTE:	The type of eCall is a parameter to this procedure.				

NOTE 1: Could be presented as specific message contents as well.

For an Automatic eCall the Emergency Service Category IE bit 7 is set to 1 and all other bits are set to 0.

For a Manual eCall the Emergency Service Category IE bit 6 is set to 1 and all other bits are set to 0.

For a Test eCall and a Reconfiguration eCall Emergency Service Category IE is not provided.

NOTE 2: The eCall is established.

6.1.2.3   Procedure for eCall in progress

Step	Procedure	Message Sequence		TP	Verdict
		I - T	**Message**		
1	UE is made to establish an eCall of the requested type in accordance with manufacturer's instructions. (see note)	-	-	-	-
2	eCall indicator - initiation	-->	PUSH-REQ		
3	PSAP requests MSD	<--	SEND MSD	-	-
4	IVS sends MSD	-->	MSD tx	-	-
5	PSAP is not able to decode MSD at LL	<--	NACK		
6	PSAP received valid MSD message at LL	<--	LL-ACK	-	-
7	PSAP received valid MSD message at AL	<--	AL-ACK	-	-
NOTE: The type of eCall is a parameter to this procedure.					

6.1.2.4   Procedure for eCall release (PSAP initiated)

Step	Procedure	Message Sequence		TP	Verdict
		I - T	**Message**		
1		<--	DISCONNECT	-	-
2		-->	RELEASE	-	-
3		<--	RELEASE COMPLETE	-	-
4		<--	CHANNEL RELEASE	-	-
5	RRC Connection release	-	-	-	-

6.1.2.5   Procedure for eCall release (IVS initiated, preceding AL-ACK call clear down)

Step	Procedure	Message Sequence		TP	Verdict
		I - T	**Message**		
1		-->	DISCONNECT	-	-
2		<--	RELEASE	-	-
3		-->	RELEASE COMPLETE	-	-
4		-->	CHANNEL RELEASE	-	-
5	RRC Connection release	-	-	-	-

6.1.2.6   Procedure for PSAP callback

UMTS

Step	Procedure	Message Sequence		TP	Verdict
		I - T	**Message**		
1	Paging	<--	-	-	-
2	PAGING RESPONSE	-->	-	-	-
3		<--	AUTHENTICATION REQUEST	-	-
4		-->	AUTHENTICATION RESPONSE	-	-
5	SS starts RRC security procedure			-	-
6		<--	SETUP	-	-
7		-->	CALL CONFIRMED	-	-
8		-->	ALERTING	-	-
9		-->	CONNECT	-	-
10		<--	CONNECT ACKNOWLEDGE (see note 2)	-	-

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See ETSI TS 134 108 [i.5], clause 7.1.2 Establishment cause: Terminating Conversational Call.
2	->		PAGING RESPONSE	
3	<-		AUTHENTICATION REQUEST	
4	->		AUTHENTICATION RESPONSE	
5	<-		SECURITY MODE COMMAND	
6	->		SECURITY MODE COMPLETE	
7	<-		SETUP	U6 (see note 1)
8	->		CALL CONFIRMED	U9
A9	->		CONNECT	U8, p = Y (see note 2)
B9	->		ALERTING	U7, p = N (see note 2)
B10	UE			(see note 3)
B11	->		CONNECT	U8
12			Radio Bearer Setup Procedure	See ETSI TS 134 108 [i.5], clause 7.1.3
13	<-		CONNECT ACKNOWLEDGE	U10
NOTE 1: With signal information included in the SETUP message.				
NOTE 2: The UE is supporting immediate connect (p = Y/N). See ICS/IXIT statement.				
NOTE 3: If necessary (see ICS/IXIT statement), the UE is made to accept the call in the way described in a ICS/IXIT statement.				

6.1.2.7   Procedure for call rejection

The procedure is parametrized with the type of eCall.

Possible values:

- automatic eCall

- manual eCall

- test eCall

- reconfiguration eCall

UMTS

Sequence for automatic or manual eCall

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1	-	-	-	-
2	UE is made to initiate an eCall of the requested type in accordance with manufacturer's instructions (see note)	-	-	-	-
3	UE performs RRC procedure with cause "Emergency call"	-	-	-	-
4	The CM service type IE indicates "emergency call establishment"	-->	CM SERVICE REQUEST	-	-
5	MNO test point denies service request with cause "#22 Congestion"	<--	CM SERVICE REJECT	-	-
NOTE: The type of eCall is a parameter to this procedure.					

Sequence for test eCall and reconfiguration eCall

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1	-	-	-	-
2	UE is made to initiate an eCall of the requested type in accordance with manufacturer's instructions (see note)	-	-	-	-
3	UE performs RRC procedure with cause "originatingConversationalcall"	-	-	-	-
4	The CM service type IE indicates "originating conversational call"	-->	CM SERVICE REQUEST	-	-
5	MNO test point denies service request with cause "#22 Congestion"	<--	CM SERVICE REJECT	-	-
NOTE:	The type of eCall is a parameter to this procedure.				

GSM:

Sequence for automatic or manual eCall

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1	-	-	-	-
2	UE is made to initiate an eCall of the requested type in accordance with manufacturer's instructions (see note)	-	-	-	-
3	UE sends RACH Request with "Establishment cause is emergency call establishment"	-->	CHANNEL REQUEST	-	-
4		<--	IMMEDIATE ASSIGNMENT	-	-
5	The CM service type IE indicates "emergency call establishment"	-->	CM SERVICE REQUEST		
6	MNO test point denies service request with cause "#22 Congestion"	<--	CM SERVICE REJECT	-	-
NOTE:	The type of eCall is a parameter to this procedure.				

Sequence for test eCall and reconfiguration eCall

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1	-	-	-	-
2	UE is made to initiate an eCall of the requested type in accordance with manufacturer's instructions (see note)	-	-	-	-
3	UE sends RACH Request with "Establishment cause is originating call establishment"	-->	CHANNEL REQUEST	-	-
4		<--	IMMEDIATE ASSIGNMENT	-	-
5	The CM service type IE indicates "originating call establishment"	-->	CM SERVICE REQUEST		
6	MNO test point denies service request with cause "#22 Congestion"	<--	CM SERVICE REJECT	-	-
NOTE:	The type of eCall is a parameter to this procedure.				

6.2   Preambles

Preamble 1 for PE eCall capable IVS Testing:

Pre-test conditions

System Simulator:

- 1 cell, default parameters (GERAN: ETSI TS 151 010-1 [9], UMTS: ETSI TS 134 123-1 [2]).

IVS:

- The IVS is equipped with a USIM containing default values except for those listed below.

USIM field	Value/Remark
EF$_{UST}$	Service n°4 Service Dialling Numbers (SDN) and Service n°89 eCall Data available
EF$_{SDN}$	Last two entries of SDNs, eCall Test Number (123456) and eCall reconfiguration number (345678)
EF$_{EST}$	Enabled Services Table

Preamble:

- IVS is switched on, is registered on a PLMN and is in MM IDLE state (Preamble 1).

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
-	EXCEPTION: Steps 1 to 3 shall be performed if PreambleState = IGN_OFF	-	-	-	-
1	Set the cell type of cell 1 to the "Serving cell".	-	-	-	-
2	Power on/switch on the IVS	-	-	-	-
3	IVS performs self-test (see note 1)	-	-	-	-
4	Steps of the generic procedure for network registration (clause 6.1.2.1) are performed (see note 2)	-	-	-	-
NOTE 1: The result of the self-test is checked.					
NOTE 2: This step is not performed for eCall Only IVS. See Preamble 1 for IVS only Testing. In such a case the network registration will happen at the point of time when it is needed.					

Preamble 1 for PE eCall only IVS Testing:

Pre-test conditions.

System Simulator:

- 1 cell, default parameters (GERAN: ETSI TS 151 010-1 [9], UMTS: ETSI TS 134 123-1 [2]).

IVS:

- The IVS is equipped with a USIM containing default values except for those listed below.

USIM field	Value/Remark
EF$_{UST}$	Service n°2 Fixed Dialling Numbers (FDN) and Service n°89 eCall Data available
EF$_{FDN}$	Display two FDNs, eCall Test Number (123456) and eCall reconfiguration number (345678)
EF$_{EST}$	Enabled Services Table

Preamble 1:

- IVS is powered on and in MM IDLE eCALL INACTIVE state. In this state the IVS with an "eCall only" subscription shall not be registered on a network but may perform a background scan to identify available PLMNs.

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
-	EXCEPTION: Steps 1 to 3 b shall be performed if PreambleState = IGN_OFF	-	-	-	-
1	Set the cell type of cell 1 to the "Serving cell"	-	-	-	-
2	Vehicle Power ON	-	-	-	-
3	IVS performs self-test (see note)	-	-	-	-
NOTE: The result of the self-test is checked.					

Preamble 2:

Preamble 1 with an automatic eCall in progress.

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1	-	-	-	-
2	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed with parameter automatic eCall				

Preamble 3:

Preamble 1 with a manual eCall in progress.

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1	-	-	-	-
2	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed with parameter manual eCall				

Preamble 4 for PE eCall capable IVS Testing:

Preamble 1 with a conflicting communication in progress (see CEN EN 16072 [8], clause 7.4).

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1 for PE eCall capable IVS Testing	-	-	-	-
2	Establish normal voice call	-	-	-	-

Preamble 4 for PE eCall only IVS Testing:

Preamble 1 with a conflicting communication in progress (see CEN EN 16072 [8], clause 7.4).

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1 for PE eCall only IVS Testing	-	-	-	-
2	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed with eCall type as parameter	-	-	-	-
3	Steps of the generic procedure for eCall in progress (clause 6.1.2.3) are performed	-	-	-	-
4	Steps of the generic procedure for eCall release (PSAP initiated) (clause 6.1.2.4) are performed	-	-	-	-
5	Steps of generic procedure for PSAP callback (clause 6.1.2.6) are performed	-	-	-	-

Preamble 5:

Preamble 1 with limited service condition established.

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1 with special USIM (see note)	-	-	-	-
NOTE:	USIM with IVS put in limited service. Step 1 of preamble 1 is adapted.				

Preamble 6:

Preamble 1 with emergency speech ongoing.

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1	-	-	-	-
2	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed with eCall type as parameter	-	-	-	-
3	Steps of the generic procedure for eCall in progress (clause 6.1.2.3) are performed	-	-	-	-

Preamble 7:

Preamble 1 with test eCall completed and timer T9 running.

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1	-	-	-	-
2	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed with parameter test eCall (see note 1)	-	-	-	-
3	Steps of the generic procedure for eCall in progress (clause 6.1.2.3) are performed	-	-	-	-
4	Steps of the generic procedure for eCall release (clause 6.1.2.4) are performed	-	-	-	-
5	Start Timer T9 (see note 2)	-	-	-	-
NOTE 1: The test eCall is established.					
NOTE 2: T9 is running for 3 600 seconds uninterruptable!					
NOTE 3 How to get around T9 if considered too long. Please refer to CEN EN 16062 [6], clause 7.9 on how to force de-registration before T9 expiry. This might be required to speed up testing with IVS in eCall only configuration.					

Preamble 8:

Void.

Preamble 9:

Preamble 1 with test eCall completed and callback in progress.

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 7 (see note)	-	-	-	-
k+1 cc	<establish call back>				
NOTE: A test eCall has been completed.					

CEN EN 16062 [6], clause 7.10 (**except** point c which is covered by another CTP).

The PSAP operator shall be able to initiate a call back using the PSAP application system (e.g. call back application user interface) or directly dialling the number using a conventional phone as defined in CEN EN 16072 [8].

CEN EN 16072 [8], clause 7.17.3.

See also ETSI TS 134 123-1 [2], clause 10.1.3.

Preamble 10:

Steps 1-3 of Preamble 1.

Preamble 11:

Preamble 1 with a test eCall in progress.

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Steps of Preamble 1	-	-	-	-
2	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed with parameter test eCall.				

6.3   Postambles

6.3.0   Preface

In order to reach the initial state for testing the IVS needs to be de-registered and the vehicle power has to be turned down. See state IGNITION OFF in the state diagram in clause 5.2.3.

As the IVS behaviour at the end of an emergency call differs considerably between a PE eCall capable IVS and a PE eCall only IVS different from postambles are specified.

Due to the time duration these postambles are specified in 2 variants: a short variant which allows to run the test cases in a time efficient way, and a long variant which respects the full requirements on eCall devices. It is up to the test operator to choose the appropriate postamble. E.g. a certifier may be interested to run the long variant as he/she wants to ensure that the IVS fully obeys the rules.

   NOTE: Optimizations of the test execution by shortening the postambles and starting the subsequent test in a state other than IGNITION OFF are out of the scope of the present document.

6.3.1   Postambles for eCall capable devices

A. Long variant:

   • If a test has a call set up this call is cleared down according to the procedure in clause 6.1.2.4.

Expiry of T9 is expected.

   • The IVS is de-registered by the Tester sending a DETACH message.

   • The IVS is powered down by the Tester sending a "Vehicle power off".

B. Short variant:

   • If a test has a call set up this call is cleared down according to the procedure in clause 6.1.2.4.

   • The IVS is powered down by the Tester sending a "Vehicle power off".

6.3.2   Postambles for eCall only devices

A. Long variant:

   • If a test has a call set up this call is cleared down according to the procedure in clause 6.1.2.4.

   • Expiry of T9 is expected.

   • The Tester waits for the deregistration of the UE. This will happen within 12 hours after the call release.

   • The IVS is powered down by the Tester sending a "Vehicle power off".

B. Short variant:

   • If a test has a call set up this call is cleared down according to the procedure in clause 6.1.2.4.

   • The IVS is powered down by the Tester sending a "Vehicle power off".

6.3.3   Special case: Limited Service Condition

In case the Limited Service Condition has been established by inserting a special USIM the postamble as described above needs to be completed by inserting a USIM which does not have a Forbidden PLMN registered.

In case the Limited Service Condition has been established by performing an appropriate protocol sequence the postamble as described above needs to be completed by the counterpart sequence to erase the Forbidden PLMN condition from the USIM.

