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UC15 eCall
AT Commands Manual

UMTS/HSPA Module Series

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About the Document

History

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Contents

Table Index

Figure Index

1 Introduction

This document provides a brief introduction on eCall functionality of Quectel UC15 module and mainly describes how to establish eCall via UC15 eCall AT commands.

1.1. Overview of eCall

eCall is defined as a manually or automatically initiated emergency call from a vehicle. It is supplemented with a minimum set of emergency related data (MSD), and compatible with the EU Commission's eSafety initiative. eCall can be depicted by the figure below.
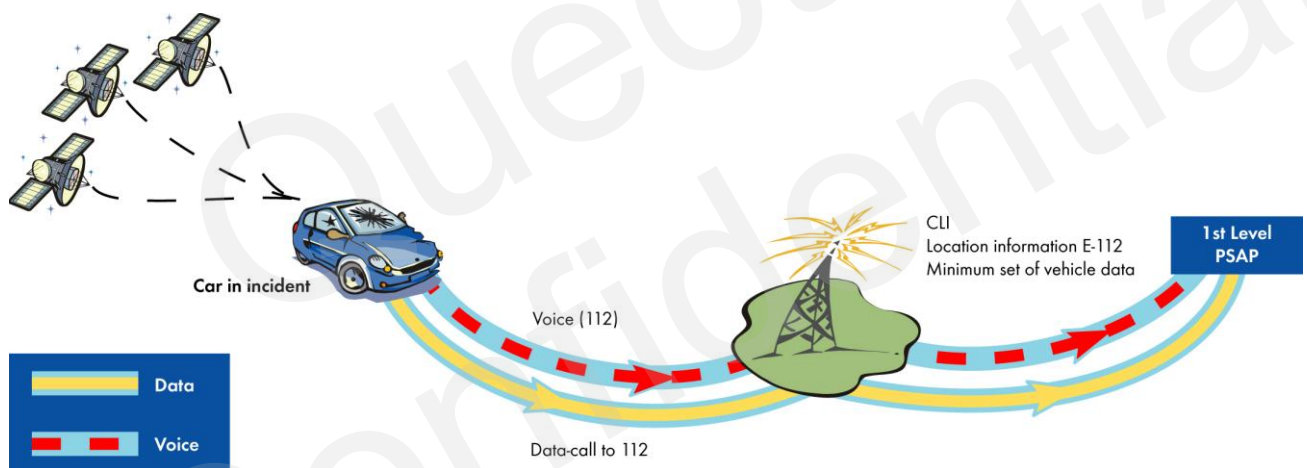
Figure 1: Overview of eCall System

