

GM47/GM48



The product described in this manual conforms to the TTE directive 91/263/EEC and EMC directive 89/336/EEC. The product fulfils the requirements according to ETS 300 342-1.

SAR statement: This product is intended to be used with the antenna or other radiating element at least 20cm away from any part of the human body.

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Part 1: Overview

1. Introduction

1.1 Target Users

GM47 and GM48 modules are designed to be integrated into machine-to-machine or man-to-machine communications applications. They are intended to be used by manufacturers, system integrators, applications developers and developers of wireless communications equipment.

1.2 Prerequisites

It is assumed that the person integrating the GM47 or GM48 into an application has a basic understanding of the following:

- GSM networking;
- Wireless communication and antennas (aerials);
- AT commands;
- ITU-T standard V.24/V.28;
- Micro controllers and programming;
- Electronic hardware design.

1.3 Manual Structure

The manual is composed of four parts:

Part 1- Overview

This section provides a broad overview of the GM47/GM48 family and includes a list of abbreviations used in the manual.

Part 2 - Developer's Kit

This section lists the contents of the whole development kit and provides the information to setup and use the equipment.

Part 3 - Integrating the Module

This section describes each of the signals available on the GM47/GM48 modules, along with mechanical information. The section also provides you with design guidelines and explains what is needed to commercialise an application from a regulatory point of view.

Part 4 - Using AT Commands

This section lists all the AT Commands relevant to the GM47 and GM48, including their required parameters. The purpose of part 4 is to give you detailed information on the function of the AT Command set.

2. GM47/GM48 Modules

2.1 About the GM47/GM48 Family

Two modules make up the family; GM47 and GM48, for use in the 900/1800MHz and 850/1900MHz GSM bands respectively.

Note! As the characteristics of the modules are quite similar, this manual only refers to the GM48 where a difference exists; by default all other references are to the GM47.

The products belong to a new generation of Sony Ericsson modules, and are intended to be used in machine-to-machine applications and man-to-machine applications. They are used when there is a need to send and receive data (by SMS, CSD, HSCSD, or GPRS), and make voice calls over the GSM network.

GM47 modules are not “stand alone” devices; they are used as the engine in an application created by the customer. A typical application, involves a micro-controller and GM47 module, in which the micro-controller sends AT commands to the module via an RS232 communications link.

2.2 GM47 in a Communication System

Figure 2.1 illustrates the main blocks of a wireless communication system using the GM47. It also shows the communication principles of the system. The definitions in the figure, as used elsewhere in this manual, are in accordance with the recommendations of GSM 07.07.

- The MS (mobile station) represents the GM47 module plus SIM card. The module excluding SIM card, is known as the ME (mobile equipment).
- The TE (terminal equipment) is a micro-controller (i.e., a computer) and is a part of the application.

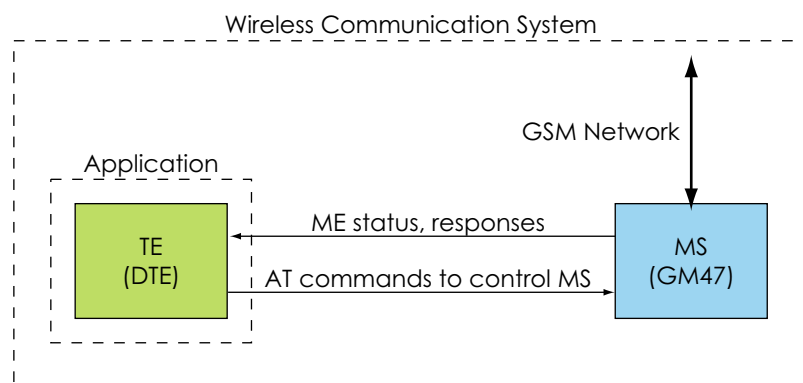


Figure 2.1 Main Blocks in a Wireless System

In accordance with the recommendations of ITU-T (International Telecommunication Union - Telecommunications Standardisation Sector) V.24, the TE communicates with the MS over a serial interface.

The functions of the GM47 follow the recommendations provided by ETSI (European Telecommunications Standards Institute) and ITU-T.

ETSI specifies a set of AT commands for controlling the GSM element of the module; these commands are supplemented by Sony Ericsson specific commands.

To find out how to work with AT commands, see “Part 4: Using AT Commands”, page 75.

Figure 2.2 illustrates the interface between the module and the application. The entire System Connector Interface is described in detail in “System Connector Interface”, page 41.

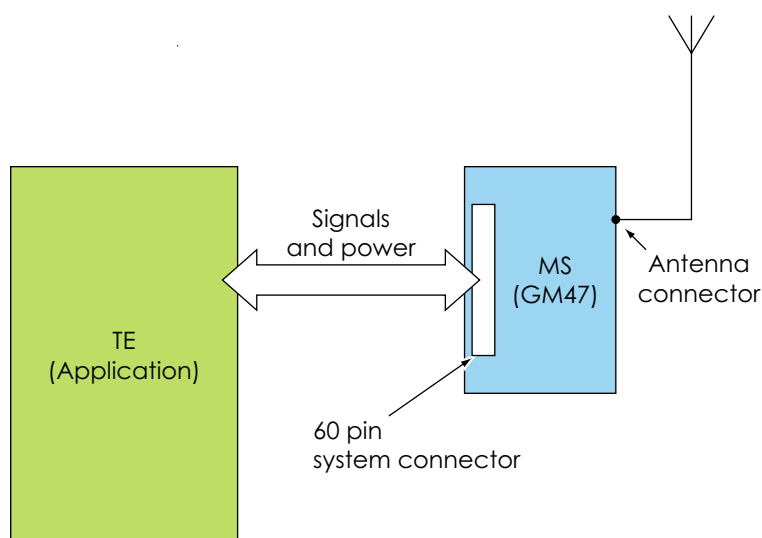


Figure 2.2 The Interface between the Module and the Application

Note! ITU-T standards define TE and TA as DTE (Data Terminal Equipment) and DCE (Data Circuit Terminating Equipment) respectively.

2.3 Features

The module performs a set of telecom services (TS) according to GSM standard phase 2+, ETSI and ITU-T. The functions of the module are implemented by issuing AT commands over a serial interface.

2.3.1 Types of Mobile Station

GM47 and GM48 are dual band mobile stations with the characteristics shown in the tables below.

<i>GM47</i>	<i>GSM900</i>	<i>E-GSM900</i>	<i>GSM1800</i>
Frequency Range (MHz)	TX: 890-915 RX: 935-960	TX: 880-890 RX: 925-935	TX: 1710-1785 RX: 1805-1880
Channel spacing	200kHz		200kHz
Number of channels	173 carriers *8 (TDMA) GSM: channels 1 to 124 E-GSM: channels 975 to 1023		374 carriers *8 (TDMA) DCS: channels 512 to 885
Modulation	GMSK		GMSK
TX phase accuracy	< 5° RMS phase error (burst)		< 5° RMS phase error (burst)
Duplex spacing	45MHz		95MHz
Receiver sensitivity at antenna connector	< -102dBm		< -102dBm
Transmitter output power at antenna connector	Class 4 2W (33dBm)		Class 1 1W (30dBm)
Automatic hand-over between GSM 900 and GSM1800			
<i>GM48</i>	<i>GSM850</i>	<i>GSM1900</i>	
Frequency Range (MHz)	TX: 824-849 RX: 869-894	TX: 1850-1910 RX: 1930-1990	
Channel spacing	200kHz		200kHz
Number of channels	123 carriers *8 (TDMA) GSM: channels 128 to 251		298 carriers *8 (TDMA) PCS: channels 512 to 810
Modulation	GMSK		GMSK
TX Phase Accuracy	< 5° RMS phase error (burst)		< 5° RMS phase error (burst)
Duplex spacing	45MHz		80MHz
Receiver sensitivity at antenna connector	< -102dBm		< -102dBm
Transmitter output power at antenna connector	Class 5 0.8W (29dBm)		Class 1 1W (30dBm)
Automatic hand-over between GSM850 and GSM1900			

2.3.2 Short Message Service

The module supports the following SMS services:

- Sending; MO (mobile-originated) with both PDU (protocol data unit) and text mode supported.
- Receiving; MT (mobile-terminated) with both PDU and text mode supported.
- CBM (cell broadcast message); a service in which a message is sent to all subscribers located in one or more specific cells in the GSM network (for example, traffic reports).
- SMS STATUS REPORT according to GSM 03.40.
- SMS COMMAND according to GSM 03.40.

The maximum length of an SMS message is 160 characters when using 7-bit encoding. For 8-bit data, the maximum length is 140 bytes. The module supports up to 6 concatenated messages to extend this function.

2.3.3 Voice Calls

The GM47 offers the capability of mobile originated and mobile terminated voice calls, as well as supporting emergency calls. Multi-party, call waiting and call deflection features are available. Some of these features are network-operator specific.

For the inter-connection of audio, the module offers both single ended and balanced analogue input and output lines. Direct interface to the digital PCM (pulse code modulation) bus used within the module is available, thus by-passing the internal analogue circuitry. The GM47 has an embedded echo cancellation and noise suppression for improved audio quality.

2.3.4 Data

The module supports the following data protocols:

- GPRS (General Packet Radio Service)
Modules are Class B terminals, which provide simultaneous activation and attachment of GPRS and GSM services. GM47 modules are GPRS 4+1 enabled devices, which are capable of transmitting in one timeslot per frame (up link), and receiving at a maximum of four timeslots per frame (down link).
- CSD (Circuit Switched Data)
GM47 modules are capable of establishing a CSD communication at 9.6kbps.
- HSCSD (High Speed Circuit Switched Data).
GM47 supports HSCSD communication, with one timeslot per frame capacity in the up link and two timeslots per frame capacity in the down link (2+1).

2.3.5 SIM Card

An external SIM card with 3 V or 5 V technology, can be connected to the module via its 60-pin system connector.

2.3.6 Average Power Consumption

		<i>Idle Mode</i>	<i>Transmit/Operation</i>
GSM850 and GSM900	Voice/CSD	<5 mA	<250mA (<2A peak)
	Data (GPRS 4+1)	<5 mA	<350mA (<2A peak)
GSM1800 and GSM1900	Voice/CSD	<5 mA	<250mA (<1.75A peak)
	Data (GPRS 4+1)	<5 mA	<350mA (<1.75A peak)

Note! The power consumption during transmission is measured at maximum transmitted power.

2.3.7 Other Features

These include:

- Internet-ready module.
- 07.10 multiplexing.
- GPS interoperability.
- SIM application tool kit.

2.4 Service and Support

2.4.1 Web Pages

Visit our web site for the following information:

- where to buy modules or for recommendations concerning accessories and components;
- the telephone number for customer support in your region;
- FAQs (frequently asked questions).

The web site address is:

<http://www.sonyericsson.com/M2M>

2.4.2 Integrator's Manual

This manual provides you with all of the information you need to integrate the module into your application.

2.4.3 Developer's Kit

Sony Ericsson provides the opportunity for designers to test the module on a limited scale using its Development Kit. The kit includes the necessary accessories (software and hardware) required to build and test an application. It includes the following:

- GSM module, GM47 or GM48;
- This integrator's manual;
- Software developer's kit and manual;
- Developer's kit hardware.

All the user needs to provide, is a computer or micro-controller and the expertise to use AT commands.

2.5 Precautions

GM47 and GM48 modules are static sensitive devices (SSDs). Normal SSD procedures for electronic devices should be used when handling the modules. In "Part 3: Integrating the Module", page 37 you will find more information about safety and product care. Do not exceed the environmental and electrical limits as specified in "Technical Data", page 73.

3. Abbreviations

<i>Abbreviation</i>	<i>Explanations</i>
BT	Bluetooth
CBM	Cell Broadcast Message
CBS	Cell Broadcast Service
CSD	Circuit Switched Data
DCE	Data Circuit Terminating Equipment
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi Frequency
EFR	Enhanced Full Rate
EMC	Electro-Magnetic Compatibility
ETSI	European Telecommunication Standards Institute
FR	Full Rate
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communication
HR	Half Rate
HSCSD	High Speed Circuit Switched Data
ITU-T	International Telecommunication Union - Telecommunications Standardisation Sector
ME	Mobile Equipment
MO	Mobile Originated
MS	Mobile Station
MT	Mobile Terminated
PCM	Pulse Code Modulation
PDU	Protocol Data Unit
RLP	Radio Link Protocol
RF	Radio Frequency
RTC	Real Time Clock
SDP	Service Discovery Protocol
SIM	Subscriber Identity Module
SMS	Short Message Service

<i>Abbreviation</i>	<i>Explanations</i>
TA	Terminal Adapter
TE	Terminal Equipment
THD	Third Harmonic Distortion
TS	Telecom Services

Part 2: Developer's Kit

1. Introduction

1.1 Overview

The developer's kit is designed to get you started quickly. It contains all the hardware you will need to begin the development of an application. The only items you need to provide are; a computer or micro controller, a SIM card and network subscription, and a knowledge of programming with AT commands.

Note! Before connecting up and using the developer's kit, we strongly recommend you read "Part 3: Integrating the Module", page 37 and all of this section. There are many switches, jumpers and connector options in the developer's kit. A knowledge of the functionality of the GM47 module is therefore essential before you start altering the hardware settings.

The main hardware in the developer's kit is a screened box, containing a board onto which you plug the GM47 module. Connectors, switches, jumpers and SIM card holder are provided to allow you to configure and access all the functions of the module.

1.2 Contents of the Kit

Please take the time to check the contents of your kit against the list shown below. If any of the items are missing contact your supplier immediately.

Developer's kit - Part Number DPY 102 218

Contents:

<i>Description</i>	<i>Product Number</i>	<i>Qty</i>
Radio modem: GM47 module or GM48 module	DPY 102 201 DPY 102 204	1
GM47/GM48 developer's kit (screened box and development board)	KRY 101 1907	1
Switched mode PSU 12V d.c.	EPA-121DA-12	1
UK mains plug	EN90POWERLEADUK	1
European mains plug	EN90POWERLEADEU	1

<i>Description</i>	<i>Product Number</i>	<i>Qty</i>
Cable with connector/cable serial 9-9 PIN	DB9(M)-DB9(F)	1
Portable handsfree	2002-1-24	1
Quad band antenna	RG174	1
Data carrier/CD-ROM containing: Software Manual; Integrator's Manual	LZY 213 1319	1

1.3 General Functioning of the Kit

The following block diagrams are provided to help you understand the general principles of operation of the developer's kit.