7   Test Cases

7.1   In-vehicle equipment and system (IVS)

7.1.1   Conformance tests for in-vehicle user equipment for Pan European eCall

7.1.1.1   CTP 1.1.0.1 Conformance to ETSI TS 102 936-1 and ETSI TS 102 936-2 - PE eCall IVS

The tests shall be performed at the system level with the behaviour, inputs and outputs as defined in ETSI TS 102 936-1 [3] and ETSI TS 102 936-2 [4], or provide certification from NAD supplier that such tests have been met. The test case list provided in the tables 5.1 and 6.1 of clauses 5.2 and 6.2 in ETSI TS 102 936-1 [3] is outdated. Instead, all test cases listed in ETSI TS 151 010-1 [9], clause 26.9.6a and - if applicable - ETSI TS 134 123-1 [2], clause 13.3 shall be carried out.

7.1.1.2a   CTP 1.1.0.2 Test for conformance to valid SIM/USIM - PE eCall capable IVS

7.1.1.2a.1   Test Purpose (TP)

(1)

```
with { IVS in mobile network coverage and the ignition is OFF }
ensure that {
  when { vehicle Power ON }
    then { network registration }
          }
```

7.1.1.2a.2   Test applicability

This test case applies to PE eCall capable IVS.

7.1.1.2a.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.1.2 paragraph 2; clause 7.12.2 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.0.2.

7.1.1.2a.4   Test description

7.1.1.2a.4.1   Pre-test conditions

Ignition OFF.

7.1.1.2a.4.2   Test procedure sequence

Table 7.1.1.2a.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Vehicle Power ON	-	-	-	-
2	Self-test	-	-	-	-
3	Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	1	P

7.1.1.2a.4.3   Specific message contents

None.

7.1.1.2b   CTP 1.1.0.2 Test for conformance to valid SIM/USIM - PE eCall only IVS

7.1.1.2b.1   Test Purpose (TP)

(1)

```
with { IVS in mobile network coverage and the ignition is ON }
ensure that {
  when { manual eCall triggered }
    then { network registration }
          }
```

7.1.1.2b.2   Test applicability

This test case applies to PE eCall only IVS.

7.1.1.2b.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.1.2 paragraph 2; clause 7.12.2 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.0.2.

7.1.1.2b.4   Test description

7.1.1.2b.4.1   Pre-test conditions

Preamble 1: Ignition ON.

7.1.1.2b.4.2   Test procedure sequence

Table 7.1.1.2b.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger manual eCall	-	-	-	-
2	Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	1	P

7.1.1.2b.4.3   Specific message contents

None.

7.1.1.3   CTP 1.1.0.3 Automatic eCall triggering does not occur when ignition OFF - PE eCall IVS

7.1.1.3.1   Test Purpose (TP)

(1)

```
with { ignition OFF and the IVS is in mobile network coverage }
ensure that {
  when { automatic eCall triggered }
    then { start timer Tp1 with no HMI alert is provided and IVS automatic eCall
         is not initiated until expiration of Tp1 }
           }
```

7.1.1.3.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.3.3   Conformance requirements

The conformance requirements of CEN EN 16072 [8], clause 7.10.1 paragraph 4 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.0.3.

7.1.1.3.4   Test description

7.1.1.3.4.1   Pre-test conditions

Ignition OFF.

7.1.1.3.4.2   Test procedure sequence

Table 7.1.1.3.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger automatic eCall	-	-	-	-
2	Start non-reaction timer Tp1	-	-	-	-
-	EXCEPTION: Steps 3a1 to 3a2 describe behaviour that depends on the test configuration; the "lower case letter" identifies a step sequence that takes place if a test configuration is supported	-	-	-	-
3a1	Check: Is HMI alert provided before timer Tp1 expires?	-	-	1	F
3a2	Check: Does IVS initiate an automatic eCall before timer Tp1 expires?	-	-	1	F
NOTE: Timer Tp1 = 60 seconds.					

7.1.1.3.4.3   Specific message contents

None.

7.1.1.4 CTP 1.1.1.1 Power on and self test - PE eCall IVS

7.1.1.4.1 Test Purpose (TP)

(1)

```
with { ignition OFF and no mobile coverage required }
ensure that {
  when { vehicle Power ON and IVS performs self-test }
    then { self-test of IVS is successful and no faults are indicated }
          }
```

7.1.1.4.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.4.3 Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.1.5 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.1.1.

7.1.1.4.4 Test description

7.1.1.4.4.1 Pre-test conditions

Ignition OFF; no mobile network coverage required.

7.1.1.4.4.2 Test procedure sequence

Table 7.1.1.4.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Vehicle Power ON	-	-	-	-
2	IVS performs self-test	-	-	-	-
-	EXCEPTION: Steps 3a1 to 3a2 describe behaviour that depends on the test configuration; the "lower case letter" identifies a step sequence that takes place if a test configuration is supported	-	-	-	-
3a1	Check: Is IVS functioning correctly?	-->	According to manufacturer's procedure	1	P
3a2	Check: Are no faults indicated before timer Tp2 expires? (see note)	-->	According to manufacturer's procedure	1	P
NOTE:	Timer Tp2 has to be declared by the manufacturer (Timer Tp2 shall reflect an appropriate time that is required for booting the IVS and performing the self-test).				

7.1.1.4.4.3 Specific message contents

None.

7.1.1.5 CTP 1.1.2.1 eCall automatically activated - PE eCall IVS

7.1.1.5.1 Test Purpose (TP)

(1)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { automatic eCall triggered }
    then { Visual or audible indication provided and eCall successfully established }
          }
```

7.1.1.5.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.5.3   Conformance requirements

The conformance requirements covered in the present TC are specified in CEN EN 16072 [8], clause 7.10.1 paragraph 1 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.2.1.

7.1.1.5.4   Test description

7.1.1.5.4.1   Pre-test conditions

Preamble 1: Ignition ON.

7.1.1.5.4.2   Test procedure sequence

Table 7.1.1.5.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger automatic eCall	-	-	-	-
2	IF PE eCall only IVS THEN Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) and eCall in progress (clause 6.1.2.3) are performed	-	-	-	-
4	Check: Is MSD transmission successful?	-->	-	1	P

7.1.1.5.4.3   Specific message contents

None.

7.1.1.6   CTP 1.1.2.2 Automatically triggered eCall in progress was not disconnected upon a new eCall trigger - PE eCall IVS

7.1.1.6.1   Test Purpose (TP)

(1a)

```
with { connection established }
ensure that {
  when { new automatic eCall triggered }
    then { eCall in progress was not disconnected }
          }
```

(1b)

```
with { connection established }
ensure that {
  when { new manual eCall triggered }
    then { eCall in progress was not disconnected }
          }
```

7.1.1.6.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.6.3 Conformance requirements

The conformance requirements of CEN EN 16072 [8], clause 7.11 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.2.2.

7.1.1.6.4 Test description

7.1.1.6.4.1 Pre-test conditions

Preamble 2: Ignition ON and IVS is in mobile network coverage; automatically triggered eCall in progress.

7.1.1.6.4.2 Test procedure sequence

Table 7.1.1.6.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
-	EXCEPTION: Steps 1a to 1b describe behaviour that depends on the test configuration; the "lower case letter" identifies a step sequence that takes place if a test configuration is supported	-	-	-	-
1a	Trigger new automatic eCall	-	-	-	-
1b	Trigger new manual eCall	-	-	-	-
2	Check: Was eCall in progress disconnected before timer Tp3 expires? (see note)	-->	DISCONNECT	1	F
NOTE: Timer Tp3 = 60 seconds.					

7.1.1.6.4.3 Specific message contents

None.

7.1.1.7 CTP 1.1.2.3 Post-side-crash performance of automatic trigger - IVS

7.1.1.7.1 Test Purpose (TP)

(1)

```
with { ignition ON and IVS is in good mobile network coverage }
ensure that {
  when { automatic eCall triggered }
    then { MSD successfully transmitted and E112 - voice connection established }
          }
```

7.1.1.7.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.7.3 Conformance requirements

The conformance requirements of CEN EN 16072 [8], clause 6.1.1 paragraph 4; clause 7.10.1 paragraph 4, paragraph 6, paragraph 8; clause 7.5 paragraph 1, paragraph 2, paragraph 3, paragraph 4 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.2.3.

7.1.1.7.4 Test description

7.1.1.7.4.1 Pre-test conditions

Preamble 1: Ignition ON and IVS is in good mobile network coverage.

In case the IVS is able to distinguish different kinds of crashes, a lateral shock to test the IVS crash robustness can be generated in two ways: Either a lateral crash according to Directive 96/27/EC [14] (or equivalent UN/ECE Regulation 95-02) shall be generated or a simulated equivalent shock condition using a shock-test rig or similar shall be applied.

7.1.1.7.4.2 Test procedure sequence

Table 7.1.1.7.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger automatic eCall	-	-	-	-
2	IF PE eCall only IVS THEN Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) and eCall in progress (clause 6.1.2.3) are performed	-	-	-	-
4	Check: Is MSD transmission successful?	-->	-	1	P
5	Unmute voice connection	-	-	-	-
6	Check: Is E112 - voice connection established?	-->	-	2	P

7.1.1.7.4.3 Specific message contents

None.

7.1.1.8 CTP 1.1.2.4 Post-frontal-crash performance of automatic trigger - IVS

In case the IVS is able to distinguish different kinds of crashes, the crash type in the pre-test conditions (7.1.1.7.4.1 of the present document) differ. Else this test is equivalent to the TC specified in clause 7.1.1.7 (CTP 1.1.2.3).

7.1.1.9 CTP 1.1.2.5 Performance of automatic trigger - different crash types - IVS

7.1.1.9.1 Test Purpose (TP)

(1)

```
with { ignition ON and IVS is in good mobile network coverage }
ensure that {
  when { automatic eCall triggered }
    then { MSD successfully transmitted and voice connection established }
          }
```

(2)

```
with { E112 - voice connection }
ensure that {
  when { call clear down indicated }
    then { IVS disconnects }
          }
```

7.1.1.9.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.9.3 Conformance requirements

The conformance requirements of CEN EN 16072 [8], clause 6.1.1, paragraph 4; clause 7.10.1, paragraph 4, paragraph 6, paragraph 8; clause 7.5, paragraph 1, paragraph 2, paragraph 3, paragraph 4 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.2.5.

7.1.1.9.4 Test description

7.1.1.9.4.1 Pre-test conditions

Preamble 1: Ignition ON and IVS is in good mobile network coverage.

7.1.1.9.4.2 Test procedure sequence

Table 7.1.1.9.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger automatic eCall	-	-	-	-
2	IF PE eCall only IVS THEN Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Steps of the generic procedure for automatic eCall establishment (clause 6.1.2.2) and eCall in progress (clause 6.1.2.3) are performed	-	-	-	-
4	Check: Is MSD transmission successful?	-->	-	1	P
5	Reconnect audio system	-	-	-	-
6	Check: Is E112 - voice connection established?	-->	-	2	P
7	Call clear down indicated	<--	DISCONNECT	-	-
8	Check: Does IVS disconnects successful?	-->	-	3	P

7.1.1.9.4.3 Specific message contents

None.

7.1.1.10 CTP 1.1.3.1 eCall manually activated - PE eCall IVS

7.1.1.10.1 Test Purpose (TP)

(1)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { manual eCall triggered }
    then { Visual or audible indication provided and eCall successfully established }
        }
```

7.1.1.10.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.10.3 Conformance requirements

The conformance requirements of CEN EN 16072 [8], clause 7.10.2 paragraph 2 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.3.1.

7.1.1.10.4 Test description

7.1.1.10.4.1 Pre-test conditions

Preamble 1: Ignition ON.

7.1.1.10.4.2   Test procedure sequence

Table 7.1.1.10.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger manual eCall	-	-	-	-
2	IF PE eCall only IVS THEN Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed	-	-	-	-
4	Check: Is the call established?	-->	CONNECT ACKNOWLEDGE	1	P

7.1.1.10.4.3   Specific message contents

None.

7.1.1.11   CTP 1.1.3.2 Manually triggered eCall in progress was not disconnected upon a new eCall trigger - PE eCall IVS

7.1.1.11.1   Test Purpose (TP)

(1a)

```
with { ignition ON and IVS is in mobile network coverage and manual eCall is in progress }
ensure that {
  when { new automatic eCall triggered }
    then { eCall in progress was not disconnected }
          }
```

(1b)

```
with { ignition is ON and IVS is in mobile network coverage and manual eCall is in progress }
ensure that {
  when { new manual eCall triggered }
    then { eCall in progress was not disconnected }
          }
```

7.1.1.11.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.11.3   Conformance requirements

The conformance requirements of CEN EN 16072 [8], clause 7.11 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.3.2.

7.1.1.11.4   Test description

7.1.1.11.4.1   Pre-test conditions

Preamble 3: Ignition ON and IVS is in mobile network coverage; manually triggered eCall in progress.

7.1.1.11.4.2   Test procedure sequence

Table 7.1.1.11.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
-	EXCEPTION: Steps 1a to 1b describe behaviour that depends on the test configuration; the "lower case letter" identifies a step sequence that takes place if a test configuration is supported	-	-	-	-
1a	Trigger new automatic eCall	-	-	-	-
1b	Trigger new manual eCall	-	-	-	-
2	Check: Was eCall in progress disconnected before timer Tp3 expires? (see note)	-->	DISCONNECT	1	F
NOTE: Timer Tp3 = 60 seconds					

7.1.1.11.4.3   Specific message contents

None.