The architecture of eCall system is described in Figure 2. UC15 module acts as IVS in the eCall system and it connects to a real PSAP.
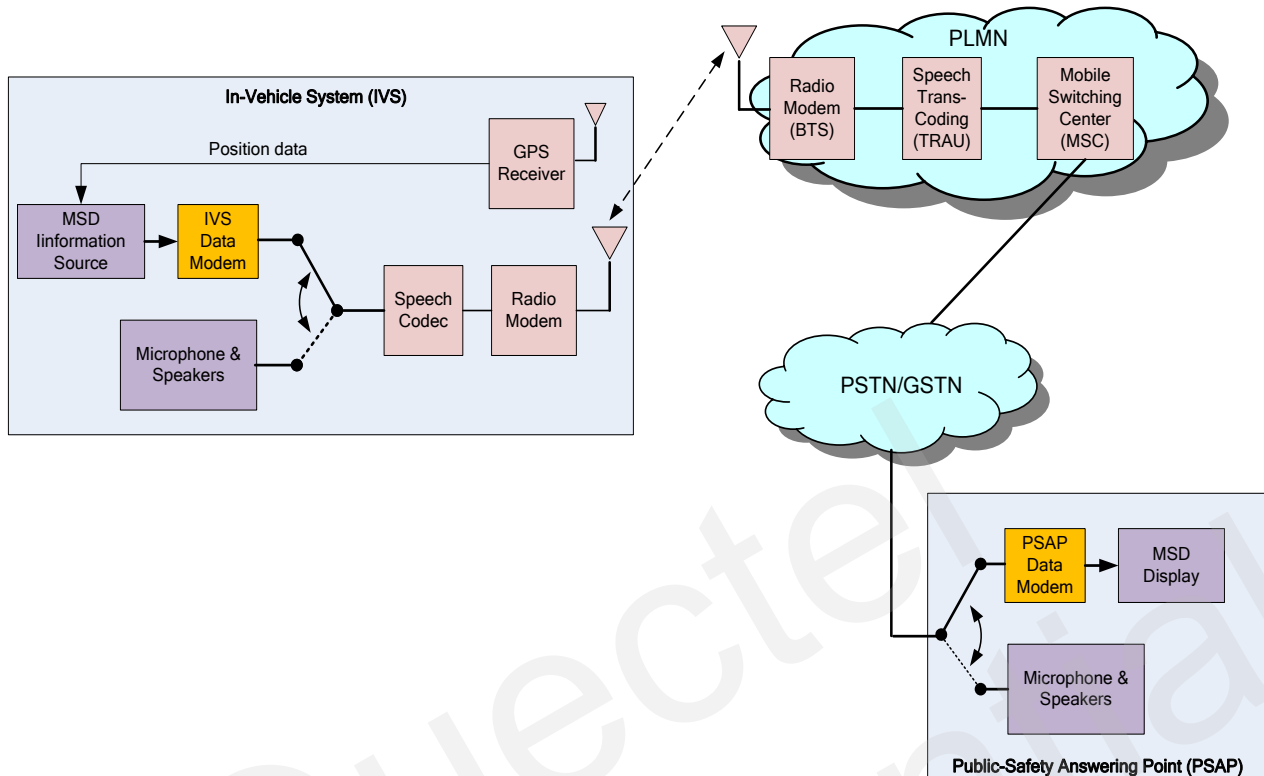
Figure 2: Architecture of eCall System

1.2. eCall Flows

Quectel UC15 module supports both push mode and pull mode. Push mode is realized by a request from the IVS to the PSAP to push the MSD; pull mode is realized by PSAP actively requiring MSD from IVS. The flow charts of these two modes are described as follows.

You can establish eCall by AT+QECALL command. When eCall is established successfully, it will transmit MSD in push mode automatically. If MSD transmission is finished, you can do voice talk or execute AT+QECPUSH command to transfer MSD in push mode again; or PSAP can request MSD and then IVS transfers MSD in pull mode.

If PSAP terminates the eCall, the MT eCall on the IVS side will be valid in 12 hours. When MT eCall is coming, you should use ATA command to answer the eCall, and then you can use AT+QECPUSH command to transfer MSD in push mode, or PSAP can request MSD and then IVS transfers MSD in pull mode.