You have the following options as shown in Figure 1.1:

- Connect the GM47 internally, direct to J4 or position it externally and connect to J10 via a flat cable.
- Use the kit's connectors to access and control the GM47 (all switches and jumpers in their default positions).
- Access and control the GM47 directly via J12 and a flat cable. This allows you to selectively bypass any circuits contained on the board, and test your own application.

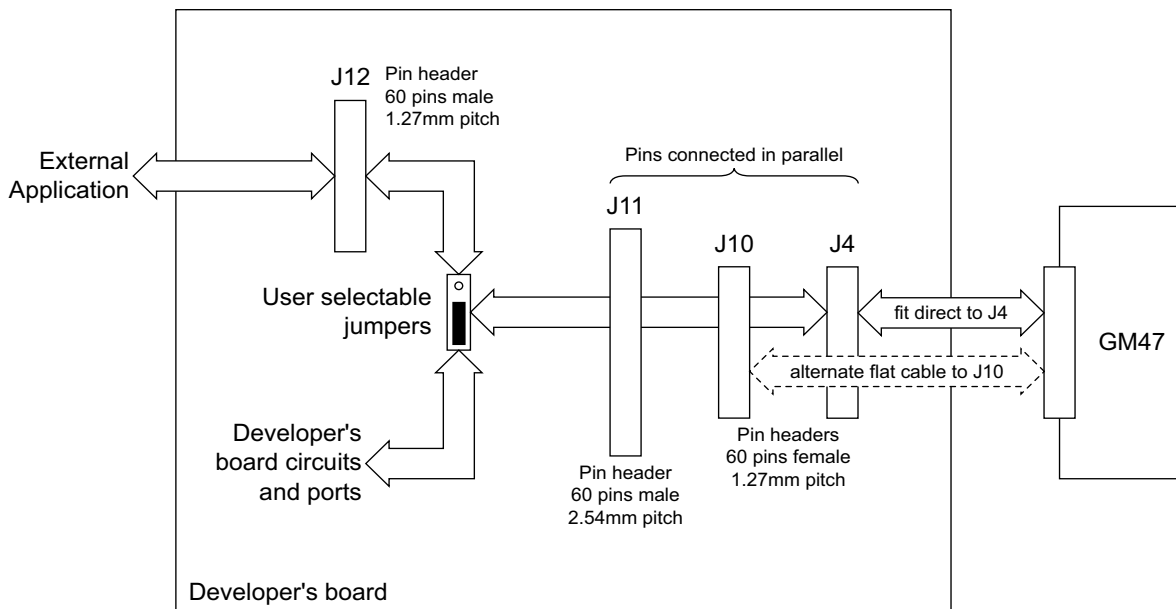


Figure 1.1 Module connections to the developer's board

Figure 1.2 shows the various on-board voltages and how they are fed to the GM47 and other circuitry. The developer's board is powered by an external power supply connected to Vcc.

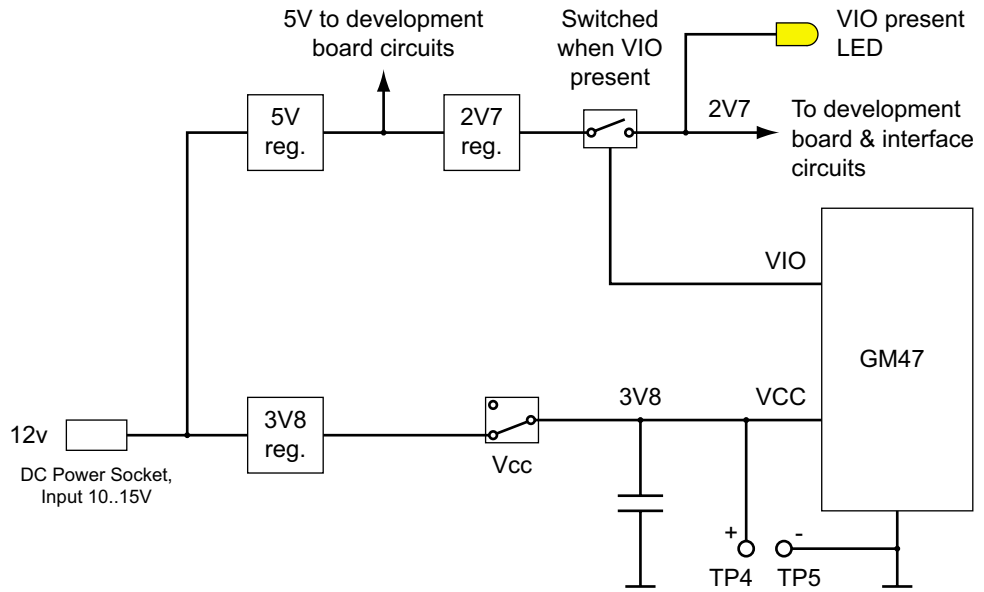


Figure 1.2 Power supply connection and the on-board voltages

Figure 1.3, Figure 1.4 and Figure 1.5 show how various signals are routed on the developer's board. Thicker lines indicate multiple signals.

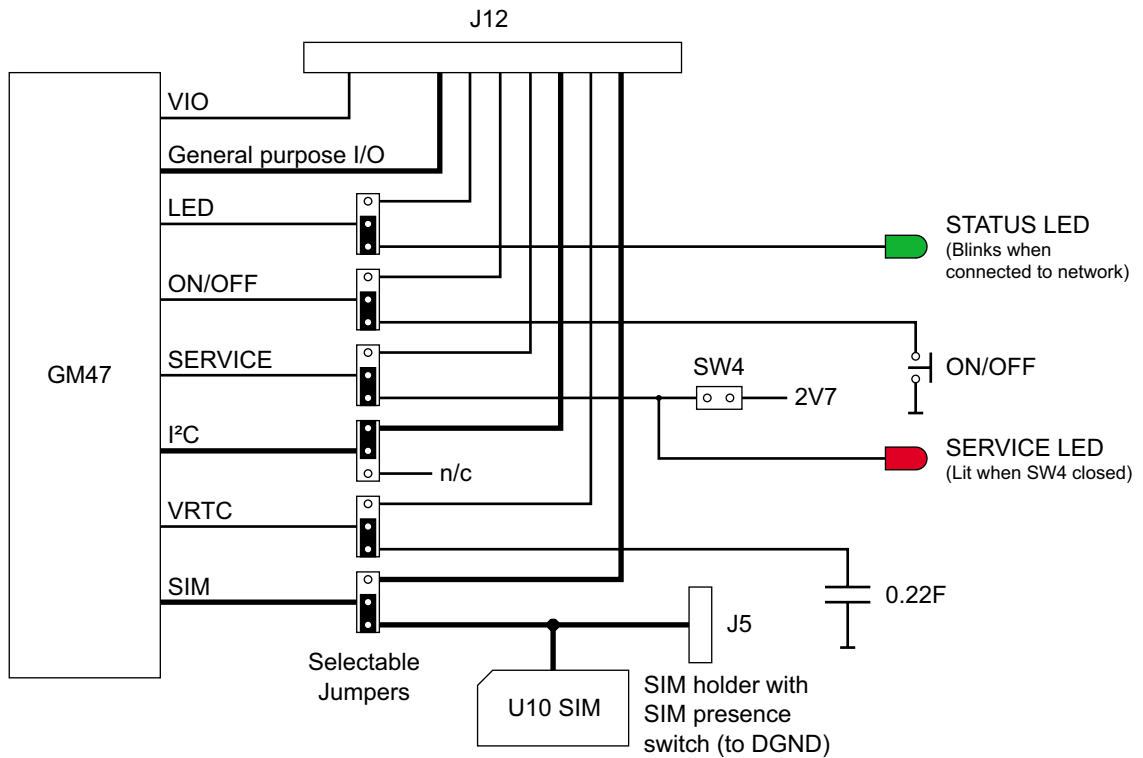


Figure 1.3 Miscellaneous signals, connection and routing

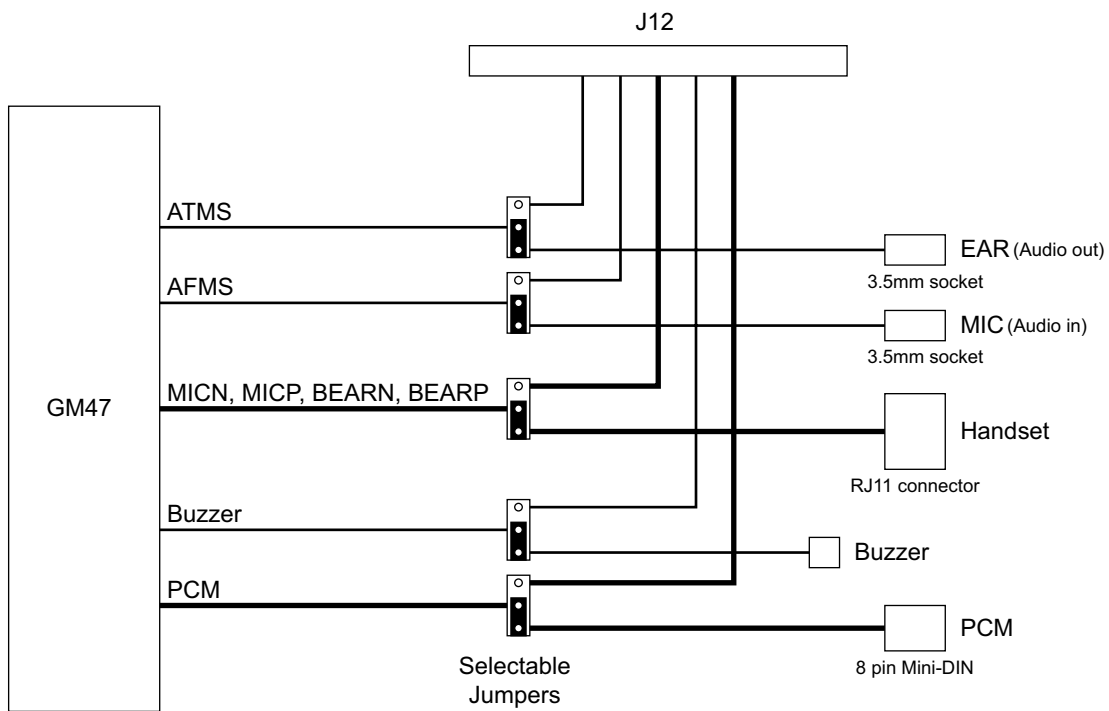


Figure 1.4 Audio signals, connection and routing

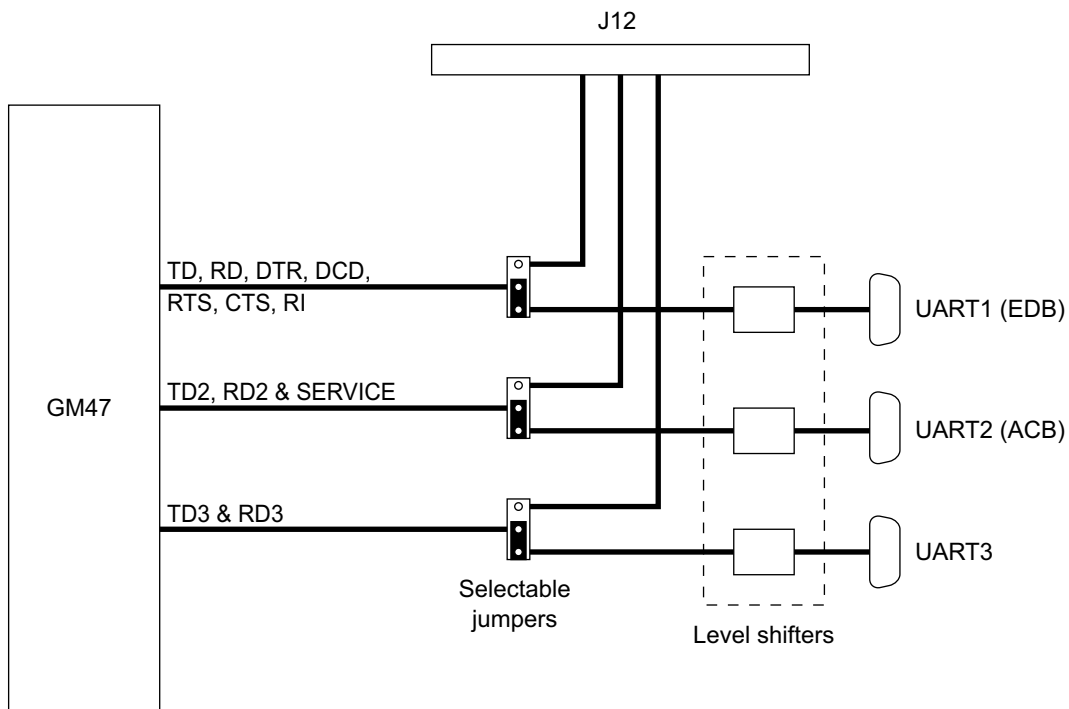


Figure 1.5 Comms signals, connection and routing

2. Using the Developer's Kit

This section provides you with the information needed to setup and use the developer's kit. Before changing switch and jumper settings, refer to "2.3 Jumpers, Switches and Connectors", page 32.

Front and rear views of the developer's kit are shown below. To access the inside, remove the 8 screws on the top of the box and the cover plate.