7.1.1.12   CTP 1.1.4.1 Test eCall activated - PE eCall IVS

7.1.1.12.1   Test Purpose (TP)

(1)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { test eCall from the IVS is triggered by using E.164 number provisioned by USIM for test
calls}
    then { test eCall has been setup with correct non-emergency number}
          }
```

7.1.1.12.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.12.3   Conformance requirements

The conformance requirements of CEN EN 16072 [8], clause 7.2.2 paragraph 1 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.4.1.

7.1.1.12.4   Test description

7.1.1.12.4.1   Pre-test conditions

Preamble 1: Ignition ON.

7.1.1.12.4.2 Test procedure sequence

Table 7.1.1.12.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger test eCall	-	-	-	-
2	IF PE eCall only IVS THEN Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Steps of the generic procedure for eCall establishment (clause 6.1.2.2)	-	-	-	-
4	Check: Is test eCall established with correct non-emergency number provisioned by USIM?	->	CONNECT ACKNOWLEDGE	1	P

7.1.1.12.4.3 Specific message contents

None.

7.1.1.13 CTP 1.1.5.1 Network registration - PE eCall IVS

7.1.1.13.1 Test Purpose (TP)

(1a)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { automatic eCall triggered }
    then { network registration successful }
          }
```
(1b)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { manual eCall triggered }
    then { network registration successful }
          }
```
(1c)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { test eCall triggered }
    then { network registration successful }
          }
```

7.1.1.13.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.13.3 Conformance requirements

The conformance requirements of CEN EN 16072 [8], clauses 7.3.2 and 7.3.4 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.5.1.

7.1.1.13.4 Test description

7.1.1.13.4.1 Pre-test conditions

Preamble 1: Ignition ON.

7.1.1.13.4.2   Test procedure sequence

Table 7.1.1.13.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
-	EXCEPTION: Steps 1a to 1c describe behaviour that depends on the test configuration; the "lower case letter" identifies a step sequence that takes place if a test configuration is supported	-	-	-	-
1a	Trigger automatic eCall	-	-	-	-
1b	Trigger manual eCall	-	-	-	-
1c	Trigger test eCall	-	-	-	-
2	Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-->	-	1	P

7.1.1.13.4.3   Specific message contents

None.

7.1.1.14   CTP 1.1.5.2 Manual termination of eCall by vehicle occupants not allowed (automatically triggered eCall) - PE eCall IVS

7.1.1.14.1   Test Purpose (TP)

(1)

```
with { ignition ON and IVS in mobile network coverage and automatically triggered eCall is in
      progress }
ensure that {
  when { attempt to terminate eCall manually }
    then { eCall in progress was not disconnected }
          }
```

7.1.1.14.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.14.3   Conformance requirements

The conformance requirements of CEN EN 16072 [8], clause 7.10.3 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.5.2.

7.1.1.14.4   Test description

7.1.1.14.4.1   Pre-test conditions

Preamble 2: Ignition ON and IVS is in mobile network coverage; automatically triggered eCall is in progress.

7.1.1.14.4.2   Test procedure sequence

Table 7.1.1.14.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	attempt to terminate eCall manually	<--	-	-	-
2	Check: Was eCall in progress disconnected before timer Tp3 expires? (see note)	-->	DISCONNECT	1	F
NOTE: Timer Tp3 = 60 seconds.					

7.1.1.14.4.3   Specific message contents

None.

7.1.1.15   CTP 1.1.5.3 Manual termination of eCall by vehicle occupants not allowed (manually triggered eCall) - PE eCall IVS

7.1.1.15.1   Test Purpose (TP)

(1)

```
with { ignition ON and IVS in mobile network coverage and manually triggered eCall is in progress }
ensure that {
  when { attempt to terminate eCall manually }
    then { eCall in progress was not disconnected }
          }
```

7.1.1.15.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.15.3   Conformance requirements

The conformance requirements of CEN EN 16072 [8], clause 7.10.3 paragraph 2 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.5.3.

7.1.1.15.4   Test description

7.1.1.15.4.1   Pre-test conditions

Preamble 3: Ignition ON and IVS is in mobile network coverage; manually triggered eCall is in progress.

7.1.1.15.4.2   Test procedure sequence

Table 7.1.1.15.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Attempt to terminate eCall manually	<--	-	-	-
2	Check: Was eCall in progress disconnected before timer Tp3 expires?	-->	DISCONNECT	1	F
NOTE: Timer Tp3 = 60 seconds.					

7.1.1.15.4.3   Specific message contents

None.

7.1.1.16   CTP 1.1.5.4 Automatically triggered eCall in progress was not disconnected when ignition is switched to OFF - PE eCall IVS

7.1.1.16.1   Test Purpose (TP)

(1)

```
with { ignition ON and IVS in mobile network coverage and automatically triggered eCall is in
      progress }
ensure that {
  when { vehicle Power OFF }
    then { eCall in progress was not disconnected }
          }
```

7.1.1.16.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.16.3 Conformance requirements

The conformance requirements of CEN EN 16072 [8], clause 7.10.1 paragraph 5 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.5.4.

7.1.1.16.4 Test description

7.1.1.16.4.1 Pre-test conditions

Preamble 2: Ignition ON and IVS is in mobile network coverage; automatically triggered eCall is in progress.

7.1.1.16.4.2 Test procedure sequence

Table 7.1.1.16.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Vehicle Power OFF	<--	Manufacturer dependent (see note 2)	-	-
2	Check: Was eCall in progress disconnected before timer Tp3 expires? (see note 1)	-->	DISCONNECT	1	F
NOTE 1: Timer Tp3 = 60 seconds.					
NOTE 2: System level test vs. module level test. In case of built-in battery in modem this test can be run on modem level, else the test has to be run on system level.					

7.1.1.16.4.3 Specific message contents

None.

7.1.1.17 CTP 1.1.5.5 Manually triggered eCall in progress was not disconnected when ignition is switched to OFF - PE eCall IVS

7.1.1.17.1 Test Purpose (TP)

(1)

```
with { ignition ON and IVS in mobile network coverage and manually triggered eCall is in progress }
ensure that {
  when { vehicle Power OFF }
    then { eCall in progress was not disconnected }
          }
```

7.1.1.17.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.17.3 Conformance requirements

The conformance requirements of CEN EN 16072 [8], clause 7.11 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.5.5.

7.1.1.17.4 Test description

7.1.1.17.4.1 Pre-test conditions

Preamble 3: Ignition ON and IVS is in mobile network coverage; manually triggered eCall is in progress.

7.1.1.17.4.2   Test procedure sequence

Table 7.1.1.17.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Vehicle Power OFF	<--	Manufacturer dependent (see note 2)	-	-
2	Check: Was eCall in progress disconnected before timer Tp3 expires? (see note 1)	-->	DISCONNECT	1	F
NOTE 1:	Timer Tp3 = 60 seconds.				
NOTE 2:	System level test vs. module level test. In case of built-in battery in modem this test can be run on modem level, else the test has to be run on system level.				

7.1.1.17.4.3   Specific message contents

None.

7.1.1.18   Void

7.1.1.18a   CTP 1.1.5.6 Priority over conflicting communication - PE eCall capable IVS

7.1.1.18a.1   Test Purpose (TP)

(1a)

```
with { ignition ON and IVS in mobile network coverage and a conflicting communication is running on
      IVS }
ensure that {
  when { automatic eCall triggered }
    then { conflicting communication is stopped, HMI alert is provided and all necessary components
          of the IVS are unrestricted available and IVS starts connection establishment }
          }
```

(1b)

```
with { ignition ON and IVS in mobile network coverage and a conflicting communication is running on
      IVS }
ensure that {
  when { manual eCall triggered }
    then { conflicting communication is stopped, HMI alert is provided and all necessary components
          of the IVS are unrestricted available and IVS starts connection establishment }
          }
```

(2)

```
with { connection in progress }
ensure that {
  when { connection established }
    then { mute audio system }
          }
```

(3)

```
with { connection established }
ensure that {
  when { SEND-MSD received }
    then { synchronize IVS & PSAP }
          }
```

(4)

```
with { synchronized IVS & PSAP }
ensure that {
  when { MSD tx }
    then { MSD transmission started }
```

(5)

```
with { MSD transmission in progress }
ensure that {
  when { AL-ACK is received }
    then { reconnect audio system }
          }
```

7.1.1.18a.2 Test applicability

This test case applies to of PE eCall capable IVS.

7.1.1.18a.3 Conformance requirements

The conformance requirements of CEN EN 16072 [8], clause 7.4 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.5.6.

7.1.1.18a.4 Test description

7.1.1.18a.4.1 Pre-test conditions

Preamble 4 for PE eCall capable IVS Testing: Ignition ON and IVS is in good mobile network coverage; no error is detected on the IVS, a conflicting communication is running on the IVS.

7.1.1.18a.4.2 Test procedure sequence

Table 7.1.1.18a.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
-	EXCEPTION: Steps 1a to 1b describe behaviour that depends on the test configuration; the "lower case letter" identifies a step sequence that takes place if a test configuration is supported	-	-	-	-
1a	Trigger automatic eCall	-	-	-	-
1b	Trigger manual eCall	-	-	-	-
-	EXCEPTION: Steps 3a1 to 3a3 describe behaviour that depends on the test configuration; the "lower case letter" identifies a step sequence that takes place if a test configuration is supported	-	-	-	-
3a1	Check: Conflicting communication (voice call) is stopped?	-->	-	1	P
3a2	Check: Is HMI alert provided?	-->	-	1	P
3a3	Check: Are all components of the IVS necessary for the eCall unrestricted available?	-->	-	1	P
3a4	Steps of the generic procedure for eCall in progress (clause 6.1.2.3) are performed	-	-	2, 3, 4	P
4	Check: Is audio system reconnected?	-	-	5	P

7.1.1.18a.4.3 Specific message contents

None.

7.1.1.18b CTP 1.1.5.6 Priority over conflicting communication - PE eCall only IVS

7.1.1.18b.1 Test Purpose (TP)

(1a)

```
with { ignition ON and IVS in mobile network coverage and a conflicting communication is running on
      IVS }
ensure that {
  when { automatic eCall triggered }
    then { conflicting communication is stopped, HMI alert is provided and all necessary components
          of the IVS are unrestricted available and IVS starts connection establishment }
          }
```

(1b)

```
with { ignition ON and IVS in mobile network coverage and a conflicting communication is running on
       IVS }
ensure that {
  when { manual eCall triggered }
    then { conflicting communication is stopped, HMI alert is provided and all necessary components
           of the IVS are unrestricted available and IVS starts connection establishment }
           }
```

(2)

```
with { connection in progress }
ensure that {
  when { connection established }
    then { mute audio system }
           }
```

(3)

```
with { connection established }
ensure that {
  when { SEND-MSD received }
    then { synchronize IVS & PSAP }
           }
```

(4)

```
with { synchronized IVS & PSAP }
ensure that {
  when { MSD tx }
    then { MSD transmission started }
```

(5)

```
with { MSD transmission in progress }
ensure that {
  when { AL-ACK is received }
    then { reconnect audio system }
           }
```

7.1.1.18b.2   Test applicability

This test case applies to PE eCall only IVS.

7.1.1.18b.3   Conformance requirements

The conformance requirements of CEN EN 16072 [8], clause 7.4 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.5.6.

7.1.1.18b.4   Test description

7.1.1.18b.4.1   Pre-test conditions

Preamble 4 for PE eCall only IVS Testing: Ignition ON and IVS is in good mobile network coverage; no error is detected on the IVS, a conflicting communication is running on the IVS.

7.1.1.18b.4.2   Test procedure sequence

Table 7.1.1.18a.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
-	EXCEPTION: Steps 1a to 1b describe behaviour that depends on the test configuration; the "lower case letter" identifies a step sequence that takes place if a test configuration is supported	-	-	-	-
1a	Trigger automatic eCall	-	-	-	-
1b	Trigger manual eCall	-	-	-	-
-	EXCEPTION: Steps 3a1 to 3a3 describe behaviour that depends on the test configuration; the "lower case letter" identifies a step sequence that takes place if a test configuration is supported	-	-	-	-
3a1	Check: Conflicting communication (voice call) is stopped?	-->	-	1	P
3a2	Check: Is HMI alert provided?	-->	-	1	P
3a3	Check: Are all components of the IVS necessary for the eCall unrestricted available?	-->	-	1	P
3a4	Steps of the generic procedure for eCall in progress (clause 6.1.2.3) are performed	-	-	2, 3, 4	P
4	Check: Is audio system reconnected?	-	-	5	P

7.1.1.18b.4.3   Specific message contents

None.

7.1.1.19   CTP 1.1.5.7 Network registration is re-tried when network registration attempt was not successful - PE eCall IVS

No test required. (This eventuality is covered by ETSI TS 134 123-1 [2], clause 6 for UMTS and ETSI TS 151 010-1 [9], clauses 26.2 and 26.7 correspondingly).

7.1.1.20a   CTP 1.1.6.1 Mute IVS and vehicle audio - PE eCall capable IVS

7.1.1.20a.1   Test Purpose (TP)

(1a)

```
with { ignition ON and IVS in mobile coverage }
ensure that {
  when { automatic eCall is triggered }
    then { IVS starts connection establishment }
          }
```

(1b)

```
with { ignition ON and IVS in mobile coverage }
ensure that {
  when { manual eCall is triggered }
    then { IVS starts connection establishment }
          }
```

(1c)

```
with { ignition ON and IVS in mobile coverage }
ensure that {
  when { test eCall is triggered }
    then { IVS starts connection establishment }
          }
```

(2)

```
with { connection in progress }
ensure that {
  when { connection established }
    then { mute audio system }
            }
```

(3)

```
with { connection established }
ensure that {
  when { SEND-MSD received }
    then { synchronize IVS & PSAP }
            }
```

(4)

```
with { synchronized IVS & PSAP }
ensure that {
  when { MSD tx }
    then { MSD transmission started }
```

(5)

```
with { MSD transmission in progress }
ensure that {
  when { AL-ACK is received }
    then { reconnect audio system }
            }
```

7.1.1.20a.2   Test applicability

This test case applies to PE eCall capable IVS.

7.1.1.20a.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.2.1 and CEN EN 16072 [8], clause 7.17.3 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.6.1.

7.1.1.20a.4   Test description

7.1.1.20a.4.1   Pre-test conditions

Preamble 1: Ignition ON and IVS is in mobile network coverage.

7.1.1.20a.4.2   Test procedure sequence

Table 7.1.1.20a.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
-	EXCEPTION: Steps 1a to 1b describe behaviour that depends on the test configuration; the "lower case letter" identifies a step sequence that takes place if a test configuration is supported	-	-	-	-
1a	Trigger manual eCall	-	-	-	-
1b	Trigger automatic eCall	-	-	-	-
1c	Trigger test eCall	-	-	-	-
2	Steps of the generic procedure for eCall in progress (clause 6.1.2.3) are performed	-	-	1a, 1b, 1c, 2, 3, 4	P
3	Check: Is audio system reconnected?	-	-	5	P

7.1.1.20a.4.3   Specific message contents

None.