1.2.1. eCall Flow Chart in Push Mode

For MO eCall on the IVS, when eCall is established successfully, it will automatically transmit MSD in push mode. If MSD transmission is finished, you can use AT+QECPUSH command to re-transmit MSD in push mode. The following figure shows the detailed procedure in push mode.
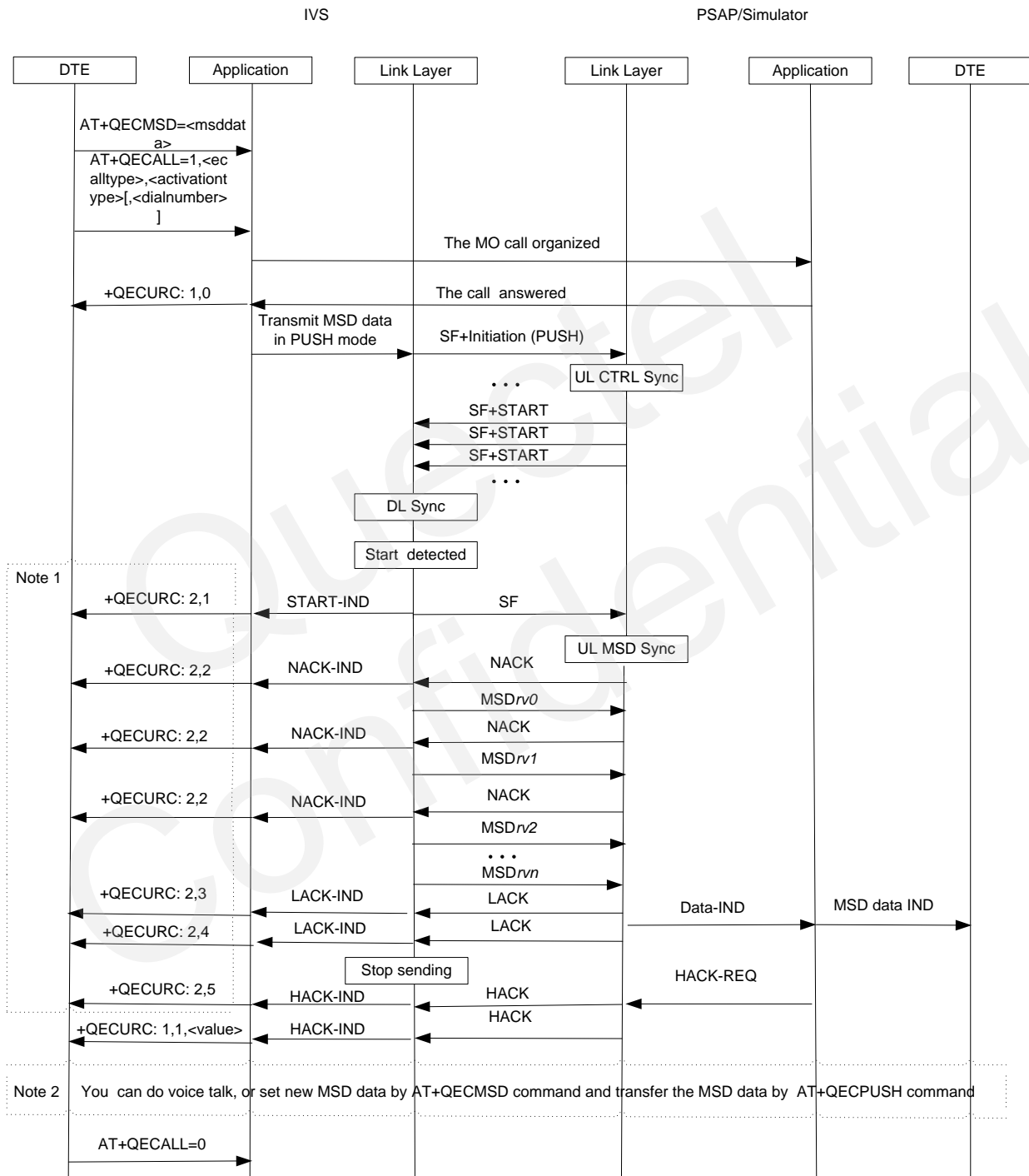
Figure 3: Flow Chart in Push Mode

Step 1: Set MSD by AT+QECMSD.

Step 2: Establish eCall by AT+QECALL. After being established successfully, eCall will automatically transmit MSD in push mode.

Step 3: +QECURC: 1,1,<hackcode> will be reported when MSD is transmitted successfully.

Step 4: Release eCall by AT+QECALL=0.

NOTES

1. When using AT+QECCFG to enable <processinfo>, URC of eCall process information will be reported in MSD transmission. Otherwise, it would not be outputted. For details, please refer to Chapter 2.1.1 and 2.2.3.

2. Whenever MSD is transferred successfully or not, before eCall hangs up, you can do voice talk or execute AT+QECPUSH command to transfer MSD again, or use AT+QECMSD command to set new MSD and then execute AT+QECPUSH command to transfer new MSD.