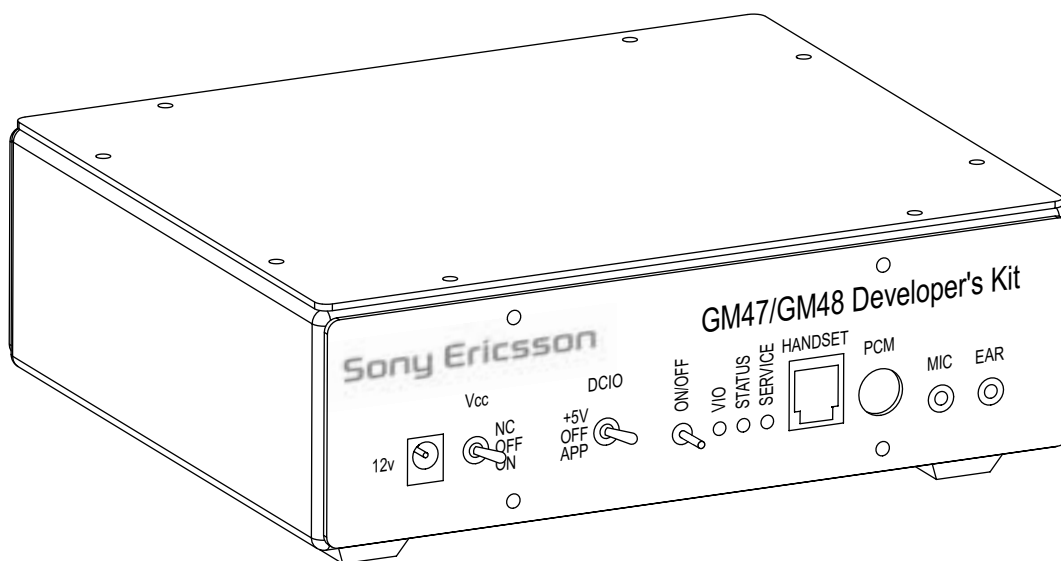


Figure 2.1 Front view

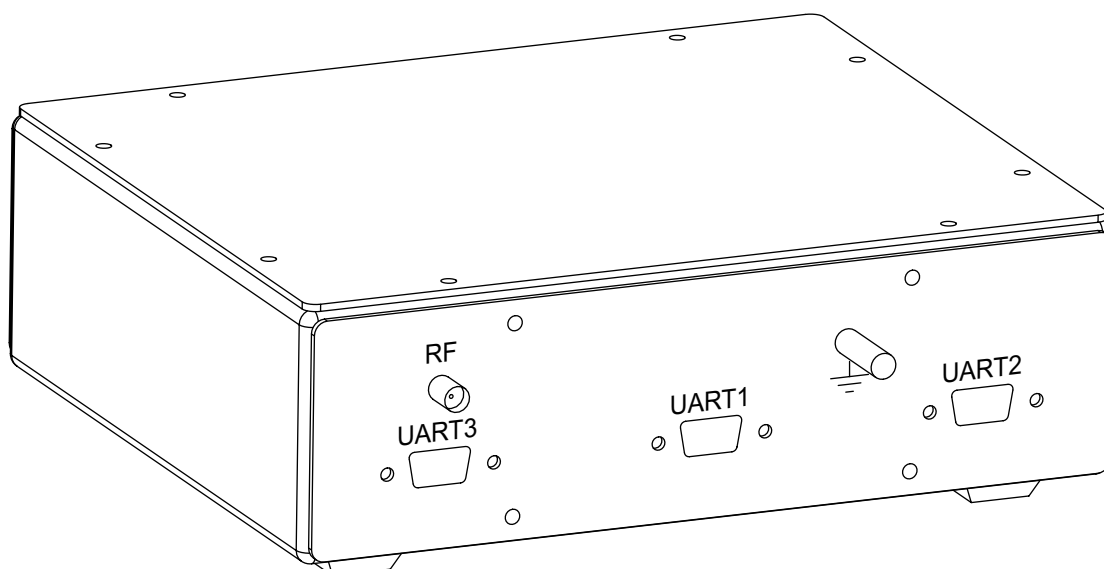


Figure 2.2 Rear view

2.1 Start up Check List

To use the developer's kit in standard format check the following:

- With the case lid removed, make sure the GM47 module is plugged into J4 and the RF lead is connected to the rear of the module;
- Add your SIM card;
- Check the jumpers are in their default positions. Refer to Figure 2.3;
- Connect the serial cable between your computer and UART1 on the rear panel;
- Connect the antenna to the RF connector on the rear panel;
- Connect the audio equipment if required;
- Plug the external power supply into the socket marked 12v on the front panel;
- Switch Vcc to ON;
- Push ON/OFF for at least 2 seconds until the yellow VIO LED is on.

Your developer's kit should now be operational and ready to receive AT commands.

2.2 Developer's Board Overlay

Figure 2.3 shows the developer's board, including the position of all the connectors, switches and jumpers (default positions). You will notice that many jumpers are labelled "SW". This is because the board was previously fitted with DIL switches.

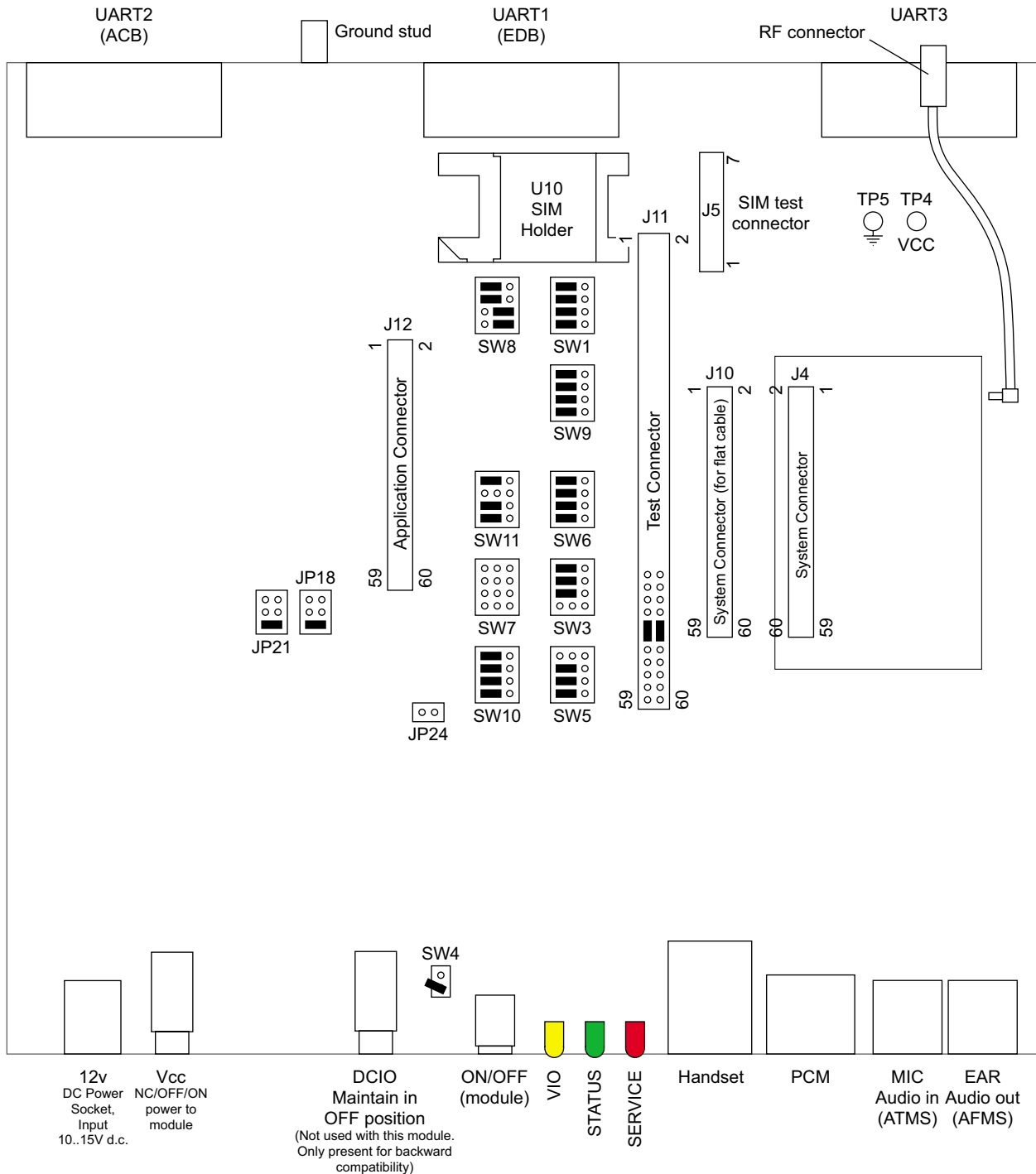
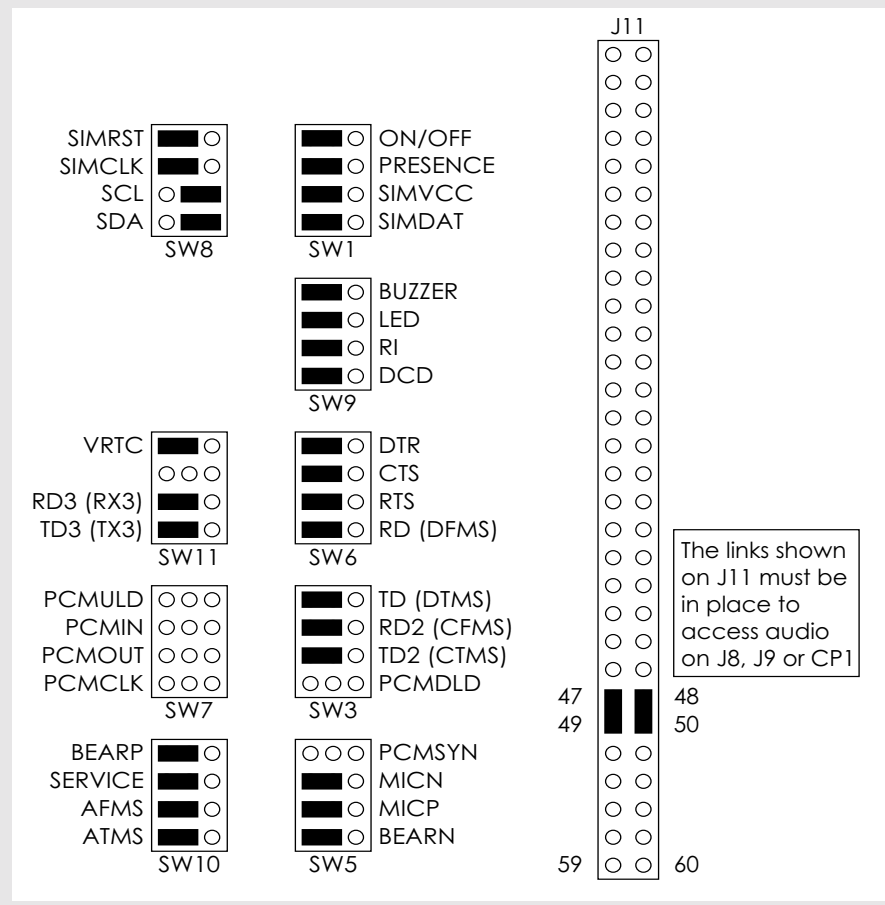
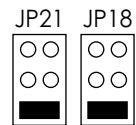


Figure 2.3 Developer's board overlay

2.3 Jumpers, Switches and Connectors

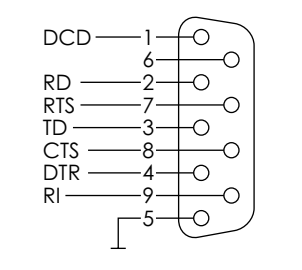
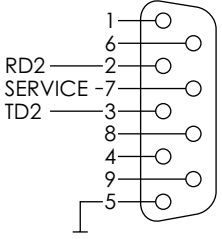
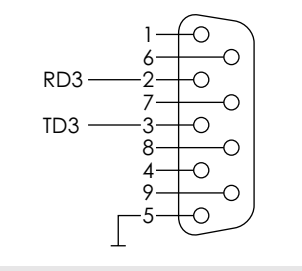
You will notice that many jumpers are labelled “SW”. This is because the board was previously fitted with DIL switches. All jumpers are located on the developer’s board (see “Developer’s board overlay”, page 31).

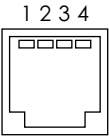
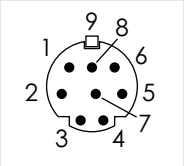
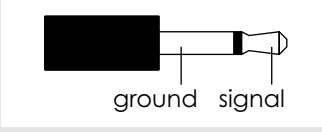
Jumper	Signal	Setting
JP18	TD	Maintain jumper in lower default position
JP21	RD	Maintain jumper in lower default position
JP24	Reserved for future use	MUST remain open to prevent damage to the module. As an extra precaution, maintain DCIO in the OFF position
SW4	SERVICE	Connect the pins using the floating connector ONLY when programming the module or logging data
SW1, SW3, SW5, SW6, SW7, SW8, SW9, SW10, SW11, J11 links	See diagram below	Default positions shown below. Move any “SW” jumper to the right-hand position to divert the signal to connector J12. Remove the J11 links to bypass J8, J9 or CP1 and process audio signals externally



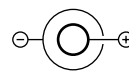
All switches are mounted on the front panel of the developer's box.