7.1.1.20b   CTP 1.1.6.1 Mute IVS and vehicle audio - PE eCall only IVS

7.1.1.20b.1   Test Purpose (TP)

(1a)

```
with { ignition ON and IVS in mobile coverage }
ensure that {
  when { automatic eCall is triggered }
    then { IVS registers on the network and starts connection establishment }
            }
```

(1b)

```
with { ignition ON and IVS in mobile coverage }
ensure that {
  when { manual eCall is triggered }
    then { IVS registers on the network and starts connection establishment }
            }
```

(1c)

```
with { ignition ON and IVS in mobile coverage }
ensure that {
  when { test eCall is triggered }
    then { IVS registers on the network and starts connection establishment }
        }
```

(2)

```
with { connection in progress }
ensure that {
  when { connection established }
    then { mute audio system }
            }
```

(3)

```
with { connection established }
ensure that {
  when { SEND-MSD received }
    then { synchronize IVS & PSAP }
            }
```

(4)

```
with { synchronized IVS & PSAP }
ensure that {
  when { MSD tx }
    then { MSD transmission started }
            }
```

(5)

```
with { MSD transmission in progress }
ensure that {
  when { AL-ACK is received }
    then { reconnect audio system }
            }
```

7.1.1.20b.2   Test applicability

This test case applies to PE eCall only IVS.

7.1.1.20b.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.2.1 and CEN EN 16072 [8], clause 7.17.3 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.6.1.

7.1.1.20b.4   Test description

7.1.1.20b.4.1   Pre-test conditions

Preamble 1: Ignition ON and IVS is in mobile network coverage.

7.1.1.20b.4.2   Test procedure sequence

Table 7.1.1.20b.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
-	EXCEPTION: Steps 1a to 1b describe behaviour that depends on the test configuration; the "lower case letter" identifies a step sequence that takes place if a test configuration is supported	-	-	-	-
1a	Trigger manual eCall	-	-	-	-
1b	Trigger automatic eCall	-	-	-	-
1c	Trigger test eCall	-	-	-	-
2	Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	1a, 1b, 1c	P
3	Steps of the generic procedure for eCall in progress (clause 6.1.2.3) are performed	-	-	1a, 1b, 1c, 2, 3, 4	P
4	Check: Is audio system reconnected?	-	-	5	P

7.1.1.20b.4.3   Specific message contents

None.

7.1.1.21   CTP 1.1.7.1 Set-up TS12 call with eCall identifier (flag) set to "automatic" - PE eCall IVS

7.1.1.21.1   Test Purpose (TP)

(1)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { automatic eCall triggered }
    then { "Service Category Request" message information element (IE) set to automatically
          initiated eCall (AIeC) }
          }
```

7.1.1.21.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.21.3   Conformance requirements

Reference requirements of CTP 1.1.7.1 [1].

The conformance requirements of CEN EN 16062 [6], clause 7.3.6 paragraph 2 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.7.1.

7.1.1.21.4 Test description

7.1.1.21.4.1 Pre-test conditions

Preamble 1: Ignition ON and IVS is in mobile network coverage.

7.1.1.21.4.2 Test procedure sequence

Table 7.1.1.21.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger automatic eCall	-	-	-	-
2	Check: Is the "Service Category Request" message information element (IE) set to automatically initiated eCall (AIeC)?	-->	Service Category Request	1	P

7.1.1.21.4.3 Specific message contents

None.

7.1.1.22 CTP 1.1.8.1 Set-up TS12 call with eCall identifier (flag) set to "manual" - PE eCall IVS

7.1.1.22.1 Test Purpose (TP)

(1)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { manual eCall from the IVS is triggered }
    then { "Service Category Request" message information element (IE) set to manually initiated
          eCall (MIeC) }
            }
```

7.1.1.22.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.22.3 Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.3.6 paragraph 2 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.8.1.

7.1.1.22.4 Test description

7.1.1.22.4.1 Pre-test conditions

Preamble 1: Ignition ON and IVS is in mobile network coverage.

7.1.1.22.4.2   Test procedure sequence

Table 7.1.1.22.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger manual eCall	-	-	-	-
2	IF PE eCall only IVS THEN Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Check: Is "Service Category Request" message information element (IE) set to manually initiated eCall (MIeC)?	-->	Service Category Request	1	P

7.1.1.22.4.3   Specific message contents

None.

7.1.1.23   CTP 1.1.9.1 Set-up TS11 call to test number - PE eCall IVS

7.1.1.23.1   Test Purpose (TP)

(1)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { test eCall from the IVS is triggered by using E.164 number provisioned by USIM for test
calls}
    then { test eCall has been setup with correct non-emergency number and is routed to PSAP test
point}
          }
```

7.1.1.23.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.23.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.2.2 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.9.1.

7.1.1.23.4   Test description

7.1.1.23.4.1   Pre-test conditions

Preamble 1: Ignition ON and IVS is in mobile network coverage.

7.1.1.23.4.2   Test procedure sequence

Table 7.1.1.23.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger test eCall	-	-	-	-
2	IF PE eCall only IVS THEN Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Steps of the generic procedure for eCall establishment (clause 6.1.2.2)	-	-	-	-
4	Check: Is test eCall established with correct non-emergency number provisioned by USIM?	->	CONNECT ACKNOWLEDGE	1	P

7.1.1.23.4.3   Specific message contents

None.

7.1.1.24a   CTP 1.1.10.1 eCall is attempted when no networks are available (limited service condition with forbidden PLMN on SIM/USIM) - PE eCall IVS

7.1.1.24a.1   Test Purpose (TP)

(1)

```
with { IVS is in mobile network coverage (limited service condition as specified in ETSI 124.008)}
ensure that {
  when {test eCall at the IVS is triggered }
    then { IVS does not initiate a test eCall}
          }
```

(2a)

```
with { IVS is in mobile network coverage (limited service condition as specified in ETSI 124.008) }
ensure that {
  when { manual eCall from the IVS is triggered }

    then { { MNO test point accepts service request for emergency call establishment,
          manual eCall is connected through to the PSAP test point}
          }
```

(2b)

```
with { IVS is in mobile network coverage (limited service condition as specified in ETSI 124.008)}
ensure that {
  when { automatic eCall from the IVS is triggered }

    then { MNO test point accepts service request for emergency call establishment ,
          automatic eCall is connected through to the PSAP test point}
            }
```

7.1.1.24a.2   Test applicability

This test case applies to all types of PE eCall IVS which support an exchangeable or reconfigurable SIM/USIM.

7.1.1.24a.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clauses 7.3.5 and 7.14.2 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.10.1.

7.1.1.24a.4   Test description

7.1.1.24a.4.1   Pre-test conditions

A SIM/USIM supporting the limited service condition shall be used (i.e. forbidden PLMN).

PE eCall capable IVS: Preamble 5: Ignition ON and IVS is in mobile network coverage, limited service condition.

PE eCall only IVS: Preamble 1: Ignition ON and IVS is in mobile network coverage.

7.1.1.24a.4.2   Test procedure sequence

Table 7.1.1.24a.4.2-1: Main behaviour

Step	Procedure	I - T	Message	TP	Verdict
		Message Sequence			
1	Tester triggers a test eCall	-<--	-	-	-
2	Check: Does the IVS initiate a call setup within the next minute?	-	-	1	F
3a.1	Tester triggers manual eCall	<--			
3a.2	Generic procedure for manual eCall according to steps 2-11 in generic procedure (clause 6.1.2.2)	-	-	-	-
3a.3	Check: Is the manual eCall established?	-->	CONNECT ACKNOWLEDGE	2a	P
3b.1	Tester triggers automatic eCall	<--			
3b.2	Generic procedure for automatic eCall according to steps 2-11 in generic procedure (clause 6.1.2.2)	-	-	-	-
3b.3	Check: Is the automatic eCall established?	-->	CONNECT ACKNOWLEDGE	2b	P

7.1.1.24a.4.3   Specific message contents

None.

7.1.1.24b   CTP 1.1.10.1 eCall is attempted when no networks are available (limited service condition, location update rejected by network) - PE eCall IVS

7.1.1.24b.1   Test Purpose (TP)

(1)

```
with { IVS is in mobile network coverage (limited service condition as specified in ETSI 124.008)}
ensure that {
  when {test eCall at the IVS is triggered }
    then { IVS does not initiate a test eCall}
        }
```

(2a)

```
with { IVS is in mobile network coverage (limited service condition as specified in ETSI 124.008) }
ensure that {
  when { manual eCall from the IVS is triggered }

    then { { MNO test point accepts service request for emergency call establishment,
        manual eCall is connected through to the PSAP test point}
        }
```

(2b)

```
with { IVS is in mobile network coverage (limited service condition as specified in ETSI 124.008)}
ensure that {
  when { automatic eCall from the IVS is triggered }

    then { MNO test point accepts service request for emergency call establishment ,
        automatic eCall is connected through to the PSAP test point}
         }
```

7.1.1.24b.2   Test applicability

This test case applies to all types of PE eCall IVS which do not support an exchangeable or reconfigurable SIM/USIM.

7.1.1.24b.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clauses 7.3.5 and 7.14.2 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.10.1.

7.1.1.24b.4 Test description

7.1.1.24b.4.1 Pre-test conditions

Preamble 1 (Steps 1 to 3, applies to eCall only and PE eCall capable IVS): Ignition ON and IVS is in mobile network coverage.

7.1.1.24b.4.2 Test procedure sequence

Table 7.1.1.24b.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	IF PE eCall capable IVS: IVS tries location update	-			
2	IF PE eCall capable IVS: MNO test point denies location update with cause "#11 PLMN not allowed", "#12 Location Area not allowed" or "#13 Roaming not allowed in this location area"	-			
3	Tester triggers a test eCall	<--	-	-	-
4	IF PE eCall only IVS: IVS tries location update	-	-	-	-
5	IF PE eCall only IVS: MNO test point denies location update with cause "#11 PLMN not allowed", "#12 Location Area not allowed" or "#13 Roaming not allowed in this location area"	-	-	-	-
6	Check: Does the IVS initiate a call setup within the next minute?	-	-	1	F
7a.1	Tester triggers manual eCall	<--			
7a.2	Generic procedure for manual eCall according to steps 2-11 in generic procedure (clause 6.1.2.2)	-	-	-	-
7a.3	Check: Is the manual eCall established?	-->	CONNECT ACKNOWLEDGE	2a	P
7b.1	Tester triggers automatic eCall	<--			
7b.2	Generic procedure for automatic eCall according to steps 2-11 in generic procedure (clause 6.1.2.2)	-	-	-	-
7b.3	Check: Is the automatic eCall established?	-->	CONNECT ACKNOWLEDGE	2b	P

7.1.1.24b.4.3 Specific message contents

None.

7.1.1.25 CTP 1.1.10.2 Re-dial attempt completed within 2 minutes after eCall is dropped - PE eCall IVS

7.1.1.25.1 Test Purpose (TP)

(1a)

```
with { automatic eCall in state call established }
ensure that {
  when { call is dropped before MSD transfer is completed (before LL-ACK is sent)}
    then { at least 1 redial attempt has to be made, all redial attempts have to be completed within
2 minutes }
          }
```

(1b)

```
with { manual eCall in state call established }
ensure that {
  when { call is dropped before MSD transfer is completed (before LL-ACK is sent)}
    then { at least 1 redial attempt has to be made, all redial attempts have to be completed within
2 minutes }
          }
```

7.1.1.25.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.25.3 Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.12.3, CEN EN 16072 [8], clauses 6.17.2 and 6.17.3 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.10.2.

7.1.1.25.4 Test description

7.1.1.25.4.1 Pre-test conditions

Depending on call type (automatic or manual) preamble 2 or preamble 3 is used.

7.1.1.25.4.2 Test procedure sequence

Table 7.1.1.25.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	IVS sends initiation signal	-->	PUSH-REQ	-	-
2	PSAP requests MSD	<--	SEND MSD	-	-
3	IVS sends MSD	-->	MSD tx	-	-
4	MNO releases call without applying generic procedure (clause 6.1.2.4)	-	-	-	-
5	MNO monitors incoming calls for 2 minutes	-	-	-	-
5.1	IVS attempts to re-dial acc. to generic procedure (clause 6.1.2.2-)	-	-	-	-
5.2	Check: Does IVS perform at least one re-dial attempt?	-	-	1a, 1b	P
5.3	MNO rejects call attempts according to generic procedure (clause 6.1.2.7)	-	-	-	-
6	Check: All re-dial attempts are completed within 2 minutes	-	-	1a, 1b	P

7.1.1.25.4.3 Specific message contents

None.

7.1.1.26 CTP 1.1.10.3 Duration of eCall Initiation signal - PE eCall IVS

7.1.1.26.1 Test Purpose (TP)

(1a)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { automatic eCall triggered and no SEND MSD message is received}
    then { eCall is established and the initiation signal shall not persist for longer than 2 s }
          }
```
(1b)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { manual eCall triggered and no SEND MSD message is received}
    then { eCall is established and the initiation signal shall not persist for longer than 2 s }
          }
```

7.1.1.26.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.26.3 Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.4.2 paragraph 2; annex A table A.1 T3 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.10.3.

7.1.1.26.4 Test description

7.1.1.26.4.1 Pre-test conditions

Depending on call type, (automatically or manually) preamble 2 or preamble 3 is used.

7.1.1.26.4.2 Test procedure sequence

Table 7.1.1.26.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	IVS sends initiation signal	-->	PUSH-REQ	-	-
2	Check: eCall is established and the initiation signal shall not persist for longer than 2 s (see note)	-	-	1a, 1b	P
NOTE:	A time of 2 s correspond to a maximum of 5 PUSH REQs.				

7.1.1.26.4.3 Specific message contents

None.

7.1.1.27 CTP 1.1.11.1 Send MSD with indicator set to "Automatically Initiated eCall" (AIeC) - PE eCall IVS

7.1.1.27.1 Test Purpose (TP)

(1)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { automatic eCall from the IVS is triggered }
    then { MSD contains automaticActivation = true and testCall = false) }
          }
```

7.1.1.27.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.27.3 Conformance requirements

The conformance requirements of CEN EN 15722 [12], clause 6.3.1 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.11.1.