1.2.2. eCall Flow Chart in Pull Mode

When MT eCall on the IVS has been established, MSD can be transmitted in pull mode. If +QECURC: 1,2,1 is reported, it indicates PSAP requests MSD, and then MSD will be transmitted in pull mode. The following figure shows the detailed procedure in pull mode.
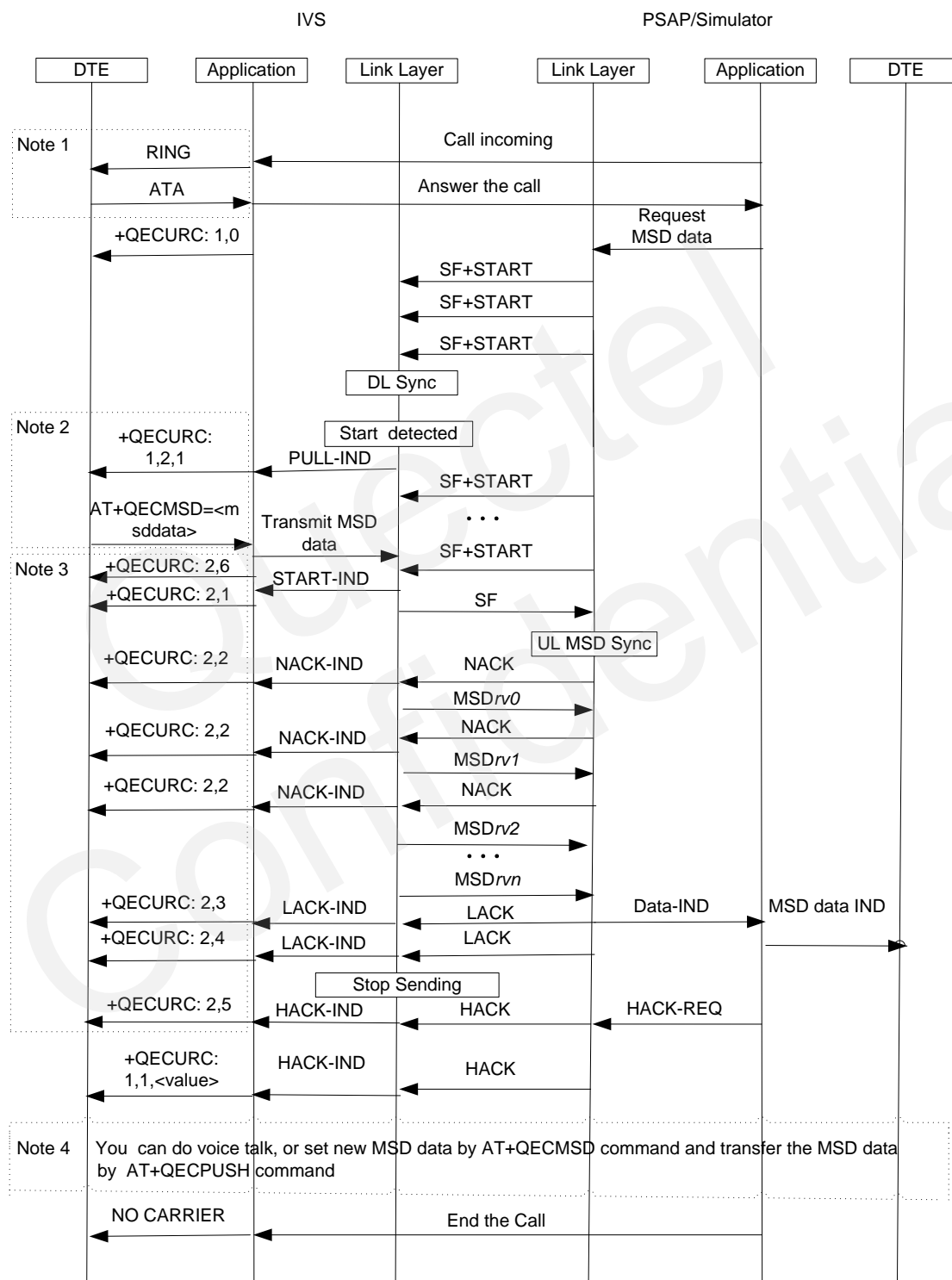
Figure 4: Flow Chart in Pull Mode

Step 1: Call is coming and answers the call.

Step 2: +QECURC: 1,2,1 is reported, which indicates to update MSD.

Step 3: Set MSD by AT+QECMSD and transmit MSD in pull mode.

Step 4: +QECURC: 1,1,<hackcode> is reported when MSD is transmitted successfully.

Step 5: NO CARRIER is reported, which indicates eCall session has terminated.

NOTES

1. When eCall has been established and PSAP ends the eCall, the MT eCall on the IVS will be valid in 12 hours. When MT eCall is answered, MSD will not be transmitted automatically in push mode.

2. +QECURC: 1,2,1 is reported, which indicates to update MSD. AT+QECMSD command can be used to update MSD. If MSD has not been updated within 5 seconds, the related timer will be timeout and +QECURC: 1,2,0 will be reported. In this situation, the old MSD will be transferred.