Switch	Description	Operation
Vcc	Toggle switch	Switches power from external power supply to module. Has three positions; NC, OFF and ON. Switch to ON to connect power to the module
ON/OFF	Push button switch	Switches module on and off. To power up the module, push button for at least 2 seconds, until the yellow VIO LED is on. Repeat the process to turn the module off
DCIO	Toggle switch	Maintain in OFF position to prevent damage to the module. Included only for backwards compatibility

Connector	Description	Connections
UART1 (EDB)	9-way D socket (accessible on the rear panel)	Full 9-pin RS232 communication port. Used during run-time to communicate with the module (AT-commands, data transmission, etc.) 
UART2 (ACB)	9-way D socket (accessible on the rear panel)	3 line RS232 communications port (+SERVICE). Used during service and maintenance operations. Also used to download new software to the module 
UART3	9-way D socket (accessible on the rear panel)	3 line serial port. RS232 levels 

Connector	Description	Connections																				
Handset	RJ11 socket	<p>Connector for a standard telephone handset. As PCM paths are open inside the module, a default short circuit is made between PCMDLD-PCMIN and PCMLD-PCMOUT signals on test connector J11 to enable analogue audio in downlink and uplink directions. Jumpers are in place between pins 48 & 50 and between pins 47 & 49</p> <table border="1"> <thead> <tr> <th>Pin #</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>MICN</td> </tr> <tr> <td>2</td> <td>BEARN</td> </tr> <tr> <td>3</td> <td>BEARP</td> </tr> <tr> <td>4</td> <td>MICP</td> </tr> </tbody> </table> 	Pin #	Signal	1	MICN	2	BEARN	3	BEARP	4	MICP										
Pin #	Signal																					
1	MICN																					
2	BEARN																					
3	BEARP																					
4	MICP																					
PCM	8 pin mini-DIN connector	<p>Carries PCM signals</p> <table border="1"> <thead> <tr> <th>Pin #</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>VIO (2.75V d.c. output)</td> </tr> <tr> <td>2</td> <td>PCMLD</td> </tr> <tr> <td>3</td> <td>PCMDLD</td> </tr> <tr> <td>4</td> <td>PCMCLK</td> </tr> <tr> <td>5</td> <td>PCMSYNC</td> </tr> <tr> <td>6</td> <td>DGND</td> </tr> <tr> <td>7</td> <td>PCMIN</td> </tr> <tr> <td>8</td> <td>PCMOUT</td> </tr> <tr> <td>9</td> <td>DGND</td> </tr> </tbody> </table> 	Pin #	Signal	1	VIO (2.75V d.c. output)	2	PCMLD	3	PCMDLD	4	PCMCLK	5	PCMSYNC	6	DGND	7	PCMIN	8	PCMOUT	9	DGND
Pin #	Signal																					
1	VIO (2.75V d.c. output)																					
2	PCMLD																					
3	PCMDLD																					
4	PCMCLK																					
5	PCMSYNC																					
6	DGND																					
7	PCMIN																					
8	PCMOUT																					
9	DGND																					
J4	SYSTEM connector	Allows direct connection of the module to the development board (see Figure 2.3, page 31)																				
J5	SIM card test connector	<p>Connector to gain access to the SIM card signals, which are connected in parallel with U10</p> <table border="1"> <thead> <tr> <th>Pin #</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>SIMVCC</td> </tr> <tr> <td>2</td> <td>SIMRST</td> </tr> <tr> <td>3</td> <td>SIMCLK</td> </tr> <tr> <td>4</td> <td>SIMDAT</td> </tr> <tr> <td>5</td> <td>SIMPRESENCE</td> </tr> <tr> <td>6</td> <td>SIMGND</td> </tr> <tr> <td>7</td> <td>SIMGND</td> </tr> </tbody> </table>	Pin #	Signal	1	SIMVCC	2	SIMRST	3	SIMCLK	4	SIMDAT	5	SIMPRESENCE	6	SIMGND	7	SIMGND				
Pin #	Signal																					
1	SIMVCC																					
2	SIMRST																					
3	SIMCLK																					
4	SIMDAT																					
5	SIMPRESENCE																					
6	SIMGND																					
7	SIMGND																					
U10	SIM Holder	Connector for SIM card. Signals are also present at test connector J5, described above																				
EAR	3.5mm 2-pole jack socket	<p>Audio output (unbalanced) or Audio From Mobile Station (AFMS). Make sure jumpers are in place between pins 48 & 50 and between pins 47 & 49</p> 																				
MIC	3.5mm 2-pole jack socket	<p>Audio input (unbalanced) or Audio To Mobile Station (ATMS). Signal source must be AC-coupled as a bias voltage for electret microphones is provided (2.0 - 2.5V d.c.). Make sure Jumpers are in place between pins 48 & 50 and between pins 47 & 49</p>																				

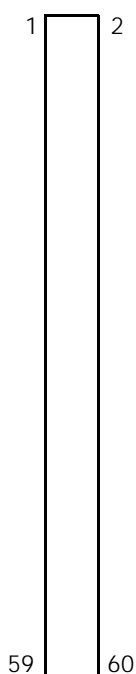
<i>Connector</i>	<i>Description</i>	<i>Connections</i>
J10	SYSTEM connector	For optional flat cable connection between the module and the development board (see Figure 2.3, page 31)
J11	TEST connector	60 pin, 2.54mm pitch, dual row pin header that carries all signals present at the system connector of the module. Used for easy testing of the signals (see Figure 2.4, page 36)
J12	Application connector	For flat cable connection between a host application and the module. Most of the signals pass through jumpers that allow the developer to select whether a specific signal is routed to/from the development board or to/from the host application. If no application is connected to J12, these jumpers (SW1, SW3, SW5, SW6, SW7, SW8, SW9, SW10 & SW11) serve as on/off switches for the module signals (see Figure 2.3, page 31)
12v	2.1mm DC Power Socket	Allows connection of an external power supply. Between 10V and 15V d.c. at 6 watts is required
RF	SMA panel socket	Connect the supplied antenna



2.4 System Connector Pin Assignments

Refer to the table below when monitoring signals on, or connecting to, J10, J11 or J12. The table shows the system-connector pin assignments for the GM47 module.

J10, J11 & J12 pin numbering viewed from the front of the developer's box



1	VCC	DGND	2
3	VCC	DGND	4
5	VCC	DGND	6
7	VCC	DGND	8
9	VCC	DGND	10
11	VCC	DGND	12
13	Reserved for future use	ON/OFF	14
15	SIMVCC	SIMPRESENCE	16
17	SIMRST	SIMDAT	18
19	SIMCLK	DAC	20
21	IO1	IO2	22
23	IO3	IO4	24
25	VRTC	ADC1	26
27	ADC2	ADC3	28
29	SDA	SCL	30
31	BUZZER	OUT5	32
33	LED	VIO	34
35	TX_ON	RI	36
37	DTR	DCD	38
39	RTS	CTS	40
41	TD (DTMS)	RD (DFMS)	42
43	TD3 (TX3)	RD3 (RX3)	44
45	TD2 (CTMS)	RD2 (CFMS)	46
47	PCMULD	PCMDLD	48
49	PCMOUT	PCMIN	50
51	PCMSYNC	PCMCLK	52
53	MICP	MICN	54
55	BEARP	BEARN	56
57	AFMS	SERVICE	58
59	ATMS	AGND	60

Figure 2.4 System connector pin assignments

Part 3: Integrating the Module

1. Mechanical Description

1.1 Interface Description

The pictures below show the mechanical design of the GM47 along with the positions of the different connectors and mounting holes. The GM47 is protected with AISI 304 stainless steel covers that meet the environmental and EMC requirements.

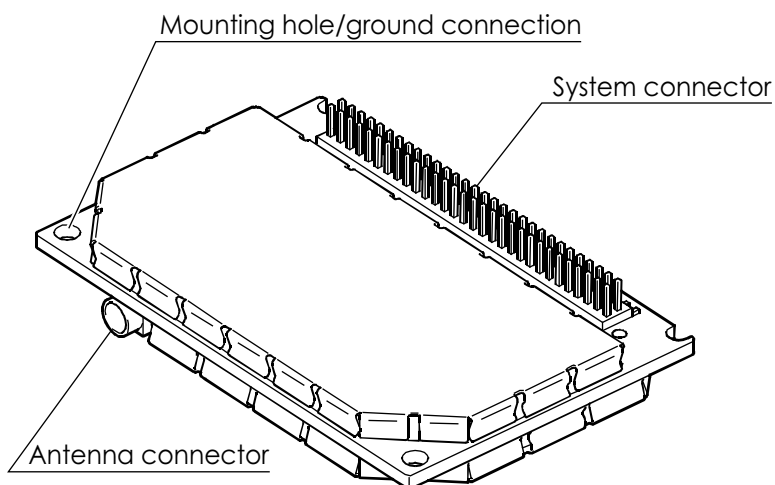


Figure 1.1 GM47 viewed from below

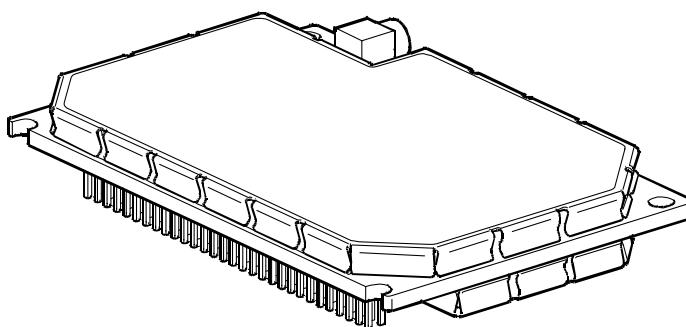


Figure 1.2 GM47, viewed from above

Please note the following:

- Mounting holes positioned at the corners make it possible to securely bolt the module into your application.

- Keypad, display, microphone, speaker and battery are not part of the module.
- The SIM card is mounted in your application, external to the module.
- The System Connector is a 60-pin, standard 0.05 in (1.27 mm) pitch type. The pins and their electrical characteristics are described in “2. System Connector Interface”, page 41.
- Information about the Antenna Connector is found in “3. Antenna Connector”, page 65.

1.2 Physical Dimensions

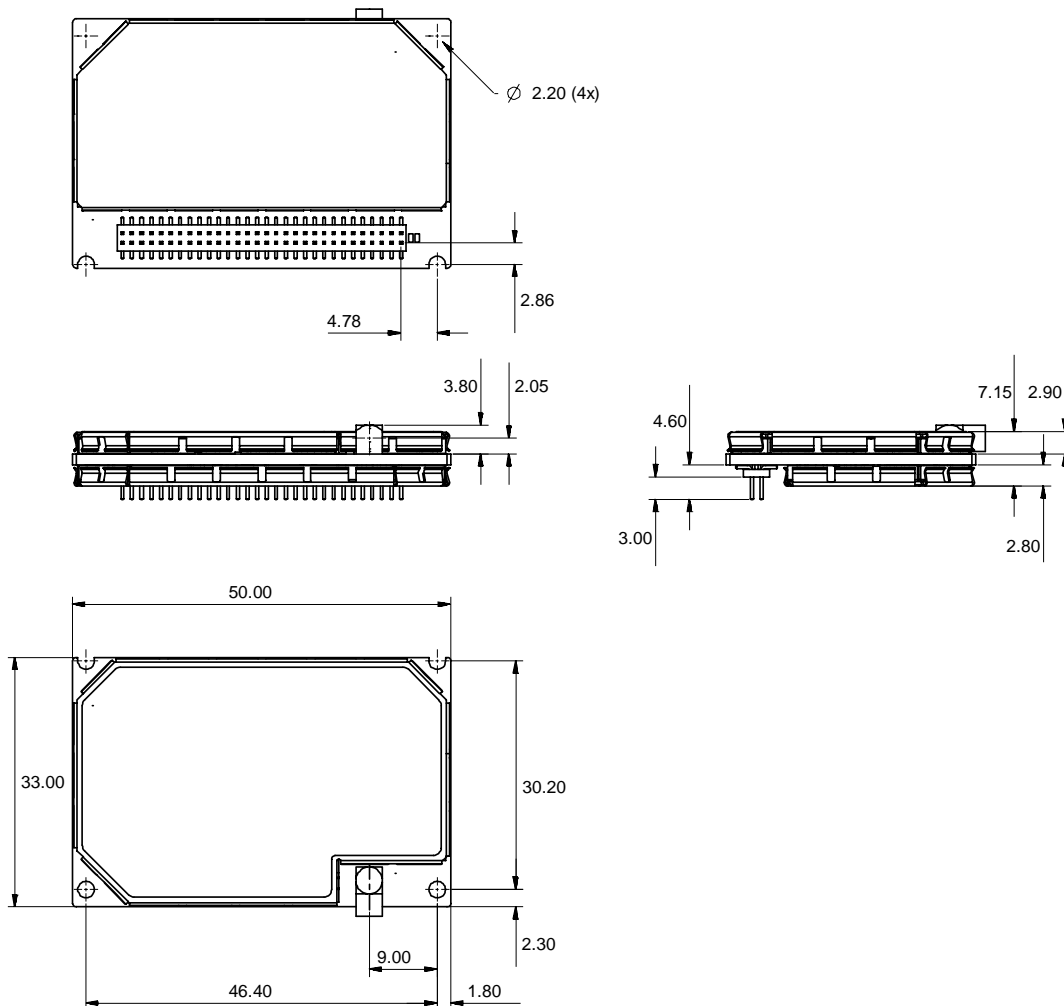


Figure 1.3 Dimensions of the GM47

Measurements are given in millimetres. See also “Technical Data”, page 73.

2. System Connector Interface

2.1 Overview

Electrical connections to the module (except the antenna), are made through the System Connector Interface. The system connector is a 60-pin, standard 0.05 in (1.27 mm) pitch device.

The system connector allows both board-to-board and board-to-cable connections to be made. The table below shows two possible mating connectors for use in your applications. Use the board-board connector to connect the module directly to a PCB, and the board-cable connector to connect the module via a cable.

Part Number	Description
9462-9101-606	Female, board-board connector (Speed Tech)
TBD	Female, board-cable connector

Figure 2.1 below shows the numbering of the connector pins.

A ground connection is provided at the mounting hole next to the RF connector on the module as shown below. Connect this ground point to the DGND pins of the module by the shortest, low-impedance path possible. The purpose of this connection is to allow any ESD picked up by the antenna to bypass the module's internal ground path.

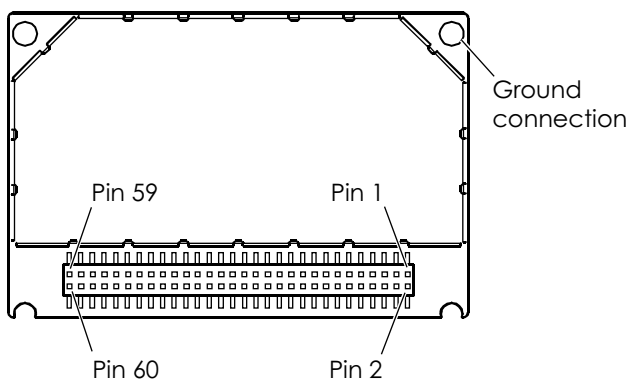


Figure 2.1 GM47, viewed from underneath

The following table gives the pin assignments for the system connector interface and a short description for each signal.

Note! Under the heading “Dir” in the table, module input and output signals are indicated by the letters I and O respectively.