7.1.1.27.4 Test description

7.1.1.27.4.1 Pre-test conditions

Preamble 1: Ignition ON and IVS is in mobile network coverage.

7.1.1.27.4.2   Test procedure sequence

Table 7.1.1.27.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger automatic eCall	-	-	-	-
2	IF PE eCall only IVS: Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed				
4	Steps of the generic procedure for eCall in progress (clause 6.1.2.3) are performed				
5	Check: Does received MSD contain automaticActivation = true and testCall = false?			1	P

7.1.1.27.4.3   Specific message contents

None.

7.1.1.28   CTP 1.1.12.1 Send MSD with indicator set to "Manually Initiated eCall" (MIeC) - PE eCall IVS

7.1.1.28.1   Test Purpose (TP)

(1)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { manual eCall from the IVS is triggered }
    then { MSD contains automaticActivation = false and testCall = false) }
          }
```

7.1.1.28.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.28.3   Conformance requirements

The conformance requirements of CEN EN 15722 [12], clause 6.3.1 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.12.1.

7.1.1.28.4   Test description

7.1.1.28.4.1   Pre-test conditions

Preamble 1: Ignition ON and IVS is in mobile network coverage.

7.1.1.28.4.2   Test procedure sequence

Table 7.1.1.28.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger manual eCall	-	-	-	-
2	IF PE eCall only IVS: Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed				
4	Steps of the generic procedure for eCall in progress (clause 6.1.2.3) are performed				
5	Check: Does received MSD contain automaticActivation = false and testCall = false?			1	P

7.1.1.28.4.3   Specific message contents

None.

7.1.1.29   CTP 1.1.13.1 Send MSD with indicator set to "Test eCall" - PE eCall IVS

7.1.1.29.1   Test Purpose (TP)

(1)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { test eCall from the IVS is triggered }
    then { MSD contains testCall = true) }
          }
```

7.1.1.29.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.29.3   Conformance requirements

The conformance requirements of CEN EN 15722 [12], clause 6.3.1 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.13.1.

7.1.1.29.4   Test description

7.1.1.29.4.1   Pre-test conditions

Preamble 1: Ignition ON and IVS is in mobile network coverage.

7.1.1.29.4.2   Test procedure sequence

Table 7.1.1.29.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger test eCall	-	-	-	-
2	IF PE eCall only IVS: Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed				
4	Steps of the generic procedure for eCall in progress (clause 6.1.2.3) are performed				
5	Check: Does received MSD contain testCall = true?			1	P

7.1.1.29.4.3   Specific message contents

None.

7.1.1.30   CTP 1.1.14.1 Verify MSD transfer - PE eCall IVS

7.1.1.30.1   Test Purpose (TP)

(1a)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { automatic eCall from the IVS is triggered }
    then { eCall is established and the initiation signal is received before PSAP timer T4 expires }
          }
```

(1b)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { manual eCall from the IVS is triggered }
    then { eCall is established and the initiation signal is received before PSAP timer T4 expires }
          }
```

(1c)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { test eCall from the IVS is triggered }
    then { eCall is established and the initiation signal is received before PSAP timer T4 expires }
          }
```

(2)

```
with { valid initiation signal received at PSAP}
ensure that {
  when { PSAP requests MSD }
    then { IVS sends MSD and MSD is received by PSAP before timer T8 expires }
          }
```

(3)

```
with { valid MSD received at PSAP}
ensure that {
  when { Format check of MSD at PSAP is successful and PSAP sends AL-ACK}
    then { PSAP timer Tp1 is started and IVS receives AL-ACK before T6 (mirror timer Tp1) expires }
          }
```

7.1.1.30.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.30.3　　　　　Conformance requirements

The conformance requirements of CEN EN 16062 [6], clauses 7.4 and 7.5 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.14.1.

7.1.1.30.4　　　　　Test description

7.1.1.30.4.1　　　　　　　Pre-test conditions

Depending on call type (automatic, manual or test eCall) preamble 2, preamble 3 or preamble 11 is used.

7.1.1.30.4.2　　　　　　　Test procedure sequence

Table 7.1.1.30.4.2-1: Main behaviour

Step	Procedure	I - T	Message	TP	Verdict
1a	Trigger automatic eCall	-	-	-	-
1b	Trigger manual eCall	-	-	-	-
1c	Trigger test eCall	-	-	-	-
2	IF PE eCall only IVS: Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed				
4	PSAP starts timer T4				
5	IVS sends Initiation signal	->	PUSH-REQ		
6	Check: Initiation signal is received before timer T4 expires			1a, 1b, 1c	P
7	PSAP requests MSD	<-	SEND MSD		
8	PSAP starts timer T8.				
9	IVS sends MSD	->	MSD tx		
10	Check: MSD is received before Timer T8 expires			2	P
11	PSAP received valid MSD message at LL	<--	LL-ACK		
12	IVS stops sending MSD and starts timer T6				
13	PSAP received valid MSD message at AL	<--	AL-ACK		
14	PSAP starts timer Tp1				
15	Check: IVS receives an AL-ACK before timer T6 expires (see note)	-	-	3	P
NOTE: After Tp1 expires check if 2-way speech is possible. Timer Tp1 = T6.					

7.1.1.30.4.3　　　　　　　Specific message contents

None.

7.1.1.31　　　　CTP 1.1.14.2 Un-mute IVS audio when AL-ACK received - PE eCall IVS

7.1.1.31.1　　　　　Test Purpose (TP)

(1a)

```
with { automatic eCall in state call established }
ensure that {
  when { MSD transfer is completed and AL-ACK is sent }
    then { IVS un-mutes audio }
          }
```

(1b)

```
with { manual eCall in state call established }
ensure that {
  when { MSD transfer is completed and AL-ACK is sent }
    then { IVS un-mutes audio }          }
```

(1c)

```
with { test eCall in state call established }
ensure that {
  when { MSD transfer is completed and AL-ACK is sent }
    then { IVS un-mutes audio }
          }
```

7.1.1.31.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.31.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.5.1 paragraph 3 shall apply for this TC.

7.1.1.31.4   Test description

7.1.1.31.4.1   Pre-test conditions

Depending on call type (automatic, manual or test eCall) preamble 2, preamble 3 or preamble 11 is used.

7.1.1.31.4.2   Test procedure sequence

Table 7.1.1.31.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	eCall in progress according to steps 2-7 of generic procedure (clause 6.1.2.3)			-	-
2	Check: Are IVS loudspeaker and microphone un-muted?			1a, 1b, 1c	P

7.1.1.31.4.3   Specific message contents

None.

7.1.1.32   CTP 1.1.15.1 Establish voice link to PSAP - PE eCall IVS

7.1.1.32.1   Test Purpose (TP)

(1a)

```
with { automatic eCall in state call established }
ensure that {
  when { MSD transfer is completed and AL-ACK is sent }
    then { Two-way speech is possible }
          }
```

(1b)

```
with { manual eCall in state call established }
ensure that {
  when { MSD transfer is completed and AL-ACK is sent }
    then { Two-way speech is possible }            }
```

(1c)

```
with { test eCall in state call established }
ensure that {
  when { MSD transfer is completed and AL-ACK is sent }
    then { Two-way speech is possible }
              }
```

7.1.1.32.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.32.3 Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.5.1 paragraph 3 shall apply for this TC.

7.1.1.32.4 Test description

7.1.1.32.4.1 Pre-test conditions

Depending on call type (automatic, manual or test eCall) preamble 2, preamble 3 or preamble 11 is used.

7.1.1.32.4.2 Test procedure sequence

Table 7.1.1.32.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	eCall in progress according to steps 2-7 of generic procedure (clause 6.1.2.3) (see note)			-	-
2	Un-mute IVS loudspeaker and microphone				
3	Check: Is 2-way speech possible?			1a, 1b, 1c	P
NOTE: The case that no AL-ACK is sent by the tester is covered by TC CTP 1.1.15.4.					

7.1.1.32.4.3 Specific message contents

None.

7.1.1.33 CTP 1.1.15.2 MSD transfer request while eCall conversation in progress - PE eCall IVS

7.1.1.33.1 Test Purpose (TP)

(1a)

```
with { automatically triggered eCall is in progress, MSD is transferred and 2-way voice connection
established }
ensure that {
  when { PSAP requests MSD again}
    then { IVS mutes audio, IVS sends MSD and MSD is received by PSAP before timer T8 expires }
              }
```

(1b)

```
with { manually triggered eCall is in progress, MSD is transferred and 2-way voice connection
established }
ensure that {
  when { PSAP requests MSD again}
    then { IVS mutes audio, IVS sends MSD and MSD is received by PSAP before timer T8 expires }
              }
```

(1c)

```
with { triggered test eCall is in progress, MSD is transferred and 2-way voice connection
established }
ensure that {
  when { PSAP requests MSD again}
    then { IVS mutes audio, IVS sends MSD and MSD is received by PSAP before timer T8 expires }
          }
```

(2)

```
with { audio muted and valid MSD received at PSAP }
ensure that {
  when { Format check of MSD at PSAP is successful and PSAP sends AL-ACK }
    then { PSAP timer Tp1 is started and IVS receives AL-ACK before T6 (mirror timer Tp1) expires }
          }
```

(3)

```
with { AL-ACK received at IVS }
ensure that {
  when { MSD transfer stopped }
    then { IVS unmutes audio and 2-way speech connection is possible again}
          }
```

NOTE 1:   Cases with expiry of timer T6 and timer T7 are not considered here, because they are not mentioned within the test objective of CEN EN 16454 [1] CTP 1.1.15.2.

NOTE 2:   The test description in CEN EN 16454 [1] CTP 1.1.15.2 does not state which type of eCall is ongoing. Hence, automatic, manual or test eCall are given as alternatives in this test case.

7.1.1.33.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.33.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.6.2 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.15.2.

7.1.1.33.4   Test description

7.1.1.33.4.1   Pre-test conditions

Preamble 6, call type (automatic, manual, test) to be specified.

7.1.1.33.4.2 Test procedure sequence

Table 7.1.1.33.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	PSAP requests MSD	<-	SEND MSD		
2	PSAP starts timer T8				
3	Check: IVS mutes audio			1a, 1b, 1c	P
4	IVS sends MSD	->	MSD tx		
5	PSAP received valid MSD message at LL	<--	LL-ACK		
6	IVS stops sending MSD and starts timer T6				
7	PSAP received valid MSD message at AL	<--	AL-ACK		
8	Check: MSD is received before Timer T8 expires			1a, 1b, 1c, 2	P
9	PSAP starts timer Tp1				
10	Check: IVS receives an AL-ACK before timer T6 expires (see note)	-	-	2, 3	P
NOTE: After Tp1 expires check if 2-way speech is possible. Without considering a round trip delay the Tp1 has the same value as T6.					

7.1.1.33.4.3 Specific message contents

None.

7.1.1.34 CTP 1.1.15.3 eCall continuation when SEND MSD request not received (T5 expired) - PE eCall IVS

7.1.1.34.1 Test Purpose (TP)

(1a)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { automatic eCall triggered,  no SEND MSD is received}
    then { 2-way speech connection is established after expiry of timer T5 }
          }
```

(1b)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { manual eCall triggered no SEND MSD is received}
    then { 2-way speech connection is established after expiry of timer T5 }
          }
```

(1c)

```
with { ignition ON and IVS in mobile network coverage }
ensure that {
  when { test eCall triggered,  no SEND MSD is received}
    then { 2-way speech connection is established after expiry of timer T5 }
          }
```

7.1.1.34.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.34.3 Conformance requirements

The conformance requirements of CEN EN 16062 [6], clauses 7.4.4 and 7.12.10; annex A table A.1 T5 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.15.3.

7.1.1.34.4   Test description

7.1.1.34.4.1   Pre-test conditions

Preamble 1: Ignition ON and IVS is in mobile network coverage.

7.1.1.34.4.2   Test procedure sequence

Table 7.1.1.34.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1a	Trigger automatic eCall	-	-	-	-
1b	Trigger manual eCall				
1c	Trigger test eCall				
2	IF PE eCall only IVS THEN Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Steps of the generic procedure for eCall establishment (clause 6.1.2.2)	-	-	-	-
4	IVS starts Timer T5				
5	PSAP does not send MSD REQ				
6	Check: Timer T5 expires and 2-way speech is possible			1a, 1b, 1c	P

7.1.1.34.4.3   Specific message contents

None.

7.1.1.35   CTP 1.1.15.4 Call continuation when AL-ACK not received (T6 expired) - PE eCall IVS

7.1.1.35.1   Test Purpose (TP)

(1a)

```
with { automatic eCall in state call established }
ensure that {
  when { MSD is received, LL-ACK is sent and no AL-ACK is sent }
    then { after timer T6 expiry two-way speech is possible }
          }
```
(1b)

```
with { manual eCall in state call established }
ensure that {
  when { MSD is received, LL-ACK is sent and no AL-ACK is sent }
    then { after timer T6 expiry two-way speech is possible }
```
(1c)

```
with { test eCall in state call established }
ensure that {
  when { MSD is received, LL-ACK is sent and no AL-ACK is sent }
    then { after timer T6 expiry two-way speech is possible }
          }
```

7.1.1.35.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.35.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clauses 7.5.3 and 7.12.5.2; annex A, table A.1 T6 shall apply for this TC.

7.1.1.35.4 Test description

7.1.1.35.4.1 Pre-test conditions

Depending on call type (automatic, manual or test eCall) preamble 2, preamble 3 or preamble 11 is used.

7.1.1.35.4.2 Test procedure sequence

Table 7.1.1.35.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	eCall in progress according to steps 2-6 of generic procedure (clause 6.1.2.3)			-	-
2	Timer T6 (5s) is started	-	-		
3	Timer T6 is expired (note 1)				
4	Un-mute IVS loudspeaker and microphone (note 2)				
5	Check: Is 2-way speech possible?			1a, 1b, 1c	P
NOTE 1: No AL-ACK is sent by PSAP.					
NOTE 2: It is not intended to un-mute directly after positive LL-ACK reception (deviation from [1]).					

7.1.1.35.4.3 Specific message contents

None.

7.1.1.36 CTP 1.1.15.5 MSD is transferred continuously until T7 expires and IVS reconnects loudspeaker and microphone on its expiry - PE eCall IVS

7.1.1.36.1 Test Purpose (TP)

(1a)