3. When using AT+QECCFG to enable <processinfo>, URC of eCall process information will be reported in MSD transmission. Otherwise, it would not be outputted. For details, please refer to Chapter 2.1.1 and 2.2.3.

4. Whenever MSD is transferred successfully or not, before eCall hangs up, executing AT+QECPUSH command can transfer MSD again, or use AT+QECMSD command to set new MSD and then executing AT+QECPUSH command to transfer new MSD.

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2 Description of eCall AT Commands

2.1. Description of AT Command

2.1.1. AT+QECCFG   eCall Related Configuration

AT+QECCFG is used to configure eCall parameters. These parameters will be automatically saved into NV memory, except <T5>,<T6> and <T7>.

If <voiceconfig> is set to 1, UC15 module will mute IVS speaker automatically in MSD transmission, so voice and noise will not be heard. When MSD transmission is finished, the module will unmute IVS speaker.

There are three eCall modes: eCall only mode, eCall normal mode and eCall default mode. In general, there is no need to change the eCall mode, for it is configured via SIM card by default.

AT+QECCFG eCall Related Configuration	
Test Command **AT+QECCFG=?**	Response **+QECCFG: "voiceconfig",(0,1)** **+QECCFG: "ecallmode",(0-2)** **+QECCFG: "processinfo",(0,1)** **+QECCFG: "T5",(2-255)** **+QECCFG: "T6",(5-255)** **+QECCFG: "T7",(20-255)** **OK**
Read Command **AT+QECCFG?**	Response **+QECCFG: "voiceconfig",<voiceconfig>** **+QECCFG: "ecallmode",<ecallmode>** **+QECCFG: "processinfo",<processinfo>** **+QECCFG: "T5",<timeoutvalue>** **+QECCFG: "T6",<timeoutvalue>** **+QECCFG: "T7",<timeoutvalue>** **OK**
Mute IVS speaker in MSD transmission **AT+QECCFG="voiceconfig"[,<voicec**	Response If <voiceconfig> is null:

onfig>]	+QECCFG: "voiceconfig",<voiceconfig>
	OK
	If <voiceconfig> is set:
	OK
	If error is related to ME functionality:
	+CME ERROR: <err>
Set the eCall mode **AT+QECCFG="ecallmode"[,<ecallmode>]**	Response If <ecallmode> is null: **+QECCFG: "ecallmode",<ecallmode>** **OK** If <ecallmode> is set: **OK** If error is related to ME functionality: **+CME ERROR: <err>**
Enable to report URC of eCall process information **AT+QECCFG="processinfo"[,<processInfo>]**	Response If <processinfo> is null: **+QECCFG: "processinfo",<processinfo>** **OK** If <processinfo> is set: **OK** If error is related to ME functionality: **+CME ERROR: <err>**
Set T5 timeout value **AT+QECCFG="T5"[,<timeoutvalue>]**	Response If <timeoutvalue> is null: **+QECCFG: "T5",<timeoutvalue>** **OK** If <timeoutvalue> is set: **OK** If error is related to ME functionality: **+CME ERROR: <err>**
Set T6 timeout value **AT+QECCFG="T6"[,<timeoutvalue>]**	Response If <timeoutvalue> is null:

	+QECCFG: "T6",<timeoutvalue> **OK** If <timeoutvalue> is set: **OK** If error is related to ME functionality: **+CME ERROR: <err>**
Set T7 timeout value **AT+QECCFG="T7"[,<timeoutvalue>]**	Response If <timeoutvalue> is null: **+QECCFG: "T7",<timeoutvalue>** **OK** If <timeoutvalue> is set: **OK** If error is related to ME functionality: **+CME ERROR: <err>**