<i>Pin</i>	<i>Signal Name</i>	<i>Dir</i>	<i>Signal Type</i>	<i>Description</i>
1	VCC	-	Supply	Power supply
2	DGND	-	-	Digital ground
3	VCC	-	Supply	Power supply
4	DGND	-	-	Digital ground
5	VCC	-	Supply	Power supply
6	DGND	-	-	Digital ground
7	VCC	-	Supply	Power supply
8	DGND	-	-	Digital ground
9	VCC	-	Supply	Power supply
10	DGND	-	-	Digital ground
11	VCC	-	Supply	Power supply
12	DGND	-	-	Digital ground
13	Reserved for future use			
14	ON/OFF	I	Internal pull up, open drain	Turns the module on and off. Former WAKE_B
15	SIMVCC	-	Digital 3V/5V	SIM card power supply. Power output from module for SIM Card
16	SIMPRESENCE	I	Internal pull up, open drain	SIM Presence A “1” indicates that the SIM is missing; a “0” that it is inserted
17	SIMRST	O	Digital 3V/5V	SIM card reset
18	SIMDATA	I/O	Digital 3V/5V	SIM card data
19	SIMCLK	O	Digital 3V/5V	SIM card clock
20	DAC	O	Analogue	Digital to analogue converter
21	IO1	I	Digital 2.75	General purpose input/output 1
22	IO2	I	Digital 2.75	General purpose input/output 2
23	IO3	I	Digital 2.75	General purpose input/output 3
24	IO4	I	Digital 2.75	General purpose input/output 4
25	VRTC	I	Supply 1.8V	Supply for real time clock
26	ADC1	I	Analogue	Analogue to digital converter 1
27	ADC2	I	Analogue	Analogue to digital converter 2

2. SYSTEM CONNECTOR INTERFACE

<i>Pin</i>	<i>Signal Name</i>	<i>Dir</i>	<i>Signal Type</i>	<i>Description</i>
28	ADC3	I	Analogue	Analogue to digital converter 3
29	SDA	I/O	2.75, internal pull up	I ² C data
30	SCL	O	2.75, internal pull up	I ² C clock
31	BUZZER	O	Digital 2.75	Buzzer output from module
32	OUT5	O	Digital 2.75	Programmable output 5
33	LED	O	Digital 2.75	Flashing LED
34	VIO	O	Power Out 2.75V	Module power indication. VIO is a 2.75V at 75mA output supply that can be used to power external circuitry that interfaces to the GM47
35	TX_ON	O	Digital 2.75	This output indicates when the GSM module is going to transmit the burst
36	RI	O	Digital 2.75	Ring Indicator (UART1)
37	DTR	I	Digital 2.75	Data Terminal Ready (UART1)
38	DCD	O	Digital 2.75	Data Carrier Detect (UART1)
39	RTS	I	Digital 2.75	Request To Send (UART1)
40	CTS	O	Digital 2.75	Clear To Send (UART1)
41	TD	I	Digital 2.75	Transmitted Data (UART1). Data from DTE (host) to DCE (module). Former DTMS
42	RD	O	Digital 2.75	Received Data (UART1). Data from DCE (module) to DTE (host). Formerly DFMS
43	TD3	I	Digital 2.75	UART3 transmission
44	RD3	O	Digital 2.75	UART3 reception
45	TD2	I	Digital 2.75	UART2 transmission. Used for flashing the memory. Former CTMS
46	RD2	O	Digital 2.75	UART2 Reception. Used for flashing the memory. Former CFMS
47	PCMULTD	I	Digital 2.75	DSP PCM digital audio input
48	PCMDLD	O	Digital 2.75	DSP PCM digital audio output
49	PCMOUT	O	Digital 2.75	Codec PCM digital audio output
50	PCMIN	I	Digital 2.75	Codec PCM digital audio input
51	PCMSYNC	O	Digital 2.75	DSP PCM frame sync
52	PCMCLK	O	Digital 2.75	DSP PCM clock output
53	MICP	I	Analogue	Microphone Input positive
54	MICN	I	Analogue	Microphone Input negative
55	BEARP	O	Analogue	Speaker output positive

<i>Pin</i>	<i>Signal Name</i>	<i>Dir</i>	<i>Signal Type</i>	<i>Description</i>
56	BEARN	O	Analogue	Speaker output negative
57	AFMS	O	Analogue	Audio output from module
58	SERVICE	I	2.7V	Flash programming voltage for the MS. Enable logger information if not flashing. Formerly VPPFLASH
59	ATMS	I	Analogue	Audio input to module
60	AGND	-	-	Analogue ground

2.2 General Electrical and Logical Characteristics

Many of the signals, as indicated in the table above, are high-speed CMOS logic inputs or outputs powered from a $2.75\text{V} \pm 5\%$ internal voltage regulator, and are defined as Digital 2.75V. Whenever a signal is defined as Digital 2.75V, the following electrical characteristics apply.

<i>Parameter</i>	<i>Min.</i>	<i>Max.</i>	<i>Units</i>
High Level Output Voltage (V_{OH}), $I_o = -2\text{mA}$	2.2	2.75	V
Low Level Output Voltage (V_{OL}), $I_o = 2\text{mA}$	0	0.6	V
High Level Input Voltage (V_{IH})	1.93	2.75	V
Low Level Input voltage (V_{IL})	0	0.8	V

2.2.1 General Protection Requirements

- All 2.75V digital inputs will continuously withstand and suffer no damage in the power-on or power-off condition when subjected to any voltage from -0.5V to 3.47V ($3.3\text{V} + 5\%$).
- All 2.75V digital outputs will continuously withstand a short circuit to any other voltage within the range 0V to 3V.
- All analogue outputs will continuously withstand a short circuit to any voltage within the range 0V to 3V.
- The SIM output signals and the SIMVCC supply will continuously withstand a short circuit to any voltage within the range 0V to 5.8V.

2.3 Grounds

<i>Pin</i>	<i>Signal</i>	<i>Description</i>
2, 4, 6, 8, 10, 12	DGND	Digital ground
60	AGND	Analogue ground

There are two ground connections in the GM47, AGND (analogue ground) and DGND (digital ground). Pin assignments are shown in the table above.

Note! AGND and DGND are connected at a star point inside the module. They must *not* be joined together in your application.

2.3.1 Analogue Ground - AGND

AGND is the return signal, or analogue audio reference, for ATMS (Audio To Mobile Station) and AFMS (Audio From Mobile Station).

<i>Parameter</i>	<i>Limit</i>
I_{\max}	$\cong 12.5\text{mA}$

2.3.2 Digital Ground - DGND

DGND is the reference or return signal for all system interface digital signals and is also the d.c. return for SERVICE and the power supply, VCC. Connect all DGND pins together in your application in order to carry the current drawn by the module.

2.4 VCC - Regulated Power Supply Input

<i>Pins</i>	<i>Signal</i>	<i>Description</i>
1, 3, 5, 7, 9, 11	VCC	regulated power supply input

Power is supplied to the module VCC pins, from an external source.

Connect all VCC pins together in your application in order to carry the current drawn by the module.

The electrical characteristics for VCC are shown in the table below.

<i>Parameter</i>	<i>Mode</i>	<i>Limit</i>
Vcc supply voltage	Nominal	3.6V
	Tolerance including ripple ^a	3.4V - 4.0V
	Over-voltage limit	5.5V
	Maximum ripple	TBD
Maximum allowable voltage drop	Burst transmission	200mV
Current drawn, at full TX power		<600mA (average)
		<2A (peak)

a. Measured at system connector pins.

Note! GM47 has no internal capacitance to supply the large current peaks during GSM burst transmission. We recommend you follow these general guidelines:

- Fit a low ESR electrolytic capacitor close to the module: minimum value 1,000 μ F, <100m Ω ESR.
- Make sure power supply to module line resistance is <200m Ω .

2.5 ON/OFF and External Power Signal

<i>Pin</i>	<i>Signal</i>	<i>Dir</i>	<i>Description</i>
14	ON/OFF	I	Pulse signal to turn the module on or off
34	VIO	O	2.75V supplied by the module

2.5.1 Switching the module ON and OFF

The module is turned on and off by momentarily grounding the ON/OFF pin. This input should be driven by an open collector, or other device which will not tie the input high, to allow the internal alarm clock function to operate. See the table below for exact characteristics. In the OFF state the current consumption of the module is less than 100 μ A.

The ON/OFF signal is a digital input with the following characteristics:

<i>Parameter</i>	<i>Min.</i>	<i>Typ.</i>	<i>Max.</i>	<i>Units</i>
Voltage HIGH level (FALSE)			VCC	V
Voltage LOW level (TRUE)	0		0.3 x VCC	V
Pull-up resistance (internal)			39	k Ω

The following timing diagram illustrates both power-up and power-down processes.

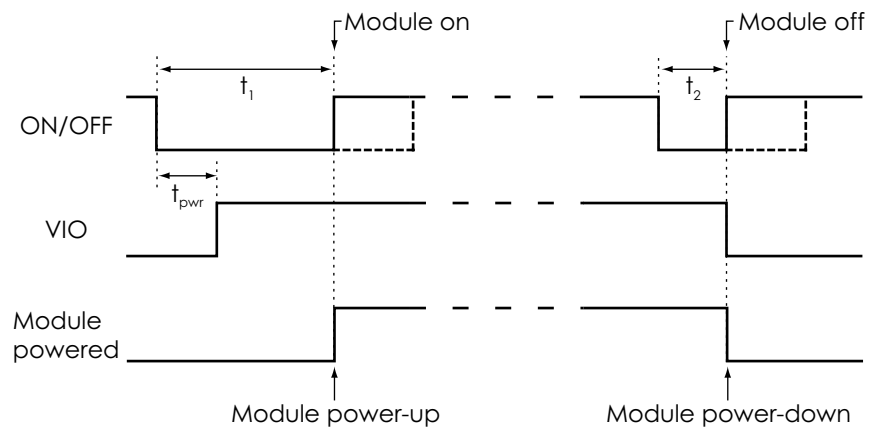


Figure 2.2 ON/OFF timing and VIO performance

Times are defined as follows:

Time	Description	Min.	Typ.	Max.	Units
t_1	Turn-on pulse time	≥ 2			s
	Turn-off pulse time	≥ 1			s
t_2	Hardware-reset pulse time ^a	> 10			s
t_{pwr}	Time for VIO and internal voltages to be established	100		200	ms

a. Active only when a full system reset is required.

2.5.2 VIO - 2.75V Supply

VIO provides an output voltage derived from an internal 2.75V regulator. Its electrical characteristics are shown below.

Parameter	Min.	Typ.	Max.	Units
Output Voltage ($I_{load} = 50\text{mA}$)	2.70	2.75	2.85	V
Load current			75	mA

You can use this output for the following:

- to indicate that the module is alive;
- to power interface circuits, external to the module.

2.6 Analogue Audio

<i>Pin</i>	<i>Signal</i>	<i>Dir</i>	<i>Description</i>
57	AFMS	O	Audio from mobile station
59	ATMS	I	Audio to mobile station
60	AGND	-	Ground (return) for analogue audio

ATMS is the audio input, and AFMS is the audio output, of the module. These signals can be used in Hands-free or Portable Hands-free mode.

Hands-free Mode

This mode is used for audio accessories, such as car kits and hands-free equipment.

Portable Hands-free Mode

This is the default mode. It activates a different amplification factor in the ME, and activates a 2V microphone bias level for ATMS. The bias level is adjustable using AT*E2EAMS.

2.6.1 Audio To Mobile Station - ATMS

ATMS is the analogue audio input to the module. Internally, the signal is sent to the CODEC (COder/DECoder), where it is converted to digital audio in PCM (Pulse Code Modulation) format. The encoded audio is sent to PCMOUOUT via the internal PCM bus.

ATMS provides a DC bias when it is used as the microphone input in Portable Hands-free applications. All other sources must be a.c.-coupled to avoid attenuation of low frequencies, and to prevent incorrect biasing or damage to the ATMS input. Use a capacitor greater than the value shown in the table below.

The ATMS input is a passive network followed by the transmit part of the CODEC.

<i>Parameter</i>	<i>Limit</i>
Application driving impedance (0.3 - 3.5kHz)	≤300Ω
AC coupling capacitance ^a	≥1μF
Module input impedance (0.3 - 3.5kHz)	>50kΩ
Low frequency cut-off (-3dB)	300Hz ± 50Hz

<i>Parameter</i>	<i>Limit</i>
High frequency cut-off (-3dB)	> 3500Hz ± 50Hz
Output d.c. bias level	Hands-free mode
	Portable hands-free mode
Additional Gain in Portable hands-free mode	28.5dB

- a. The a.c.-coupling capacitance must be supplied by your application, unless a d.c.-coupled microphone is used.

The following tables show the nominal PGA (programming gain settings). For more information see the relevant AT commands.

Maximum input voltage limit: $245\text{ mV}_{\text{rms}}$

<i>Input</i>	<i>Input (mV_{rms})</i>	<i>TXAGC (dB)</i>	<i>AUX AMP gain</i>	<i>PCMOUT (dBm0)</i>
ATMS	245	0	13	3

Maximum input level at MICI, $61.4\text{ mV}_{\text{rms}}$ output at PCMOUT = 3 dBm0

<i>Input</i>	<i>Differential input (mV_{rms})</i>	<i>TXAGC (dB)</i>	<i>AUX AMP gain</i>	<i>PCMOUT (dBm0)</i>
MICN MICP	61.4	0	25	3

Output at AFMS for 3 dBm0 at PCMIN

<i>Input</i>	<i>dBm0</i>	<i>RXPGA</i>	<i>Volume control (dB)</i>	<i>AFMS (mV_{rms})</i>
PCMIN	3	0	0	436

Output at BEARN/BEARP for 3 dBm0 at PCMIN

<i>Input</i>	<i>dBm0</i>	<i>RXPGA</i>	<i>Volume control (dB)</i>	<i>BEAR (mV_{rms})</i>
PCMIN	3	0	0	388

2.6.2 Audio From Mobile Station - AFMS

AFMS is the analogue audio output from the module and may be used to drive a speaker or the ear-piece in a portable hands-free accessory.

PCM digital audio signals, entering the module through the PCMIN pin, are translated to analogue signals by the CODEC. See “2.7 Digital Audio”, page 52 for further information.

The table below shows the audio signal levels for AFMS.

Parameter	Limit	
Speaker impedance	64Ω to 1kΩ	
Output Capacitance	2.2μF ±10%	
Levels (THD <5%)	Drive capability into 5kΩ (0.3 - 3.5kHz)	>2.4V _{p-p}
	Drive capability into 1.5kΩ (0.3 - 3.5kHz)	>2.2V _{p-p}
	Drive capability into 150Ω (at 1kHz)	>1.3V _{p-p}

2.6.3 Microphone Signals

Pin	Speaker signals	Dir	Function
53	MICP	I	Microphone positive input
54	MICN	I	Microphone negative input

MICP and MICN are balanced differential microphone input pins. These inputs are compatible with an electret microphone. The microphone contains an FET buffer with an open drain output, which is supplied with at least +2V relative to ground by the module as shown below.