```
with { automatic eCall in state call established }
ensure that {
  when { MSD is received, no LL-ACK and no AL-ACK is sent }
    then { after timer T7 expiry two-way speech is possible }
          }
```

(1b)

```
with { manual eCall in state call established }
ensure that {
  when { MSD is received, no LL-ACK and no AL-ACK is sent }
    then { after timer T7 expiry two-way speech is possible }
```

(1c)

```
with { test eCall in state call established }
ensure that {
  when { MSD is received, no LL-ACK and no AL-ACK is sent }
    then { after timer T7 expiry two-way speech is possible }
          }
```

7.1.1.36.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.36.3 Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.4.7; annex A table A.1 T7 shall apply for this TC.

7.1.1.36.4   Test description

7.1.1.36.4.1   Pre-test conditions

Depending on call type (automatic, manual or test eCall) preamble 2, preamble 3 or preamble 11 is used.

7.1.1.36.4.2   Test procedure sequence

Table 7.1.1.36.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
2	IVS sends initiation signal	-->	PUSH-REQ		
3	PSAP requests MSD	<--	SEND MSD	-	-
4	IVS starts timer T7				
5	IVS sends MSD	-->	MSD tx	-	-
6	PSAP does not send LL-ACK and does not send AL-ACK	<--	NACK		
7	Timer T7 expires				
8	Un-mute IVS loudspeaker and microphone				
9	Check: Is 2-way speech possible?			1a, 1b, 1c	P

7.1.1.35.4.3   Specific message contents

None.

7.1.1.37   CTP 1.1.16.1 Clear down call automatically - PE eCall IVS

7.1.1.37.1   Test Purpose (TP)

(1a)

```
with { automatic eCall in state call established }
ensure that {
  when { MSD transfer is completed }
    then { 2-way speech is possible }
          }
```
(1b)

```
with { manual eCall in state call established }
ensure that {
  when { MSD transfer is completed }
    then { 2-way speech is possible }
}
```
(1c)

```
with { test eCall in state call established }
ensure that {
  when { MSD transfer is completed }
    then { 2-way speech is possible }
          }
```
(2)

```
with { eCall in progress and 2-way speech possible }
ensure that {
  when { PSAP hangs-up call }
    then { call is released }
          }
```
(3a)

```
with { automatic eCall in state call established }
ensure that {
  when { MSD transfer is completed and AL-ACK with CLEAR DOWN is sent }
    then { call is released }
          }
```

(3b)

```
with { manual eCall in state call established }
ensure that {
  when { MSD transfer is completed and AL-ACK with CLEAR DOWN is sent }
    then { call is released }
              }
```

(3c)

```
with { test eCall in state call established }
ensure that {
  when { MSD transfer is completed and AL-ACK with CLEAR DOWN is sent }
    then { call is released }
              }
```

7.1.1.37.2 Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.37.3 Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.5 shall apply for this TC.

7.1.1.37.4 Test description

7.1.1.37.4.1 Pre-test conditions

Preamble 6.

7.1.1.37.4.2 Test procedure sequence

Table 7.1.1.37.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Check: Is 2-way speech possible?			1a, 1b, 1c	P
2	PSAP hangs-up call according to generic procedure (clause 6.1.2.4)			-	-
3	Check: Is the call released?			2	P
4a	Trigger automatic eCall	-	-	-	-
4b	Trigger manual eCall	-	-	-	-
4c	Trigger test eCall	-	-	-	-
5	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed				
6	Steps 1-6 of the generic procedure for eCall in progress (clause 6.1.2.3) are performed				
7	PSAP sends AL-ACK with CLEAR DOWN	<-	AL-ACK (Clear Down)		
8	IVS hangs-up call according to generic procedure (clause 6.1.2.5)				
9	Check: Is the call released?			3a, 3b, 3c	P

7.1.1.37.4.3 Specific message contents

None.

7.1.1.38   CTP 1.1.16.2 IVS clears down the eCall upon T2 expiry - PE eCall IVS

7.1.1.38.1   Test Purpose (TP)

(1a)

```
with { automatic eCall in state call established and IVS timer T2 started }
ensure that {
  when { timer T2 expires }
    then { call is released }
            }
```

(1b)

```
with { manual eCall in state call established and IVS timer T2 started }
ensure that {
  when { timer T2 expires }
    then { call is released }
            }
```

(1c)

```
with { test eCall in state call established and IVS timer T2 started }
ensure that {
  when { timer T2 expires }
    then { call is released }
            }
```

7.1.1.38.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.38.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clauses 7.9; 7.12.3, 7.12.16 and 7.3.1; annex A table A.1 T2 shall apply for this TC.

7.1.1.38.4   Test description

7.1.1.38.4.1   Pre-test conditions

Preamble 1.

7.1.1.38.4.2   Test procedure sequence

Table 7.1.1.38.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1a	Trigger automatic eCall	-	-	-	-
1b	Trigger manual eCall	-	-	-	-
1c	Trigger test eCall	-	-	-	-
2	IF PE eCall only IVS THEN Steps of the generic procedure for network registration (clause 6.1.2.1) are performed				
3	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed				
4	IVS starts timer T2				
5	Steps of the generic procedure for eCall in progress (clause 6.1.2.3) are performed				
6	Timer T2 expires				
7	IVS hangs-up call according to generic procedure (clause 6.1.2.5)				
8	Check: Is the call released?			1a, 1b, 1c	P

7.1.1.38.4.3   Specific message contents

None.

7.1.1.39   CTP 1.1.16.3 IVS registers recent eCalls - PE eCall IVS

7.1.1.39.1   Test Purpose (TP)

(1a)

```
with { automatic eCall in state call established }
ensure that {
  when { MSD transfer is completed and AL-ACK is sent with CLEAR DOWN and tester requests time stamp
AL-ACK information }
    then { IVS provides means to access the correctly stored time stamp of the AL-ACK information  }
            }
```

(1b)

```
with { manual eCall in state call established }
ensure that {
  when { { MSD transfer is completed and AL-ACK is sent with CLEAR DOWN and tester requests time
stamp AL-ACK information }
    then { IVS provides means to access the correctly stored time stamp of the AL-ACK information }
            }
```

(1c)

```
with { test eCall in state call established }
ensure that {
  when { { MSD transfer is completed and AL-ACK is sent with CLEAR DOWN and tester requests time
stamp AL-ACK information }
    then { IVS provides means to access the correctly stored time stamp of the AL-ACK information }
            }
```

7.1.1.39.2   Test applicability

This test case applies to all types of PE eCall IVS for which the tester has access to data stored in the IVS.

7.1.1.39.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.5.2 paragraph 3 also CEN EN 16072 [8], clause 7.17.4 shall apply for this TC.

7.1.1.39.4   Test description

7.1.1.39.4.1   Pre-test conditions

Depending on call type (automatic, manual or test eCall) preamble 2, preamble 3 or preamble 11 is used.

7.1.1.39.4.2   Test procedure sequence

Table 7.1.1.39.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	eCall in progress according to steps 2-6 of generic procedure (clause 6.1.2.3)			-	-
2	PSAP sends AL-ACK with CLEAR DOWN	<--	AL-ACK (CLEAR DOWN)	-	-
3	Tester triggers IVS time stamp output	<--	(see note)		
4	Check: Is the time stamp of the AL-ACK stored in the IVS?	-->	(see note)	1a, 1b, 1c	P
NOTE: Realization is not defined, necessary commands have to be introduced.					

7.1.1.39.4.3   Specific message contents

None.

7.1.1.40   CTP 1.1.17.1 Call-back allowed and able to be answered by IVS - PE eCall IVS

7.1.1.40.1   Test Purpose (TP)

(1)

```
with { eCall completed and timer T9 running }
ensure that {
  when { IVS is called back }
    then { IVS answers call automatically }
              }
```

(2)

```
with { callback answered automatically by IVS }
ensure that {
  when { audio/voice line has been reconnected }
    then { IVS loudspeaker and microphone are activated and 2-way speech is possible }
              }
```

7.1.1.40.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.40.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.10 (including point c) and CEN EN 16072 [8], clause 7.17.3 shall apply for this TC.

7.1.1.40.4   Test description

7.1.1.40.4.1   Pre-test conditions

Preamble 7.

7.1.1.40.4.2   Test procedure sequence

Table 7.1.1.40.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Trigger Callback from PSAP	-	-	-	-
2	Steps 1-8 of the generic procedure for call back to the IVS according to generic procedure (clause 6.1.2.6) are performed	-	-	-	-
3	Check: Does IVS answer the incoming call automatically?	-->	CONNECT	1	P
4	PSAP completes the call establishment procedure	<--	CONNECT ACKNOWLEDGE	-	-
5	Activate IVS loudspeaker and microphone	-	-	-	-
6	Check: Is 2-way speech possible?	-	-	2	P

7.1.1.40.4.3   Specific message contents

None.

7.1.1.41   CTP 1.1.17.2 Call-back answered by IVS in the event of abnormal termination - PE eCall IVS

7.1.1.41.1   Test Purpose (TP)

(1a)

```
with { automatic eCall in state call established }
ensure that {
  when { call is dropped before MSD transfer is completed (before LL-ACK is sent) }
    then { at least 1 redial attempt has to be made, all redial attempts have to be completed within
2 minutes }
            }
```
(1b)

```
with { manual eCall in state call established }
ensure that {
  when { call is dropped before MSD transfer is completed (before LL-ACK is sent) }
    then { at least 1 redial attempt has to be made, all redial attempts have to be completed within
2 minutes }
            }
```
(1c)

```
with { test eCall in state call established }
ensure that {
  when { call is dropped before MSD transfer is completed (before LL-ACK is sent) }
    then { at least 1 redial attempt has to be made, all redial attempts have to be completed within
2 minutes }
            }
```
(2)

with { call terminated abnormally and all re-dial attempts are completed }
ensure that {
 when { PSAP calls back within the third minute after eCall terminated abnormally }
  then { IVS answers a callback from the PSAP automatically }
      }(3)

```
with { callback answered automatically by IVS }
ensure that {
  when { audio/voice line has been reconnected }
    then { IVS loudspeaker and microphone are activated and 2-way speech is possible }
            }
```

7.1.1.41.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.41.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.10 (including point c) and CEN EN 16072 [8], clause 7.17.3 shall apply for this TC.

7.1.1.41.4   Test description

7.1.1.41.4.1   Pre-test conditions

Depending on call type (automatic, manual or test eCall) preamble 2, preamble 3 or preamble 11 is used.

7.1.1.41.4.2   Test procedure sequence

Table 7.1.1.41.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	IVS sends initiation signal	-->	PUSH-REQ	-	-
2	PSAP requests MSD	<--	SEND MSD	-	-
3	IVS sends MSD	-->	MSD tx	-	-
4	MNO releases call without applying generic procedure (clause 6.1.2.4)	-	-	-	-
5	MNO monitors incoming calls for 2 minutes	-	-	-	-
5.1	IVS attempts to re-dial acc. to generic procedure (clause 6.1.2.2)	-	-	-	-
5.2	Check: Does IVS perform at least one re-dial attempt?	-	-	1a, 1b, 1c	-
5.3	MNO rejects call attempts according to generic procedure (clause 6.1.2.7)	-	-	-	-
6	PSAP calls IVS back within the next minute (see note) according to steps 1-8 of generic procedure (clause 6.1.2.6)	-	-	-	-
7	Check: Does the IVS answer the call automatically?	-->	CONNECT	2	P
8	PSAP completes the call establishment procedure	<--	CONNECT ACKNOWLEDGE		
9	Activate IVS loudspeaker and microphone				
10	Check: Is 2-way speech possible?	-		3	P
NOTE:	The callback is initiated after timer of step 5 is elapsed plus 20 seconds wait time.				

7.1.1.41.4.3   Specific message contents

None.

7.1.1.42   CTP 1.1.17.3 MSD transfer occurs upon PSAP request during call-back - PE eCall IVS

7.1.1.42.1   Test Purpose (TP)

(1)

```
with { call back is in progress and 2-way voice connection established }
ensure that {
  when { PSAP requests MSD}
    then { IVS mutes audio, IVS sends MSD and MSD is received by PSAP before timer T8 expires }
          }
```
(2)

```
with { audio muted and valid MSD received at PSAP }
ensure that {
  when { Format check of MSD at PSAP is successful and PSAP sends AL-ACK }
    then { PSAP timer Tp1 is started and IVS receives AL-ACK before T6 (mirror timer Tp1) expires }
          }
```
(3)

```
with { AL-ACK received at IVS }
ensure that {
  when { MSD transfer stopped }
    then { IVS unmutes audio and 2-way speech connection is possible again}
          }
```

7.1.1.42.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.42.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.6.3 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.17.3.

7.1.1.42.4   Test description

7.1.1.42.4.1   Pre-test conditions

Preamble 9.

7.1.1.42.4.2   Test procedure sequence

Table 7.1.1.42.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	PSAP requests MSD	<-	SEND MSD		
2	PSAP starts timer T8.				
3	Check: IVS mutes audio.			1	P
4	IVS sends MSD	->	MSD tx		
5	PSAP received valid MSD message at LL	<--	LL-ACK		
6	IVS stops sending MSD and starts timer T6				
7	PSAP received valid MSD message at AL	<--	AL-ACK		
8	Check: Is MSD received before Timer T8 expires?			1, 2	P
9	PSAP starts timer Tp1				
10	Check: Does IVS receive an AL-ACK before timer T6 expires? (see note)	-	-	2, 3	P
NOTE:	After Tp1 expires check if 2-way speech is possible. Without considering a round trip delay the Tp1 has the same value as T6.				

7.1.1.42.4.3   Specific message contents

None.

7.1.1.43   CTP 1.1.17.4 Remain registered for ≥1 hr - PE eCall IVS

7.1.1.43.1   Test Purpose (TP)

(1a)