Parameter

<voiceconfig>	A numeric parameter, indicates to enable or disable to mute IVS speaker in MSD transmission. The configured value will be saved to NV automatically.
	0 Disable to mute IVS speaker automatically in MSD transmission
	1 Enable to mute IVS speaker automatically in MSD transmission
<ecallmode>	A numeric parameter, indicates the eCall mode. The configured value will be saved to NV automatically.
	0 eCall normal mode. In this mode, module will register to network
	1 eCall only mode. GPRS attach procedure. An eCall only mobile station shall not perform a normal or combined GPRS attach procedure (3GPP 24008 4.7.3)
	2 eCall default mode. In this mode, whether or not to register to the network is determined by SIM/USIM card
<processinfo>	A numeric parameter, indicates to enable or disable to report the URC of eCall process information. The configured value will be saved to NV automatically.
	0 Disable to report URC of eCall process information
	1 Enable to report URC of eCall process information
<T5>	The timer of IVS waiting for START, default timeout value is 2 seconds. The timeout value will not be saved to NV. You should set the timeout value before organizing the eCall. For further information about this timer, please refer to EN 16062.
<T6>	The timer of IVS waiting for HACK, default timeout value is 5 seconds. The timeout value will not be saved to NV. You should set the timeout value before organizing the

	eCall. For further information about this timer, please refer to EN 16062.
<T7>	The timer for MSD transmission, default timeout value is 20 seconds. The timeout value will not be saved to NV. You should set the timeout value before organizing the eCall. For further information about this timer, please refer to EN 16062.
<timeoutvalue>	A numeric parameter, indicates the timeout value, the unit is second.

2.1.2. AT+QECMSD   Set the Whole MSD

AT+QECMSD is used to set the MSD in hex bytes. The max length of <msddata> is 280 hex characters, which represents 140 bytes of MSD. Spaces in <msddata> will be skipped; and characters out of the range of '0'~'f' will be regarded as '0'. For more information about MSD structure, please refer to CEN EN 15722. Meanwhile, before establishing eCall, AT+QECMSD command must be executed to set the MSD.

AT+QECMSD Set the Whole MSD	
Test Command **AT+QECMSD=?**	Response **OK**
Write Command **AT+QECMSD=<msddata>**	Response **OK** If error is related to ME functionality: **+CME ERROR: <err>**

Parameter

<msddata>	MSD should be hex bytes written in string format.

2.1.3. AT+QECALL   Establish/Release eCall

AT+QECALL is used to establish or release eCall. When module has established eCall, it will automatically transmit MSD in push mode. So before establishing eCall, AT+QECMSD command must be executed to set the MSD. The eCall may be initiated automatically, for example, due to a vehicle sensor, or manually set by the vehicle occupants.

For emergency call (<ecalltype> is 1), the dial number is 112. If <dialnumber> is set as other numbers such as 119, it will return ERROR.

For test call (<ecalltype> is 0), if <dialnumber> has been set, it is preferred to be used; If <dialnumber> has not been set or has been cancelled, the number can be obtained from the FDN or SDN. If it is failed to get dial number or the eCall mode is incorrect, it will return ERROR.

If AT+QECALL command returns OK, it means the module is starting to establish eCall. If establishing

eCall fails, "+QECURC: 0,0" will be returned. If network disconnects the eCall, "NO CARRIER" will be returned.

AT+QECALL Establish/Release eCall	
Test Command **AT+QECALL=?**	Response **+QECALL: (0,1),(0,1),(0,1),<dialnumber>** **OK**
Read Command **AT+QECALL?**	Response **+QECALL:** **<session>[,<ecalltype>,<activationtype>[,<dialnumber>]]** **OK**
Write Command **AT+QECALL=<session>[,<ecalltype>,<activationtype>[,<dialnumber>]]**	Response **OK** If error is related to ME functionality: **+CME ERROR: <err>**

Parameter

<session>	A numeric parameter, indicates to establish/release eCall
	0 Release eCall
	1 Establish eCall
<ecalltype>	A numeric parameter, indicates eCall type
	0 Test call
	<u>1</u> Emergency call
<activationtype>	A numeric parameter, indicates activation type of eCall
	0 Manually initialized eCall
	<u>1</u> Automatically initialized eCall
<dialnumber>	A string parameter, indicates dial number of the test call. An optional proceeding "+" and numbers 0-9 are allowed only.

2.1.4. AT+QECPUSH   Push MSD to PSAP

AT+QECPUSH is used to push MSD to PSAP by push mode. The AT+QECPUSH command cannot be used until eCall has been established. When MSD is transmitting, AT+QECPUSH cannot be executed, or else, it will return ERROR.