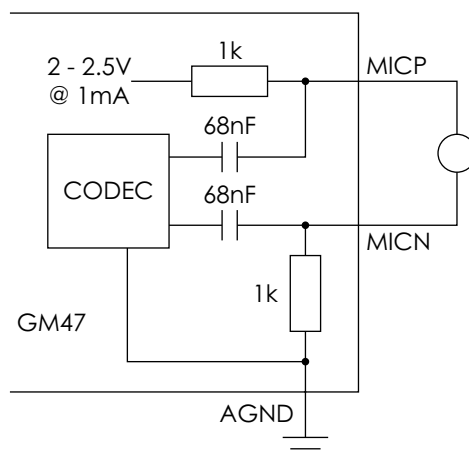


Figure 2.3 Microphone connections to the module

2.6.4 Speaker Signals

<i>Pin</i>	<i>Speaker signals</i>	<i>Dir</i>	<i>Function</i>
55	BEARP	O	Speaker positive output
56	BEARN	O	Speaker negative output

BEARP and BEARN are the speaker output pins. These are differential-mode outputs. The electrical characteristics are given in the table below.

<i>Parameter</i>	<i>Limit</i>
Output level (differential)	$\geq 4.0V_{pp}$
Output level (dynamic load = 32Ω)	$\geq 2.8V_{pp}$
Gain PCMIN ^a to BEARP/BEARN (differential)	$-9dB \pm 1$
Distortion at 1kHz and maximum output level	$\leq 5\%$
Offset, BEARP to BEARN	$\pm 30mV$
Ear-piece mute-switch attenuation	$\geq 40dB$

a. See PCMIN signal in “2.7 Digital Audio”, page 52

The following table shows the ear piece impedances that can be connected to BEARP and BEARN.

<i>Ear piece model</i>	<i>Impedance</i>	<i>Tolerance</i>
Dynamic ear piece	$[32\Omega + 800\mu H] // 100pF$	$\pm 20\%$
Dynamic ear piece	$[150\Omega + 800\mu H] // 100pF$	$\pm 20\%$
Piezo ear piece	$1k\Omega + 60nF$	$\pm 20\%$

2.7 Digital Audio

Pin	Signal	Dir	Function
52	PCMCLK	O	PCM clock
51	PCMSYNC	O	PCM frame sync
47	PCMULTD	I	PCM audio input to DSP
48	PCMDLD	O	PCM audio output from DSP
50	PCMIN	I	PCM audio input to Codec
49	PCMOUT	O	PCM audio output to Codec

Digital PCM audio signals allow the connection of a digital audio source/receiver, bypassing the analogue audio CODEC processing functions performed within the module.

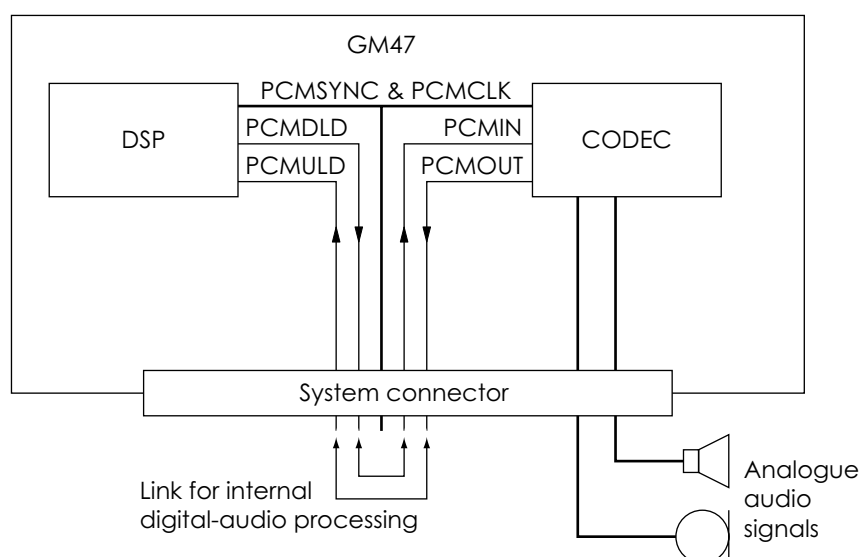


Figure 2.4 Pin connections to digital audio

Note! When no external audio processing is performed, the following pins must be connected together:

- PCMDLD to PCMIN;
- PCMULTD to PCMOUT.

Electrical characteristics

Digital 2.75V CMOS input/output electrical characteristics apply.

PCM interface format

The PCM format (for PCMULD and PCMDLD) conforms to the linear PCM data I/O format of the industry standard DSP from Texas Instruments. It is the same format as the one used between the CODEC and the DSP in the module.

PCMCLK (bit clock) and PCMSYNC (frame synchronisation) are both generated by the DSP (Digital Signal Processor) in the module.

The data words in PCMULD and PCMDLD are aligned so that the MSB in each word occurs on the same clock edge.

2.8 Serial Data Interfaces

<i>Pin</i>	<i>Signal</i>	<i>Dir</i>	<i>Description</i>	<i>RS232 CCITT N°</i>
41	TD	I	Serial data to module (UART1)	103
42	RD	O	Serial data from module (UART1)	104
39	RTS	I	Request To Send (UART1)	105
40	CTS	O	Clear To Send (UART1)	106
37	DTR	I	Data Terminal Ready (UART1)	108.2
38	DCD	O	Data Carrier Detect (UART1)	109
36	RI	O	Ring Indicator (UART1)	125
45	TD2	I	UART2 Data Transmission	
46	RD2	O	UART2 Data Reception	
43	TD3	I	UART3 Data Transmission	
44	RD3	O	UART3 Data Reception	

The serial channels, consisting of three UARTs, are asynchronous communication links to the application or accessory units. UART1 has RS-232 functionality. UART2 and UART3 behave as general-purpose serial data links. In addition they are used for accessories and GPS respectively.

Digital 2.75V CMOS input/output electrical characteristics apply.

The standard character format consists of 1 start bit, 8 bit data, no parity and 1 stop bit. In all, there are 10 bits per character.

2.8.1 UART1 (RS232) - RD, TD, RTS, CTS, DTR, DCD and RI

UART1 signals conform to a 9 pin RS232 (V.24) serial port, except for the DSR (CCITT N° 107) signal. The DSR signal has been removed as it is usually connected to DTR in most systems.

Note! UART1 signal levels do not match standard RS232 (V.28) levels. The relationship between the levels is shown in the table below.

<i>RS232 level</i>	<i>RD, TD</i>	<i>RTS, CTS, DTR, DCD, RI</i>	<i>CMOS level</i>
<-3V	1	OFF	>1.93V
>+3V	0	ON	<0.80V

Conversion between the module CMOS levels and RS232 levels can be achieved using a standard interface IC, such as the Maxim Integrated Products MAX3237.

2.8.2 Serial Data Signals - RD, TD

The default baud rate is 9.6kbits/s, however higher bit rates of up to 460 kbits/s are supported, set by an AT command. UART1 starts at a rate of 9.6kbits/s in standard AT command mode or binary mode (first received data, AT or binary, will determine the operation mode). The module also supports GSM 07.10 multiplexing protocol and starts when the appropriate command is sent.

Serial Data From Module (RD)

RD is an output signal that the module uses to send data via UART1 to the application.

<i>Parameter</i>	<i>Limit</i>
Application load resistance	$\geq 100\text{k}\Omega$
Application load capacitance	<500pF

Serial Data To Module (TD)

TD is an input signal, used by the application to send data via UART1 to the module.

<i>Parameter</i>	<i>Limit</i>
Application driving impedance	<100 Ω
Input capacitance	1nF
Input resistance (pull-up)	100k Ω to VCC

2.8.3 Control Signals - RTS, CTS, DTR, DCD, RI

UART1 control signals are active low and need a standard interface IC, such as the MAX3237, to generate standard RS232 levels.

UART1 converted signals, together with DGND, RD and TD form a 9-pin RS232 data port.

RTS and CTS are capable of transmitting at 1/10th of the data transmission speed for data rates up to 460kbit/s (byte-oriented flow control mechanism).

Switching times for RTS and CTS

The table below shows the switching times.

<i>Parameter</i>	<i>Limit</i>
Time from Low to High level	<2 μ s
Time from High to Low level	<2 μ s

Request to Send (RTS)

Used to condition the DCE for data transmission. The default level is high by internal pull up.

The exact behaviour of RTS is defined by an AT command. Software or hardware control can be selected. Hardware flow is the default control.

The application must pull RTS low to communicate with the module. The module will respond by asserting CTS low, indicating it is ready for communication.

<i>Parameter</i>	<i>Limit</i>
Application driving impedance	<100 Ω
Input capacitance	<2nF
Input resistance (pull-up)	100k Ω to VCC

Clear To Send (CTS)

CTS indicates that the DCE is ready to transmit data. The default level is high. You can define the exact behaviour of CTS through an AT command, and can select software or hardware flow control.

The table below shows the load characteristics for this signal.

<i>Parameter</i>	<i>Limit</i>
Application load capacitance	<500pF
Application load resistance	\geq 1M Ω

Data Terminal Ready (DTR)

DTR indicates that the DTE is ready to transmit and receive data. It also acts as a hardware 'hang-up', terminating calls when switched high. The signal is active low. You can define the exact behaviour of DTR with an AT command.

Data Carrier Detect (DCD)

DCD indicates that the DCE is receiving a valid carrier (data signal) when low. You can define the exact behaviour of DCD with an AT command.

Ring Indicator (RI)

RI indicates that a ringing signal is being received by the DCE when low. You can define the exact behaviour of RI with an AT command.

Data Set Ready (DSR)

No DSR signal is provided. Use any DGND connection for this functionality.

2.8.4 UART2 - TD2, RD2

UART 2 consists of a full duplex serial communication port with transmission and reception lines.

This communication port works in a mode called Operation and Maintenance.

Operation and Maintenance mode works in combination with the SERVICE signal. Two events are possible if the SERVICE signal is active when the module is turned on. These are:

- the module is reprogrammed if UART2 is connected to a computer running Sony Ericsson update software;
- the module enters logging mode and sends data to UART2 if no reprogramming information is received.

Timing and electrical signals characteristics are the same as for UART1, TD and RD.

Transmitted Data 2 (TD2)

TD2 is used by the application to send data to the module via UART2. It has the same electrical characteristics as TD.

Received Data 2 (RD2)

RD2 is used to send data to the application via UART2. It has the same electrical characteristics as RD.

2.8.5 UART3 - TD3, RD3

UART3 is a full duplex serial communication port with transmission and reception lines. It has the same timing and electrical signal characteristics as UART1, TD and RD.

Transmitted Data 3 (TD3)

TD3 is used by your application to send data to the module via UART3.

Received Data 3 (RD3)

RD is used to send data to your application via UART3.

2.9 SIM Card Related Signals

<i>Pin</i>	<i>Signal</i>	<i>Dir</i>	<i>Description</i>
15	SIMVCC	-	SIM card power supply
16	SIMPRESENCE	I	SIM card presence
17	SIMRST	O	SIM card reset
19	SIMCLK	O	SIM card clock
18	SIMDATA	I/O	SIM card data

These connections allow you to communicate with the SIM card holder in you application.

Note! The distance between the SIM card holder and the module can be up to 25cm.

This SIM interface allows the use of 3 V and 5 V SIM cards. By default it works on 3 V levels but will automatically switch to 5 V, if a 5 V SIM card is fitted.

SIM voltage levels, as shown in the following table, are dependent on the type of SIM card detected by the module.

<i>Signal</i>	<i>Parameter</i>	<i>Mode</i>	<i>Min.</i>	<i>Typ.</i>	<i>Max.</i>	<i>Unit</i>
SIMVCC	SIM supply voltage	3V	2.7	3.0	3.3	V
		5V	4.5	5.0	5.5	V
SIMDAT	High Level Input voltage (V_{IH})	3V	2.1		3.0	V
		5V	3.5		5.0	V
SIMDAT	Low Level Input voltage (V_{IL})	3V	0		0.9	V
		5V	0		1.5	V
SIMDAT	High Level Output voltage (V_{OH})	3V	2.7		3.0	V
		5V	4.7		5.0	V
SIMDAT	Low Level Output voltage (V_{OL})	3V	0		0.2	V
		5V	0		0.2	V
SIMCLK SIMRST	High Level Output voltage (V_{OH})	3V	2.4		3.0	V
		5V	4.4		5.0	V
SIMCLK SIMRST	Low Level Output voltage (V_{OL})	3V	0		0.35	V
		5V	0		0.3	V

2.9.1 SIM Detection - SIMPRESENCE

SIMPRESSENCE is used to determine whether a SIM card has been inserted into or removed from the SIM card holder. You should normally wire it to the “card inserted switch” of the SIM card holder, but different implementations are possible.

When left open, an internal pull-up resistor maintains the signal high and means “SIM card missing” to the module. When pulled low the module assumes a SIM card is inserted.

SIMPRESSENCE is a Digital 2.75 CMOS input with the following electrical characteristics.

<i>Parameter</i>	<i>Min.</i>	<i>Typ.</i>	<i>Max.</i>	<i>Units</i>
Pull-up resistance (at 2.75 V)	100			k Ω
Low Level Input voltage (SIM inserted)			0.80	V
High Level Input voltage (SIM missing)	>1.93		2.75	V

2.10 Service/Programming

<i>Pin</i>	<i>Signal</i>	<i>Dir</i>	<i>Description</i>
58	SERVICE	I	Flash programming voltage

When the SERVICE input signal is active the module will:

- be reprogrammed if data is received through UART2 from a computer running Sony Ericsson reprogramming software;
- or it will output logging data on UART2.

The electrical characteristics are given below. The signal reference is DGND.

<i>Mode</i>	<i>SERVICE Voltage (V)</i>			<i>Drive Capacity</i>
	<i>Min.</i>	<i>Typ.</i>	<i>Max.</i>	
Normal Operation			0.8	-
Service/enable programming	1.9	2.75	13.6	>1mA

2.11 Buzzer

<i>Pin</i>	<i>Signal</i>	<i>Dir</i>	<i>Description</i>
31	BUZZER	O	Buzzer output from module

Connecting the BUZZER signal to an inverting transistor-buffer followed by a piezoelectric transducer enables the module to play pre-programmed melodies or sounds.

2.12 LED

<i>Pin</i>	<i>Signal</i>	<i>Dir</i>	<i>Description</i>
33	LED	O	LED Output from module

The LED states shown below, are hard coded.

<i>LED indication</i>	<i>Operational status</i>
No indication	No power or in the OFF state
Green, steady	Power on, not connected to a network
Green, blinking	Power on, connected to a network

The following circuit should be used to connect an LED.