```
with { ignition ON and IVS is in mobile coverage }
ensure that {
  when { automatic eCall is triggered }
    then { IVS registers on the network and starts connection establishment }
         }
```

(1b)

```
with { ignition ON and IVS is in mobile coverage }
ensure that {
  when { manual eCall is triggered }
    then { IVS registers on the network and starts connection establishment }
         }
```

(1c)

```
with { ignition ON and IVS is in mobile coverage }
ensure that {
  when { test eCall is triggered }
    then { IVS registers on the network and starts connection establishment }
         }
```

(2)

```
with { connection established }
ensure that {
  when { MSD transfer is completed, AL-ACK is sent and PSAP hangs-up call }
    then { call is released }
          }
```

(3)

```
with { IVS registered to the network and timer T9 not expired }
ensure that {
  when { PSAP calls IVS back after 55 minutes }
    then { IVS answers call automatically }
          }
```

7.1.1.43.2   Test applicability

This test case applies to all types of PE eCall IVS.

7.1.1.43.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.9, especially paragraph 6; clause 7.10 (c); annex A, table A.1 T9; CEN EN 16072 [8], clause 7.17.3 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.17.4.

7.1.1.43.4   Test description

7.1.1.43.4.1   Pre-test conditions

Preamble 1.

7.1.1.43.4.2   Test procedure sequence

Table 7.1.1.43.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1a	Trigger automatic eCall	-	-	-	-
1b	Trigger manual eCall	-	-	-	-
1c	Trigger test eCall	-	-	-	-
2	Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Steps of the generic procedure for eCall establishment (clause 6.1.2.2) are performed	-	-		
4	Check: Is call established?	-	-	1a, 1b, 1c	P
5	Steps of the generic procedure for eCall in progress (clause 6.1.2.3) are performed	-	-		
6	Check: Is MSD received correctly?	-	-	2	P
7	PSAP hangs-up call according to generic procedure (clause 6.1.2.4)	-	-	-	-
8	Check: Is call released?	-	-	2	P
9	PSAP waits 55 minutes	-	-	-	-
9	PSAP initiates call back to the IVS according to generic procedure (clause 6.1.2.6)	-	-	-	-
10	Check: Does IVS answer the call?	-	-	3	P

7.1.1.43.4.3   Specific message contents

None.

7.1.2 Conformance tests for in-vehicle user equipment for Pan European eCall - additional tests for eCall only systems

7.1.2.1 CTP 1.1.1.2 IVS does not perform registration after power-up - PE eCall only IVS

7.1.2.1.1 Test Purpose (TP)

(1)

```
with { ignition OFF }
ensure that {
  when { Vehicle Power ON and IVS waited for 60 seconds }
    then { IVS NAD has not attempted to register with MNO and IE "Establishment cause" is not set to
          "Registration" for 120 seconds }
          }
```

7.1.2.1.2 Test applicability

This test case applies to PE eCall only IVS.

7.1.2.1.3 Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.1.4, paragraph 1 and clause 7.1.6, paragraph 1 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.1.2.

7.1.2.1.4 Test description

7.1.2.1.4.1 Pre-test conditions

Ignition OFF; IVS has privileges to register only on this network.

7.1.2.1.4.2 Test procedure sequence

Table 7.1.2.1.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Vehicle Power ON	-	-	-	-
2	Wait 60 seconds	-	-	-	-
3	Check: Is IE "Establishment cause" set to "Registration" for 120 seconds?	-->	RRC CONNECTION REQUEST	1	F

7.1.2.1.4.3 Specific message contents

None.

7.1.2.2 CTP 1.1.1.3 IVS periodically scans and maintains a list of available PLMNs - PE eCall only IVS

No test required. Covered by ETSI TS 122 011 [i.6] and ETSI TS 123 122 [i.7], therefore if compliance has been achieved to CTP 1.1.0.1, is automatically compliant.

7.1.2.3 CTP 1.1.10.4 Verify that PLMN registration procedure is executed upon initiating an eCall - PE eCall only IVS

7.1.2.3.1 Test Purpose (TP)

(1a)

```
with { ignition ON and IVS in mobile network coverage and IVS was not registered on a PLMN }
ensure that {
  when { automatic eCall triggered }
    then { successful PLMN registration }
            }
```

(1b)

```
with { ignition ON and IVS in mobile network coverage and IVS was not registered on a PLMN }
ensure that {
  when { manual eCall triggered }
    then { successful PLMN registration }
            }
```

7.1.2.3.2 Test applicability

This test case applies to PE eCall only IVS.

7.1.2.3.3 Conformance requirements

The conformance requirements of CEN EN 16062 [6], clauses 6 (c); 7.3.4; 7.3.5 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.10.4.

7.1.2.3.4 Test description

7.1.2.3.4.1 Pre-test conditions

Preamble 1: Ignition ON and IVS was not registered on a PLMN.

7.1.2.3.4.2 Test procedure sequence

Table 7.1.2.3.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
-	EXCEPTION: Steps 1a to 1b describe behaviour that depends on the test configuration; the "lower case letter" identifies a step sequence that takes place if a test configuration is supported	-	-	-	-
1a	Trigger manual eCall	-	-	-	-
1b	Trigger automatic eCall	-	-	-	-
2	Steps of the generic procedure for network registration (clause 6.1.2.1) are performed	-	-	-	-
3	Check: Is the IVS successfully registered on the PLMN?	-->	-	1	P

7.1.2.3.4.3 Specific message contents

None.

7.1.2.4   CTP 1.1.17.5 Remain registered for ≥1 hr ≤12 hr - PE eCall only IVS

7.1.2.4.1   Test Purpose (TP)

(1)

```
with { eCall completed and timer T9 running}
ensure that {
  when { IVS is called back after 55 minutes }
    then { IVS answers call automatically }
            }
```

(2)