AT+QECPUSH Push MSD to PSAP	
Test Command **AT+QECPUSH=?**	Response **OK**

Execution Command **AT+QECPUSH**	Response **OK** If error is related to ME functionality: **+CME ERROR: \<err>**

2.2. Description of URC

URCs of UC15 eCall AT commands will be reported to the host by the type of "+QECURC:". It contains failed eCall, successful MSD transmission as well as request for updating MSD and information report during eCall.

2.2.1. URC of Failed eCall

When module establishing eCall fails or MSD transmission timeout happens, URC of failed eCall will be reported. And except for establishing eCall fails, others errors cannot hang up eCall. If URC of failed eCall is reported and eCall still holds on, you can do voice talk, or execute AT+QECPUSH command to transmit MSD again. When IVS cannot detect SF, IVS will be reset.

URC of Failed eCall	
+QECURC: 0,\<errorcode>	\<errorcode> indicates error causes.

Parameter

\<errorcode>	Error code
	0 Establishing eCall fails
	1 Wait for START timeout
	2 Wait for HACK timeout
	3 MSD transmission timeout
	4 IVS reset

2.2.2. URC of Successful eCall MSD Transmission

When MSD is transmitted successfully, +QECURC: 1,1,\<hackcode> will be reported. Then you can do voice talk or execute AT+QECPUSH command to transmit MSD again.

When eCall has been established and MSD is not transmitting, MSD can be transmitted in pull mode. In pull mode, URC of updating eCall MSD indicates that MSD is allowed to be updated within 5 seconds. You can use AT+QECMSD command to update MSD. If MSD has not been updated in 5 seconds, the old

MSD will be transmitted.

URC of Successful eCall MSD Transmission	
+QECURC: 1,0	Establish eCall successfully.
+QECURC: 1,1,<hackcode>	When IVS Link Layer receives 2 HACK messages, this URC will be reported to IVS APP. <hackcode> indicates HACK code which is transferred by PSAP.
+QECURC: 1,2,<pullstatus>	<pullstatus> indicates the status of MSD request.

Parameter

<hackcode>	HACK code which is transferred by PSAP. For details, please refer to EN 16062
<pullstatus>	URC of updating eCall MSD
	0 Indicate timeout of updating MSD and module starts to transfer the old MSD
	1 Indicate to update MSD in 5 seconds

2.2.3. URC of eCall Process Information

After AT+QECCFG="processinfo",1 command is executed, this URC will be reported during MSD transmission. Otherwise, this URC will not be reported.

URC of eCall Process Information	
+QECURC: 2,<processinfo>	<processinfo> indicates eCall process information

Parameter

<processinfo>	URC of eCall process information
	1 When IVS Link Layer receives START message and starts to send MSD, this URC will be reported
	2 When IVS Link Layer receives NACK message, this URC will be reported
	3 When IVS Link Layer receives the first LACK message, this URC will be reported
	4 When IVS Link Layer receives the second LACK message, this URC will be reported
	5 When IVS Link Layer receives first HACK message, this URC will be reported
	6 Indicates MSD has been updated and the module starts to transfer the new MSD

3 Example

3.1. MO eCall and Transfer MSD Automatically in Push Mode

For MO eCall, when eCall is established, MSD will be transferred automatically in push mode.

AT+QECMSD=00e165df6a789b4aaaa46ee4a651820daaf625803735d9dfd5c7067927d821a43d4b64b
74cd2116dc582aabc6f4e45cdf9cbe2f74eb1aaf69cb4ef86cde48f86e02147d6c49ea22587144bbfdaa8
ef92c04afeb0c4e93ba93453561e65acd5065bbe12abde11819d86434039cf4e619124d5f308240ab0ea
11635aef2edfc8bc39e77768d784b67f6f7cb603   //Set MSD.
OK

AT+QECALL=1,1,0   //Establish eCall, \<ecalltype> is 1 (emergency call).
                                            //\<activationtype> is 0 (manually initialized eCall).
                                            //If you want to establish a test eCall, you should
                                               execute AT+QECALL=1,0,0,"12345678" command.
                                            //12345678 is dial number.
OK

//When PSAP answers the call, on IVS side, the MSD will be automatically transmitted in push mode, and the following URC will be reported.