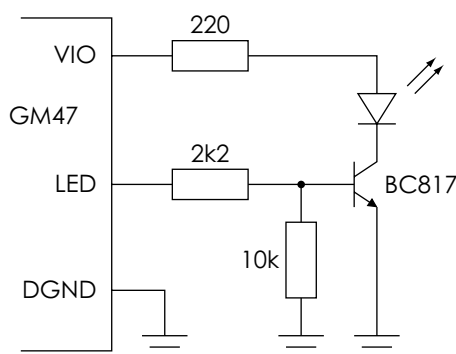


Figure 2.5 Electrical connections for the LED

2.13 General Purpose Digital I/O Ports

Pin	I/O port signal	Default signal	Description
21	IO1	-	Programmable Input/Output 1
22	IO2	-	Programmable Input/Output 2
23	IO3	-	Programmable Input/Output 3
24	IO4	-	Programmable Input/Output 4
37	IN5	DTR	Programmable input 5/Data Terminal Ready
32	OUT5	-	Programmable output 5
36	OUT6	RI	Programmable Output 6/Data Carrier Detect
38	OUT7	DCD	Programmable Output 7/Ring indicator

Signals which have an entry in the Default Signal column in the above table are multiplexed. Their operation depends on AT commands.

The following table gives you the input impedance. These values only apply when the signals are configured as input signals.

Parameter	Min.	Typ.	Max.	Units
Input impedance (IO1 - IO4) (pull-up)	20	39	100	k Ω
Input impedance (IN5)	100			k Ω

2.14 General Purpose Analogue I/O Ports

<i>Pin</i>	<i>Signal</i>	<i>Dir</i>	<i>Description</i>
20	DAC	O	Digital to analogue conversion output
26	ADC1	I	Analogue to digital conversion input 1
27	ADC2	I	Analogue to digital conversion input 2
28	ADC3	I	Analogue to digital conversion input 3

The module is able to convert digital to analogue signals and vice versa.

2.14.1 Digital to Analogue Converter - DAC

The DAC is an 8-bit converter. Conversion takes place when an AT command is sent to the module. The module sends the resulting analogue value to the DAC pin.

DAC output electrical characteristics are given in the following table.

<i>Parameter</i>	<i>Limit</i>	<i>Units</i>
Resolution	8	Bits
Output voltage for code = 0	$(2.75^a \times 0.05) \pm 0.05$	V
Output voltage for code = 255	$(2.75^a \times 0.95) \pm 0.05$	V
Nominal step size	$(2.75^a \times 0.9)/256$	mV
Absolute error ^b	$\leq \pm 0.5$	mV
Output wide-band noise and clock feed-through 0-1.1MHz	≤ 0.5	mV _{rms}
Power-supply rejection ratio 50Hz - 10kHz	≥ 40	dB
Conversion rate ± 0.5 LSB	≤ 2 (Load A) ^c	ms
	≤ 50 (Load B) ^c	ms
Output buffer impedance when disabled	≥ 50	k Ω
Output current source or sink	≥ 1	mA
Current consumption (active)	≤ 1.0	mA

a. Tolerance on this internal voltage is $\pm 5\%$

b. Referred to the ideal conversion characteristic.

c. See Figure 2.6, page 62

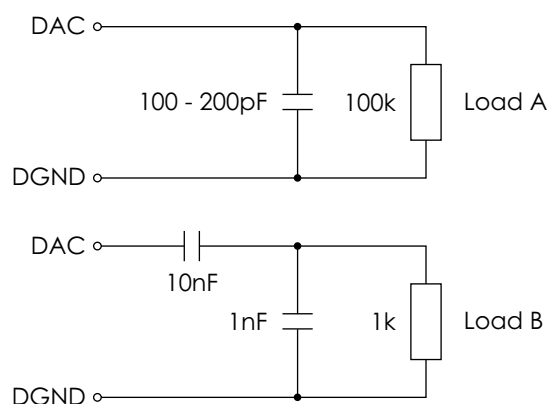


Figure 2.6 DAC loads

2.14.2 Analogue to Digital Converters 1, 2 and 3 - ADCx

The ADC is an 8-bit converter. An analogue value applied to any of the ADC pins is converted and stored in a register inside the module. When the appropriate AT command is received by the module, the digital value stored in the register is read.

ADC electrical characteristics are shown in the table below.

Parameter	Min.	Max.	Units
Resolution	8	8	Bits
Input voltage for 0000 0000 word	0	0.01×2.75^a	V
Input voltage for 1111 1111 word	0.99×2.75^a	2.75^a	V
Differential Non-Linearity (DNL)		± 0.75	LSB
Overall Non-Linearity (INL)		± 0.60	LSB
Absolute accuracy		± 1.5	LSB
Input impedance	1		M Ω
Average supply current (continuous conversion)		1	mA
External source impedance		50	k Ω

a. Tolerance on this internal voltage is $\pm 5\%$

2.15 External I²C Serial Control Bus

Pin	Signal	Dir	Description
29	SDA	I/O	I ² C serial data
30	SCL	O	I ² C serial clock

The external I²C bus consists of two signals, SDA and SCL. This bus is isolated from the module's internal I²C bus to ensure proper operation of the module, even if the external I²C bus is damaged.

The electrical characteristics are shown below.

	Parameter	Min.	Typ.	Max.	Units
Transmit operation	Frequency I ² C CLK	81.25		400	kHz
	High or low I ² C CLK	1.2			μs
	Delay time after falling edge of I ² C CLK	308	308-1230		ns
	Hold time after falling edge of I ² C CLK	0			ns
Receive operation	Frequency I ² C CLK			400	kHz
	High or low I ² C CLK	1.2			μs
	Delay time after falling edge of I ² C CLK	100			ns
	Hold time after falling edge of I ² C CLK	0			ns

2.16 TX_ON - Burst Transmission

Pin	Signal	Dir	Description
35	TX_ON	O	GSM module to transmit

Burst transmission is the time when a GSM transceiver unit is transmitting RF signals. TX_ON indicates the module is going into transmission mode.

2.17 Real Time Clock

<i>Pin</i>	<i>Signal</i>	<i>Dir</i>	<i>Description</i>
25	VRTC	-	Voltage for the Real Time Clock

The Real Time Clock provides the main microprocessor with a time-of-day calendar and alarm, and a one-hundred-year calendar.

The Real Time Clock operates in two modes when connected to a separate power supply:

- RTC normal mode: the module is in ON or OFF mode and it is supplied with power (VCC is applied).
- RTC back-up mode: VCC is disconnected and the RTC is maintained by a separate backup power supply connected to the VRTC input (see Figure 2.7 below).

Backup power is provided by a capacitor, golden-capacitor or battery in your application and must be connected to the VRTC pin. During RTC normal operation, the back up source will be charged.

In back-up mode, the back-up source must provide enough power for RTC operation. Refer to the table for the amount of current required.

The following table shows both voltage characteristics for both modes.

<i>Parameter</i>	<i>Min.</i>	<i>Typ.</i>	<i>Max.</i>	<i>Units</i>
Supply Voltage RTC (normal mode - charging the capacitor)	1.6	1.8	2.0	V
Supply Voltage RTC (back-up mode - Capacitor provides the current)	1.0	1.8	2.0	V
Current drawn		5.0	10.0	μA

If the voltage drops below 1.0 V in back-up mode, the RTC will stop working. The following diagram shows the RTC connections.

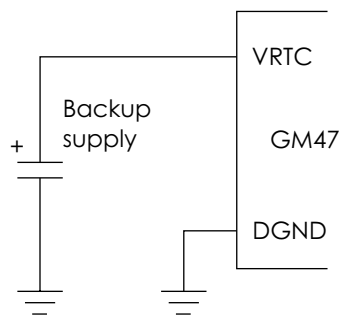


Figure 2.7 RTC connections

3. Antenna Connector

The module's antenna connector allows transmission of the radio frequency (RF) signals from the module to an external customer-supplied antenna. The connector is a micro-miniature coaxial MMCX surface mounted component. A number of suitable MMCX type, mating plugs are available from the following manufacturers;

- Amphenol;
- Suhner;
- IMS Connector Systems.

The electrical characteristics of the antenna interface are shown below.

<i>Parameter</i>	<i>Limit</i>	<i>Description</i>
Nominal impedance	50Ω (better than 2:1)	
Output Power	2 Watt peak (Class 4)	Extended GSM900
	1 Watt peak (Class 1)	GSM1800
Static Sensitivity	Better than -104dBm	Extended GSM900
	Better than -102dBm	GSM1800

4. Hints for Integrating the Module

This chapter gives you advice and helpful hints on how to integrate the GM47 into your application from a hardware perspective.

Please read and consider the information under the following headings before starting your integration work:

- Safety advice and precautions.
- Installation of the module.
- Antenna.

4.1 Safety Advice and Precautions

4.1.1 General

- Always ensure that use of the module is permitted. The module may present a hazard if used in proximity to personal medical electronic devices. As a rule, the module must not be used in hospitals, airports or planes.
- You are responsible for observing your country's safety standards, and where applicable the relevant wiring rules.
- Never use the module at a gas station, refuelling point, blasting area or in any other environment where explosives may be present.
- Operating the module close to other electronic devices, such as antennas, television sets, and radios may cause electromagnetic interference.
- Never try to dismantle the module yourself. There are no components inside the module that can be serviced by the user. If you attempt to dismantle the module, you may invalidate the warranty.
- To protect the power supply cables and meet the fire safety requirements, it is recommended that the electrical circuits are supplied with a power regulator. The power regulator should be placed as close to the terminals of the power supply as possible.
- Do not connect any incompatible component or product to the GM47. Note, Sony Ericsson does not warrant against defects, non-conformities or deviations caused thereby.

4.1.2 SIM Card

- Before handling the SIM card in your application, ensure that you are not charged with static electricity. Use proper precautions to avoid electrostatic discharges. The module must be switched off before the SIM card is installed in your application.

- When the SIM card hatch is opened, the SIM card connectors lie exposed under the SIM card holder. **CAUTION:** Do not touch these connectors! If you do, you may release an electrical discharge that could damage the module or the SIM card.
- When designing your application, the SIM card's accessibility should be taken into account. We always recommend that you have the SIM card protected by a PIN code. This will ensure that the SIM card cannot be used by an unauthorized person.

4.1.3 Antenna

- If the antenna is to be mounted outside, consider the risk of lightning. Follow the instructions provided by the antenna manufacturer.
- Never connect more than one module to a single antenna. The module can be damaged by radio frequency energy from the transmitter of another module.
- Like any mobile station, the antenna of the module emits radio frequency energy. To avoid EMI (electromagnetic interference), you must determine whether the application itself, or equipment in the application's proximity, needs further protection against radio emission and the disturbances it might cause. Protection is secured either by shielding the surrounding electronics or by moving the antenna away from the electronics and the external signals cable.
- The module and antenna may be damaged if either come into contact with ground potentials other than the one in your application. Beware, ground potential are not always what they appear to be.
- In the final application, the antenna must be positioned more than 20cm away from human bodies. When this rule cannot be applied, the application designer is responsible for providing the SAR measurement test report and declaration.

4.2 Installation of the Module

4.2.1 Where to Install the Module

There are several conditions which need to be taken into consideration when designing your application as they might affect the module and its function. They are:

Environmental Conditions

The module must be installed so that the environmental conditions stated in the Technical Data chapter, such as temperature, humidity and vibration are satisfied. Additionally, the electrical specifications in the Technical Data section must not be exceeded.

Signal Strength

The module has to be placed in a way that ensures sufficient signal strength. To improve signal strength, the antenna can be moved to another position. Signal strength may depend on how close the module is to a radio base station. You must ensure that the location at which you intend to use the module, is within the network coverage area.

Degradation in signal strength can be the result of a disturbance from another source, for example an electronic device in the immediate vicinity. More information about possible communication disturbances can be found in section 4.3.5, page 72.

When an application is completed, you can verify signal strength by issuing the AT command AT+CSQ. See “AT+CSQ Signal Strength”, page 118.

Tip! Before installing the module, use an ordinary mobile telephone to check a possible location for it. In determining the location for the module and antenna, you should consider signal strength as well as cable length

Connection of Components to GM47

The integrator is responsible for the final integrated system. Incorrectly designed or installed, external components may cause radiation limits to be exceeded. For instance, improperly made connections or improperly installed antennas can disturb the network and lead to malfunctions in the module or equipment.

Network and Subscription

- Before your application is used, you must ensure that your chosen network provides the necessary telecommunication services. Contact your service provider to obtain the necessary information.
- If you intend to use SMS in the application, ensure this is included in your (voice) subscription.
- Consider the choice of the supplementary services described in section “2.3.2 Short Message Service”, page 18.

4.2.2 How to Install the Module

Power Supply

- Use a high-quality power supply cable with low resistance. This ensures that the voltages at the connector pins are within the allowed range, even during the maximum peak current. An electrolytic capacitor should be placed close to the power supply pins of the module to supply the peak currents during burst transmission. See “VCC - Regulated Power Supply Input”, page 45.
- See section “2.2.1 General Protection Requirements”, page 44.

Grounds

A ground connection is provided at the mounting hole next to the RF connector on the module (see Figure 2.1, page 41). Connect this ground point to the DGND pins of the module by the shortest, low-impedance path possible. The purpose of this connection is to allow any ESD picked up by the antenna to bypass the module's internal ground path.

Note! It is recommended that you use a cable with a maximum resistance of 5 m Ω for the ground connection.

Note! AGND and DGND are connected at a star point inside the module. They must *not* be joined together in your application.

Audio

Use a coupling capacitor in ATMS line if the application does not use the module's bias voltage. See also "Figure 2.3 Microphone connections to the module", page 50.

Software Upgrade

To upgrade the software, the system connector must be accessible in your application. The pins SERVICE, TD, RD and the power signals are used for this purpose. Please contact customer support for more details.

4.3 Antenna

4.3.1 General

The antenna is the component in your system that maintains the radio link between the network and the module. Since the antenna transmits and receives electromagnetic energy, its efficient function will depend on:

- the type of antenna (for example, circular or directional);
- the placement of the antenna;
- communication disturbances in the vicinity in which the antenna operates.

In the sections below, issues concerning antenna type, antenna placement, antenna cable, and possible communication disturbances are addressed.

In any event, you should contact your local antenna manufacturer for additional information concerning antenna type, cables, connectors, antenna placement, and the surrounding area. You should also

determine whether the antenna needs to be grounded or not. Your local antenna manufacturer might be able to design a special antenna suitable for your the application.