```
with { callback having been performed after 55 minutes and timer T9 having elapsed}
ensure that {
  when { IVS de-registers }
    then { IVS transmits IMSI DETACH INDICATION within 12 hours following call clear-down }
            }
```

7.1.2.4.2   Test applicability

This test case applies to PE eCall only IVS.

7.1.2.4.3   Conformance requirements

The conformance requirements of CEN EN 16062 [6], clause 7.9 shall apply for this TC. The test shall complete CEN EN 16454 [1] CTP 1.1.17.5.

7.1.2.4.4   Test description

7.1.2.4.4.1   Pre-test conditions

Preamble 7: Ignition ON and IVS is in mobile network coverage; IVS has been programmed with the non-emergency number to be used for test calls; eCall of applicable type has been established and cleared down; timer T9 is running.

7.1.2.4.4.2   Test procedure sequence

Table 7.1.2.4.4.2-1: Main behaviour

Step	Procedure	Message Sequence		TP	Verdict
		I - T	Message		
1	Wait 55 minutes	-	-	-	-
2	Trigger Callback from PSAP (see note)	-	-	-	-
3	Steps 1-8 of the generic procedure for call back to the IVS according to generic procedure (clause 6.1.2.6) are performed	-	-		
4	Check: Does IVS answer and sustain the incoming call?	-->	CONNECT	1	P
5	PSAP completes the call establishment procedure	<--	CONNECT ACKNOWLEDGE	-	-
6	PSAP releases call acc. to generic procedure (clause 6.1.2.4)	-	-	-	-
7	Wait for timer T9 to elapse	-	-	-	-
8	Check: Does the IVS de-register within 12 hours following call clear-down?	-->	IMSI DETACH INDICATION	2	P
NOTE:	This is done by MMI command.				

7.1.2.4.4.3   Specific message contents

None.

7.1.3 Conformance tests for in-vehicle user equipment for Pan European eCall via a third party service provider

Tests according to CEN EN 16454 [1], clause 9.8 are for further study.

7.1.4 Minimum Performance requirements for in-vehicle user equipment for Pan-European eCall

7.1.4.1 MSD transmission time for different channel conditions

7.1.4.1.1 Definition

These tests shall validate that a PE eCall IVS passes the end-to-end minimum performance requirements in terms of MSD failure rate and MSD transmission time. The test configurations are adapted from ETSI TS 126 269 [5], clauses 5.2.1.1, 5.2.1.2 and 5.2.1.3, which were dedicated for simulative environments, in order to accommodate realtime system implementation scenarios. The transmission time shall be measured according to the definition given by ETSI TS 126 269 [5], annex D, using PSAP sided PULL mode round trip time (PSAP-PULL-RTT) and PSAP sided PUSH mode round trip time (PSAP-PUSH-RTT).

7.1.4.1.2 Conformance requirements

The average MSD transmission time for the different codec types, rates and radio channel conditions shall not exceed the requirement given in table 7.1.4.1.5-1 for PSAP-PUSH-RTT and table 7.1.4.1.5-2 for PSAP-PULL-RTT. The values define the requirement in seconds. The MSD success rate shall be higher or equal than the requirement given in table 7.1.4.1.5-3, the given value defines the requirement in percent.

7.1.4.1.3 Test purpose

To verify that the PE eCall IVS does not exceed the conformance requirement under TU3 propagation conditions.

7.1.4.1.4 Method of test

IVS under test and reference PSAP shall be setup to be connected via a concatenated radio channel and network simulators. GNSS position may be provided through a pre-stored position or through an external GNSS simulator.

For the in-band modem performance tests, repeated tests shall be conducted under different radio and speech codec conditions as depicted in table 7.1.4.1.5-1, table 7.1.4.1.5-2 and table 7.1.4.1.5-3. Each repeated test run corresponds to the CEN EN 16454 [1] reference test CTP 1.1.14.1.

Tests may use either manual, automatic or test eCall.

It is assumed that the transmission in the wireline part of the eCall uses PCM (G.711, A-law) without any further transcoding and with optimal level settings.

It is assumed that no acoustical echo is produced by the IVS and that therefore no Acoustic Echo Suppressor is applied in the network.

It is assumed that no Hybrid Echo is produced by the PSAP connection and that therefore no Hybrid Echo canceller is applied in the network simulator.

The MSD may contain randomly generated data or constant data employing the same MSD for each call.

The following radio conditions shall be tested (see table 7.1.4.1.5-1, table 7.1.4.1.5-2 and table 7.1.4.1.5-3):

- GMSK Full Rate radio channel at C/I values of 1, 4, 7, 10, 13, 16 dB, error free; with frequency hopping as defined in ETSI TS 151 010-1 [9], clause 6, with the COST207 Typical Urban profile and with 3 km/h vehicle speed (TU3) according to annex C of ETSI TS 100 910 [15]. These channel conditions shall be applied in both directions (uplink and downlink) symmetrically. Channel conditions in the uplink may be achieved by using the same simulation model, that has been used in the creation of the technical report ETSI TR 126 969 [13]. The channel conditions may be applied only during the established connection (after the completed call setup) to minimize failures already during the call setup procedure.

- DTX shall be enabled in both directions.

For any particular test condition C (specified in table 7.1.4.1.5-1 and table 7.1.4.1.5-2), the observed transmission time of the 140 bytes of the MSD may vary depending on the parameters of the channel simulation and the specific contents of the MSD. Therefore each MSD transmission may be regarded as one trial k in a random experiment, where the observed transmission time, T_k, is the random variable of interest. For each particular test condition C, the MSD transmission is repeated with different, randomly generated MSD data for at least 100 times ($k = 1, 2, ..., n$, where $n \geq 100$) to get enough statistical significance.

To ensure a practical limit on the time required for testing, the observed value of T_k shall have a reasonable upper bound. This upper bound, t_{UB}, is fixed at a value of 20 seconds for one trial for all test conditions. This corresponds to the T7 timer specified in CEN EN 16062 [6]. Any value of T_k that is observed to be greater than $t_{UB,}$ will be classified as a transmission failure and should not be included in the MSD transmission time statistics.

Each particular test condition C gives an observed sample distribution $T_1, T_2, ..., T_n$. The statistic of interest is the average value, $\mu_C = (T_1 + T_2 + ... + T_n) / n$.

The average PSAP PUSH-RTT metric and PSAP-PULL-RTT over *all* test conditions shall be calculated by unweighted averaging of μ_C over all particular test conditions $C_1, C_2, ..., C_m$ as defined in annex D of ETSI TR 126 969 [13].

If the reference PSAP does not receive the MSD correctly (i.e. CRC check failed) within $t_{UB = 20s}$, then this test trial is regarded as failure and marked as such in the result table.

Since for these tests voice communication is not needed, the PSAP should be configured such that it either sends AL-ACK value 0x2 to indicate IVS to clear down the call, or terminates the call directly upon successful reception of the MSD.

7.1.4.1.5 Test requirements

Table 7.1.4.1.5-1: Conformance Requirements for different codec and radio conditions, MSD transmission time according to definition of PSAP-PUSH-RTT (in seconds)

Codec Type	GSM-FR	GSM-HR	AMR-NB								AMR-WB
Codec Mode Radio condition	13,0	5,6	12,2	10,2	7,95	7,4	6,7	5,9	5,15	4,75	12,65
C/I = 1 dB										7,6	
C/I = 4 dB								5,6	6,0	5,6	
C/I = 7 dB	5,6		4,8	4,8	4,8	4,8	4,8	5,2	5,6	5,6	
C/I = 10 dB	4,4		4,0	4,0	4,8	4,8					
C/I = 13 dB	4,4		4,0	4,0							
C/I = 16 dB	4,4										
error free	4,4	10	4,0								4,4

NOTE: The requirements in Table 7.1.4.1.5-1 assume that the IVS immediately starts sending the SEND message as soon as it receives the CALL CONNECTED indication from the network. If there is a delay between these two events this difference should be considered when comparing the measured time to the requirements.

**Table 7.1.4.1.5-2: Conformance Requirements for different codec and radio conditions,
MSD transmission time according to definition of PSAP-PULL-RTT (in seconds)**

Codec Type	GSM-FR	GSM-HR	AMR-NB								AMR-WB
Codec Mode Radio condition	13,0	5,6	12,2	10,2	7,95	7,4	6,7	5,9	5,15	4,75	12,65
C/I = 1 dB										6,8	
C/I = 4 dB								4,8	5,2	4,8	
C/I = 7 dB	4,8		4,0	4,0	4,0	4,0	4,0	4,4	4,8	4,8	
C/I = 10 dB	3,6		3,2	3,2	4,0	4,0					
C/I = 13 dB	3,6		3,2	3,2							
C/I = 16 dB	3,6										
error free	3,6	9,2	3,2								3,6

The requirements in tables 7.1.4.1.5-1 and 7.1.4.1.5-2 specify the net transmission time of the MSD and do not contain any delay introduced by the transport channel or the measurement equipment. The following delays need to be determined prior to this test:

- End-to-End Delay in sending direction T_{Send}

- End-to-End Delay in receiving direction T_{Rec}

- PSAP processing delay T_P

These delays should either be measured or declared. T_{Send} and T_{Rec} may be measured according to the procedure described in [i.8]. According to the definition in [i.8] $T_{Send} = T_S + T_{TES}$ and $T_{Rec} = T_R + T_{TER}$. Before comparing the measured value with the requirements, above delays have to be subtracted according to the following rules:

- The measured PSAP-PUSH-RTT has to be subtraced by $(2 \times T_{Send} + T_{Rec} + T_P)$.

- The measured PSAP-PULL-RTT has to be subtracted by $(T_{Send} + T_{Rec} + T_P)$.

EXAMPLE: Given is a measured value of 4,452 s for the PSAP-PUSH-RTT under channel condition AMR-NB 12.2 error free. Granted that the IVS and test equipment together have $T_{Send} = 180$ ms and $T_{Rec} = 165$ ms and the PSAP adds a processing delay of $T_P = 0,2$ s, then $\mu_C = 4,452$ s - $(2 \times 0,18$ s + $0,165$ s + $0,2$ s) = 3,727 s. This value is lower than the given requirement of 4,0 s.

**Table 7.1.4.1.5-3: Conformance Requirements for different codec and radio conditions,
MSD Success Rate (in percent)**

Codec Type	GSM-FR	GSM-HR	AMR-NB								AMR-WB
Codec Mode Radio condition	13,0	5,6	12,2	10,2	7,95	7,4	6,7	5,9	5,15	4,75	12,65
C/I = 1 dB										97	
C/I = 4 dB								97	97	97	
C/I = 7 dB	97		98	98	98	98	98	98	98	98	
C/I = 10 dB	98		98	98	98	98					
C/I = 13 dB	98		98	98							
C/I = 16 dB	98										
error free	99	95	99								99

7.1.4.2 MSD transmission time in noisy conditions

Tests according to ETSI TS 126 269 [5], clause 5.2.1.4 are for further study.

7.1.4.3 MSD transmission time with scaling of PCM signals

Tests according to ETSI TS 126 269 [5], clause 5.2.1.5 are for further study.

7.2 Mobile Network Operators

Tests according to CEN EN 16454 [1], clause 10 are for further study.

7.3 PSAP Systems

Tests according to CEN EN 16454 [1], clause 11 are for further study.

7.4 TPS-eCall

Tests according to CEN EN 16454 [1], clause 12 are for further study.

Annex A (informative): Recommended test case applicability

The applicability of each individual test is identified in the table A-1. This is just a recommendation based on the purpose for which the test case was written.

The applicability of every test is formally expressed by the use of Boolean expression that are based on conformance testing functions included in table A-3.

The columns in table A-1 have the following meaning:

Clause

The clause column indicates the clause number that contains the test body.

CEN Test Case

The CEN Test Case column indicates the test case number of the corresponding tests according to CEN EN 16454 [1].

Title

The title column indicates the name of the test.

Applicability - Condition

The following notations are used for the applicability column:

R	recommended - the test case is recommended to all terminals supporting PE eCall.
O	optional - the test case is optional.
N/A	not applicable - in the given context, the test case is not recommended.
Ci	conditional - the test is recommended ("R") or not ("N/A") depending on the support of other items. "i" is an integer identifying an unique conditional status expression which is defined immediately following the table. For nested conditional expressions, the syntax "IF ... THEN (IF ... THEN ... ELSE...) ELSE ..." is used to avoid ambiguities.

Applicability - Comments

This comments column contains a verbal description of the condition included in the applicability column.

Table A-1: Applicability of PE eCall IVS conformance test cases

Clause	CEN Test Case	Title	Applicability Condition	Comments
IVS - PE eCall				
7.1.1.1	CTP 1.1.0.1	Conformance to ETSI TS 102 936-1 [3] and ETSI TS 102 936-2 [4] - PE eCall IVS	C01	PE eCall IVS
7.1.1.2a	CTP 1.1.0.2	Test for conformance to valid SIM/USIM - PE eCall capable IVS	C02	PE eCall capable IVS
7.1.1.2b	CTP 1.1.0.2	Test for conformance to valid SIM/USIM - PE eCall only IVS	C03	PE eCall only IVS
7.1.1.3	CTP 1.1.0.3	Automatic eCall triggering does not occur when ignition OFF - PE eCall IVS	C01	PE eCall IVS
7.1.1.4	CTP 1.1.1.1	Power on and self test - PE eCall IVS	C01	PE eCall IVS
7.1.1.5	CTP 1.1.2.1	eCall automatically activated - PE eCall IVS	C01	PE eCall IVS
7.1.1.6	CTP 1.1.2.2	Automatically triggered eCall in progress was not disconnected upon a new eCall trigger - PE eCall IVS	C01	PE eCall IVS
7.1.1.7	CTP 1.1.2.3	Post-side-crash performance of automatic trigger - PE eCall IVS	C01	PE eCall IVS
7.1.1.8	CTP 1.1.2.4	Post-frontal-crash performance of automatic trigger - PE eCall IVS	C01	PE eCall IVS

Clause	CEN Test Case	Title	Applicability	
			Condition	Comments
7.1.1.9	CTP 1.1.2.5	Performance of automatic trigger - different crash types - PE eCall IVS	C01	PE eCall IVS
7.1.1.10	CTP 1.1.3.1	eCall manually activated - PE eCall IVS	C01	PE eCall IVS
7.1.1.11	CTP 1.1.3.2	Manually triggered eCall in progress was not disconnected upon a new eCall trigger - PE eCall IVS	C01	PE eCall IVS
7.1.1.12	CTP 1.1.4.1	Test eCall activated - PE eCall IVS	C01	PE eCall IVS
7.1.1.13	CTP 1.1.5.1	Network registration - PE eCall IVS	C01	PE eCall IVS
7.1.1.14	CTP 1.1.5.2	Manual termination of eCall by vehicle occupants not allowed (automatically triggered eCall) - PE eCall IVS	C01	PE eCall IVS
7.1.1.15	CTP 1.1.5.3	Manual termination of eCall by vehicle occupants not allowed (manually triggered eCall) - PE eCall IVS	C01	PE eCall IVS
7.1.1.16	CTP 1.1.5.4	Automatically triggered eCall in progress was not disconnected when ignition is switched to OFF - PE eCall IVS	C01	PE eCall IVS
7.1.1.17	CTP 1.1.5.5	Manually triggered eCall in progress was not disconnected when ignition is switched to OFF - PE eCall IVS	C01	PE eCall IVS
7.1.1.18a	CTP 1.1.5.6	Priority over conflicting communication - PE eCall capable IVS	C01	PE eCall capable IVS
7.1.1.18b	CTP 1.1.5.6	Priority over conflicting communication - PE eCall only IVS	C01	PE eCall only IVS
7.1.1.19	CTP 1.1.5.7	Network registration is re-tried when network registration attempt was not successful - PE eCall IVS	N/A	no test required
7.1.1.20a	CTP 1.1.6.1	Mute IVS and vehicle audio - PE eCall capable IVS	C02	PE eCall capable IVS
7.1.1.20b	CTP 1.1.6.1	Mute IVS and vehicle audio - PE eCall only IVS	C03	PE eCall only IVS
7.1.1.21	CTP 1.1.7.1	Set-up TS12 call with eCall identifier (flag) set to "automatic" - PE eCall IVS	C01	PE eCall IVS
7.1.1.22	CTP 1.1.8.1	Set-up TS12 call with eCall identifier (flag) set to "manual" - PE eCall IVS	C01	PE eCall IVS
7.1.1.23	CTP 1.1.9.1	Set-up TS11 call to test number - PE eCall IVS	C01	PE eCall IVS
7.1.1.24a	CTP 1.1.10.1	eCall is attempted when no networks are available (limited service condition with forbidden PLMN on SIM/USIM) - PE eCall IVS	C04	PE eCall IVS and support of exchangeable or reconfigurable SIM/USIM
7.1.1.24b	CTP 1.1.10.1	eCall is attempted when no networks are available (limited service condition with forbidden PLMN on SIM/USIM) - PE eCall IVS	C05	PE eCall IVS and no support of exchangeable or reconfigurable SIM/USIM
7.1.1.25	CTP 1.1.10.2	Re-dial attempt completed within 2 minutes after eCall is dropped - PE eCall IVS	C01	PE eCall IVS
7.1.1.26	CTP 1.1.10.3	Duration of eCall Initiation signal - PE eCall IVS	C01	PE eCall IVS
7.1.1.27	CTP 1.1.11.1	Send MSD with indicator set to "Automatically Initiated eCall" (AIeC) - PE eCall IVS	C01	PE eCall IVS
7.1.1.28	CTP 1.1.12.1	Send MSD with indicator set to "Manually Initiated eCall" (MIeC) - PE eCall IVS	C01	PE eCall IVS
7.1.1.29	CTP 1.1.13.1	Send MSD with indicator set to "Test eCall" - PE eCall IVS	C01	PE eCall IVS
7.1.1.30	CTP 1.1.14.1	Verify MSD transfer - PE eCall IVS	C01	PE eCall IVS
7.1.1.31	CTP 1.1.14.2	Un-mute IVS audio when AL-ACK received - PE eCall IVS	C01	PE eCall IVS
7.1.1.32	CTP 1.1.15.1	Establish voice link to PSAP - PE eCall IVS	C01	PE eCall IVS
7.1.1.33	CTP 1.1.15.2	MSD transfer request while eCall conversation in progress - PE eCall IVS	C01	PE eCall IVS
7.1.1.34	CTP 1.1.15.3	eCall continuation when SEND MSD request not received (T5 expired) - PE eCall IVS	C01	PE eCall IVS
7.1.1.35	CTP 1.1.15.4	Call continuation when AL-ACK not received (T6 expired) - PE eCall IVS	C01	PE eCall IVS

Clause	CEN Test Case	Title	Applicability	
			Condition	Comments
7.1.1.36	CTP 1.1.15.5	MSD is transferred continuously until T7 expires and IVS reconnects loudspeaker and microphone on its expiry - PE eCall IVS	C01	PE eCall IVS
7.1.1.37	CTP 1.1.16.1	Clear down call automatically - PE eCall IVS	C01	PE eCall IVS
7.1.1.38	CTP 1.1.16.2	IVS clears down the eCall upon T2 expiry - PE eCall IVS	C01	PE eCall IVS
7.1.1.39	CTP 1.1.16.3	IVS registers recent eCalls - PE eCall IVS	C06	PE eCall IVS and tester has access to data stored in the IVS.
7.1.1.40	CTP 1.1.17.1	Call-back allowed and able to be answered by IVS - PE eCall IVS	C01	PE eCall IVS
7.1.1.41	CTP 1.1.17.2	Call-back answered by IVS in the event of abnormal termination - PE eCall IVS	C01	PE eCall IVS
7.1.1.42	CTP 1.1.17.3	MSD transfer occurs upon PSAP request during call-back - PE eCall IVS	C01	PE eCall IVS
7.1.1.43	CTP 1.1.17.4	Remain registered for ≥ 1 hr - PE eCall IVS	C01	PE eCall IVS
IVS - PE eCall additional tests for eCall only IVS				
7.1.2.1	CTP 1.1.1.2	IVS does not perform registration after power-up - PE eCall only IVS	C03	PE eCall only IVS
7.1.2.2	CTP 1.1.1.3	IVS periodically scans and maintains a list of available PLMNs - PE eCall only	N/A	no test required
7.1.2.3	CTP 1.1.10.4	Verify that PLMN registration procedure is executed upon initiating an eCall - PE eCall only IVS	C03	PE eCall only IVS
7.1.2.4	CTP 1.1.17.5	Remain registered for ≥ 1 hr ≤ 12 hr - PE eCall only IVS	C03	PE eCall only IVS

Table A-2: Applicability of PE eCall IVS conformance test cases conditions

C01	IF (A.3/1 OR A.3/2) THEN R ELSE N/A
C02	IF A.3/1 THEN R ELSE N/A
C03	IF A.3/2 THEN R ELSE N/A
C04	IF (A.3/1 OR A.3/2) AND A.3/3 THEN R ELSE N/A
C05	IF (A.3/1 OR A.3/2) AND NOT A.3/3 THEN R ELSE N/A
C06	IF (A.3/1 OR A.3/2) AND A.3/4 THEN R ELSE N/A

Table A-3: Conformance testing functions

Item	Conformance Testing Functions
1	PE eCall capable IVS
2	PE eCall only IVS
3	Exchangeable or reconfigurable SIM/USIM
4	Tester has access to data stored in the IVS

Annex B (informative):
Change History

Date	Version	Information about changes
April 2016	1.1.1	First publication of the TS
March 2018	1.2.1	Implemented Changes: New generic procedure for call rejection in clause 6.1.2.7 Modified preamble 4 to create conflicting communication conditions Declared measurement timer values Clause 7.1.1.18 replaced by clauses 7.1.1.18a and 7.1.1.18b Clauses 7.1.1.28 and 7.1.1.41 modified due to newly introduced generic procedure Modified clause 7.1.1.40 New minimum performance requirements in clause 7.1.4

Annex C (informative):
Bibliography

ETSI TR 126 954: "LTE; Test plan for speech quality and delay through a headset electrical interface (3GPP TR 26.954)".

History

Document history		
V1.1.1	April 2016	Publication
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