+QECURC: 1,0   //Establish eCall successfully.

+QECURC: 1,1,0   //MSD transmission is successful; HACK code is 0 (positive ACK).

//You can do voice talk, or execute AT+QECMSD command to update MSD and execute AT+QECPUSH command to transfer MSD again, shown as follows.

AT+QECMSD=00123456789012345 6789   //Set MSD.
OK

AT+QECPUSH   //Transfer MSD in push mode.
OK

+QECURC: 1,1,0   //MSD transmission is successful; HACK code is 0 (positive ACK).

//At this time, if PSAP requires the MSD, and +QECURC: 1,2,1 will be outputted, please refer to Chapter 3.2.

//You can use AT+ QECALL=0 command to hang up eCall, or PSAP hangs up eCall and NO CARRIER will be returned.

AT+ QECALL=0   //Release call.
OK

3.2. MT eCall and Transfer MSD in Pull Mode

When eCall has established and PSAP terminates the eCall, MT eCall will be valid in 12 hours. For MT eCall, when eCall is established, MSD can be transferred in push mode or pull mode. If you want to transfer MSD in push mode, you should use AT+QECPUSH command. If +QECURC: 1.2.1 is reported, it indicates PSAP requires MSD, and then MSD will be transmitted in pull mode. The following example shows the transmission in pull mode.

RING   //Call is coming and answers the call.

ATA
OK

+QECURC: 1,0   //Establish eCall successfully.

//You can do voice talk, or set the MSD by AT+QECMSD command and transmit MSD by AT+QECPUSH command.

+QECURC: 1,2,1   //URC is reported, indicates to update MSD.

AT+QECMSD=00e165df6a789b4aaaa46ee4a651820daaf625803735d9dfd5c7067927d821a43d4b64b74cd2116dc582aabc6f4e45cdf9cbe2f74eb1aaf69cb4ef86cde48f86e02147d6c49ea22587144bbfdaa8ef92c04afeb0c4e93ba93453561e65acd5065bbe12abde11819d86434039cf4e619124d5f308240ab0ea11635aef2edfc8bc39e77768d784b67f6f7cb603 //Update MSD and transmit MSD in pull mode.
OK

//Then the MSD will be automatically transmitted and the following URC indicates MSD transmission is successful.

+QECURC: 1,1,0   //MSD is transmitted successfully.

//You can do voice talk, or execute AT+QECMSD command to update MSD and use AT+QECPUSH command to transfer MSD, please refer to Chapter 3.1.

//You can use AT+QECALL=0 command to hang up eCall, or PSAP hangs up eCall and NO CARRIER will be returned.

NO CARRIER   //URC is reported, indicates that PSAP hangs up eCall.

4 Summary of Error Codes

The result of the final error code is "+CME ERROR: <err>". <err> indicates an error relating to the ME. The operation is similar to error result code. It will be returned when some definition error occurs. The <err> codes listed here are just related to the module of the eCall.

Table 1: Summary of Error Codes

<errorcode>	Meaning
850	Unknown error
851	Input parameter error
852	Operation not allowed
853	MSD in transferring
854	Not in IVS mode
855	Set MSD error
856-900	Reserved

5 Appendix A Reference

Table 2: Related Documents

SN	Document Name	Remark
[1]	3GPP TS 26.267	eCall data transfer; In-band modem solution; general description
[2]	3GPP TS 22.101	Service aspects; service principles
[3]	3GPP TS 26.268	eCall data transfer; in-band modem solution; ANSI-C reference code
[4]	CEN EN 15722	Road transport and traffic telematics-eSafety-eCall minimum set of data
[5]	EN 16062	Intelligent transport systems-eCall-High Level Application Protocols Requirements (HLAP)

Table 3: Terms and Abbreviations

Abbreviation	Description
ME	Mobile Equipment
TA	Terminal Adapter
MS	Mobile Station
DTE	Data Terminal Equipment
ACK	Acknowledgement
HACK	High Layer ACK
LACK	Link Layer ACK
SF	Synchronization Frame
IVS	In-Vehicle System
MSD	Minimum Set of Data

PSAP	Public Safety Answering Point
URC	Unsolicited Response Code
NV	Non-volatile Memory
MO	Mobile Originated
MT	Mobile Terminated