4.3.2 Antenna Type

Make sure that you choose the right type of antenna for the module. Consider the following requirements:

- the antenna must be designed for the dual frequency bands in use: EGSM/GSM900/1800 for the GM47 and GSM850/1900 for the GM48;
- the impedance of the antenna and antenna cable must be 50Ω;
- the antenna output-power handling must be a minimum of 2W;
- the VSWR value should be less than 3:1 to avoid damage to the module.

4.3.3 Antenna Placement

The antenna should be placed away from electronic devices or other antennas. The recommended minimum distance between adjacent antennas, operating in a similar radio frequency band, is at least 50cm.

If signal strength is weak, it is useful to face a directional antenna at the closest radio base station. This can increase the strength of the signal received by the module.

The module's peak output power can reach 2W. RF field strength varies with antenna type and distance. At 10cm from the antenna the field strength may be up to 70V/m and at 1m it will have reduced to 7V/m.

In general, CE-marked products for residential and commercial areas, and light industry can withstand a minimum of 3V/m.

4.3.4 The Antenna Cable

Use 50Ω impedance low-loss cable and high-quality 50Ω impedance connectors (frequency range up to 2GHz) to avoid RF losses. Ensure that the antenna cable is as short as possible.

The Voltage Standing-Wave Ratio (VSWR) may depend on the effectiveness of the antenna, cable and connectors. In addition, if you use an adapter between the antenna cable and the antenna connector, it is crucial that the antenna cable is a high-quality, low-loss cable.

Minimize the use of extension cables, connectors and adapters. Each additional cable, connector or adapter causes a loss of signal power.

4.3.5 Possible Communication Disturbances

Possible communication disturbances include the following:

- **Noise** can be caused by electronic devices and radio transmitters.
- **Path-loss** occurs as the strength of the received signal steadily decreases in proportion to the distance from the transmitter.
- **Shadowing** is a form of environmental attenuation of radio signals caused by hills, buildings, trees or even vehicles. This can be a particular problem inside buildings, especially if the walls are thick and reinforced.
- **Multi-path fading** is a sudden decrease or increase in the signal strength. This is the result of interference caused when direct and reflected signals reach the antenna simultaneously. Surfaces such as buildings, streets, vehicles, etc., can reflect signals.
- **Hand-over** occurs as you move from one cell to another in the GSM network. Your mobile application call is transferred from one cell to the next. Hand-over can briefly interfere with communication and may cause a delay, or at worst, a disruption.

5. Technical Data

Mechanical Specifications

Maximum length	50mm	
Maximum width	33mm	
Maximum thickness	7.15 mm	(excluding connector pins and top of antenna connector)
Weight	18.5g	

Power supply voltage, normal operation

Voltage	3.6V nominal (3.4V - 4.0V)
Ripple	<100mV @ 200kHz; <20mV @ >200kHz
Voltage must always stay within a normal operating range, ripple included	
Power consumption	Voice/CSD: <250mA (<2A peak)
	Data (GPRS 4+1); <350mA (<2A peak)
	Idle mode: <5mA
	Switched off: <100µA

Radio specifications

Frequency range	GM47: EGSM 900MHz and 1800MHz (dual band)
	GM48: GSM 850MHz and 1900MHz (dual band)
Maximum RF output power	GM47: 2W
	GM48: 1W
Antenna impedance	50Ω

SIM card

3 V or 5 V	Support of external SIM card
------------	------------------------------

Environmental specifications

Operating temperature range	-25°C to +55°C
Storage temperature range	-40°C to +85°C
Maximum relative humidity	95% at +40°C
Stationary vibration, sinusoidal	Displacement: 7.5mm Acceleration amplitude: 20m/s ² and 40m/s ² Frequency range: 2-8Hz, 8-200Hz, 200-500Hz
Stationary vibration, random	Acceleration spectral density (m ² /s ²): 0.96, 2.88, 0.96 Frequency range: 5-10Hz, 10-200Hz, 200-500Hz, 60min/axis
Non-stationary vibration, including shock	Shock response spectrum I, peak acceleration: 3 shocks in each axis and direction; 300m/s ² , 11 ms Shock response spectrum II, peak acceleration: 3 shocks in each axis and direction; 1000m/s ² , 6ms
Bump	Acceleration: 250m/s ²
Free fall transportation	1.2m
Rolling pitching transportation	Angle: ±35degrees; period: 8s
Static load	10kPa
Low air pressure/high air pressure	70kPa/106kPa

Data Storage

SMS storage capacity	40 in ME In addition, the unit can handle as many SMS as the SIM can store
Phone book capacity	100

Part 4: Using AT Commands

1. Introduction to AT Commands

1.1 Overview

AT commands, issued from a computer in your application are used to control and implement the functions of the module.

Using AT commands, the following actions are possible:

- Control of DCE
- GPRS
- Call control
- Supplementary Service
- SIM application tool kit

The GM47 contains a large number of Ericsson-specific commands in addition to those implemented in accordance with the GSM and ITU-T recommendations. These commands are provided to enhance the functions of the module. The Ericsson-specific commands are identified by the asterisk that precedes the command (see the syntax description provided below).

1.2 Syntax Description

This section provides a brief description of the syntax used for the GM47, AT command set. See the ITU-T recommendation V.25ter for additional information.

1.2.1 Conventions

In this manual, the following conventions are used to explain the AT commands.

<command>	The name of the command that is to be entered.
<parameter>	The parameter values that are defined for a certain command.
<CR>	The command line is terminated by the Carriage Return or Enter key.
<LF>	Line feed character.
< >	The term enclosed in angle brackets is a syntactical element. The brackets do not appear in the command line.

- [] Square brackets are used to indicate that a certain item is optional. For example, sub-parameters of a command or an optional part of a response. The brackets do not appear in the command line.
- Value** The default values of the supported parameters are indicated by using bold text when presenting the value.
- Other characters, including '?', '=', parenthesis, etc., appear in commands and responses as written.
 - The final result codes OK, ERROR, +CME ERROR: <err> and CMS ERROR:<err> (see sections 1.2.3, AT Response Syntax and 1.3, Error Codes) are not listed under “Possible Responses” for each AT command.
 - OK and ERROR are listed if these are the only possible responses.

1.2.2 AT Command Syntax

The AT standard is a line-oriented command language. Each command is made up of the following three elements:

- the prefix;
- the body;
- the termination character.

The prefix consists of the letters “AT”, which are derived from the first two letters of the word attention. The body is made up of the **command**, the **parameter**, and if applicable the associated **values**.

Commands may be combined in the same command line. Spaces between the individual bodies are ignored.

Basic Syntax Command

The format of basic syntax commands is as follows:

AT<command>[=][<parameter>]

Example! *ATL=0<CR> (sets the volume of the speaker)*

Additional commands may follow a command on the same command line without any character being required for separation. For the command D parameters, see the description for the command in question.

A version of the basic syntax is:

AT<command><parameter>

Extended Syntax Command

- **AT+<command>= [<parameter>]**

- **AT*`<command>`=[`<parameter>`]**

Example! AT+CFUN=0<CR> (*powers down the module*)

If several values are included in the command, they are separated by commas. It is also possible to enter commands with no values.

Additional commands may follow an extended syntax command on the same command line if a semicolon (; IRA 3B) is inserted after the preceding extended command as a separator.

Read Command Syntax

The read command is used to check the current values of parameters. Type '?', after the command line:

- **AT+`<command>`?**
- **AT*`<command>`?**
- **AT`<command>`?**

Example! AT+CSCS?<CR> (*show current character set*)

<CR>"IRA"<CR>(*information text response*)

<CR>OK<CR>(*final result code response*)

Test Command Syntax

The test command is used to test whether the command has been implemented or to give information about the type of subparameters it contains. Type '?', after the command line:

- **AT+`<command>`=?**
- **AT*`<command>`=?**

Example! AT+CPAS=?<CR> (*shows supported values for the response parameters*)

<CR>CPAS: (0, 3, 4, 129, 130, 131)<CR> (*supported values*)

<CR>OK<CR> (*final result code*)

If the indicated `<parameter>` is not recognized, the result code ERROR is issued.

Note! Possible responses are indicated both as `<command>`:(list of supported`<parameter>`) and (in most cases) the actual range of the parameter values.

1.2.3 AT Response Syntax

The default mode response shown below, is in text mode. See the command V for further details.

Possible formats for the result codes are:

- Basic format result code, such as OK. The Basic result code also has a numerical equivalent.
- Extended format result code, prefixed with a plus sign (+) or an asterisk (*):
 - **AT+<command>: <parameter >**
 - **AT*<command>: <parameter>**

where the <parameter> is the result code value, note that a single space character separates the colon character from the <parameter>. If several values are included in the result code, they are separated by commas. It is also possible that a result code has no value. The extended syntax result codes have no numerical equivalent. They are always issued in alphabetical form.

- Information text response may contain multiple lines separated by <CR>. The TE detects the end of informational text responses by looking for a final result code response, such as OK.

There are two types of result code responses as outlined below:

Final Result Code

A final result code indicates to the TE that execution of the command is completed and another command may be issued.

- If you type an implemented AT command, you should get the result code OK.
- If you type an AT command that is not implemented, or which had the wrong parameter or syntax, you will get an error result code. It is ERROR or, for example, +<command> ERROR followed by an error code.

Final result codes are:

Value	General meaning
OK	Command executed, no errors
ERROR	Invalid command or command line too long
NO DIALTONE	No dialling possible, wrong mode
BUSY	Remote station busy
NO ANSWER	Connection completion time-out
NO CARRIER	Link not established or disconnected

Unsolicited Result Code

Unsolicited result codes indicate the occurrence of an event not directly associated with a command being issued from the TE.

1.3 Error Codes

1.3.1 +CME ERROR (Mobile Equipment Error Code)

This final result code is similar to the regular ERROR result code. If +CME ERROR: <err> is the result code for any of the commands in a command line, none of the commands in the same command line will be executed (neither ERROR nor OK result code shall be returned as a result of a completed command line execution). The format of <err> can be either numerical or alphabetical, and is set with the +CMEE command.

The table below provides the numerical values for the parameter <err>.

<i><err></i>	<i>Description Syntax</i>
0	Phone failure
1	No connection to phone
2	Phone -adaptor link reserved
3	Operation not allowed
4	Operation not supported
5	PH-SIM PIN required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	Incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	Memory full
21	Invalid index
22	Not found
23	Memory failure
24	Text string too long
25	Invalid characters in text string
26	Dial string too long
27	Invalid characters in dial string
30	No network service

<i><err></i>	<i>Description Syntax</i>
31	Network time-out
32	Network not allowed - emergency calls only
100	Unknown
101- 255	Reserved by ETS

1.3.2 +CMS ERROR (Message Service Failure Result Code)

This final result code indicates an error related to mobile equipment or to the network. The operation is similar to the ERROR result code. None of the following commands in the same command line will be executed. Neither ERROR nor OK result code will be returned. ERROR is returned normally when an error is related to syntax or invalid parameters. Nevertheless, it always appears when a command fails.

The syntax is as follows:

+CMS ERROR: *<err>*

Values for the *<err>* parameter are described in the following table.

<i><err></i>	<i>Description</i>
0 - 127	GSM 04.11 Annex E-2 values
128 - 255	GSM 03.40 subclause 9.2.3.22 values
300	ME failure
301	SMS service of ME reserved
302	Operation not allowed
303	Operation not supported
304	Invalid PDU mode parameter
305	Invalid text mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
316	SIM PUK required
317	SIM PIN2 required
318	SIM PUK2 required
320	Memory failure

<i><err></i>	<i>Description</i>
321	Invalid memory index
322	Memory full
330	SMSC address unknown
331	No network service
332	Network time-out
340	No +CNMA acknowledgment expected
500	Unknown error
- 511	Other values in range 256 - 511 are reserved
512-	Manufacturer specific

1.4 Examples on How to Use the AT Commands

After every group of AT commands there is a section where some of the more complicated commands are exemplified. For a detailed description of the command in question (valid parameter values, AT command syntax and Response syntax) you are recommended to see its own descriptive section.

2. Call Control

2.1 AT+CPIN *PIN Control*

See 3.27, AT+CPIN PIN Control

2.2 ATA *Answer Incoming Call*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Answer an incoming call	ATA	<ul style="list-style-type: none">• ERROR• OK

Signals the MS to answer an incoming call. The command is followed by a final result code such as OK or ERROR, and the MS enters the command state.

2.3 ATD

Dial

<i>Description</i>	<i>Syntax</i>	<i>Possible Responses</i>
<ul style="list-style-type: none"> • Originate a call and dial the phone number specified in the command as <dial_string> or • Do a network detect 	ATD<dial_string>[:]	<ul style="list-style-type: none"> • CONNECT • CONNECT <text> • NO CARRIER • ERROR • NO DIAL TONE • BUSY • OK
Dial the phone number stored in the mobile phone which is located by the index <l>	ATD>ME<l>[:]	<ul style="list-style-type: none"> • CONNECT • CONNECT <text> • NO CARRIER • ERROR • NO DIAL TONE • BUSY • OK
Dial the phone number stored in the SIM card which is located by the index <l>	ATD>SM<l>[:]	<ul style="list-style-type: none"> • CONNECT • CONNECT <text> • NO CARRIER • ERROR • NO DIAL TONE • BUSY • OK
Dial the phone number stored in the <i>Last dialled number</i> list on the SIM card, which is located by the index <l> The most recently dialled number is assumed to have <l>="1"	ATD>LD<l>[:]	<ul style="list-style-type: none"> • CONNECT • CONNECT <text> • NO CARRIER • ERROR • NO DIAL TONE • BUSY • OK
Redial the last phone number dialled. Ericsson specific	ATDL[:]	...

Used to initiate a phone connection, which may be data or voice (phone number terminated by semicolon). The phone number used to establish the connection will consist of digits and modifiers, or a stored number specification.

If the dial string is followed by a semicolon this informs the phone that the number is a voice rather than a data number.

If the dial string is omitted, and the semicolon included, the command instructs the ME to do a network detect. If the network is available OK is returned.

Abortability:

Aborting an ATD command is accomplished by the transmission from the DTE to the DCE of any character. A single character shall be sufficient to abort the command in progress; however, characters

transmitted during the first 125 milliseconds after transmission of the termination character are ignored. This is to allow the DTE to append additional control characters such as line feed after the command line termination character.

<i><dial_string></i>	<i>Description</i>
"0 1 2 3 4 5 6 7 8 9 * # +"	Valid characters for origination
W	The W modifier is ignored but is included only for compatibility purposes
,	The comma modifier is ignored but is included only for compatibility purposes
T	The T modifier is ignored but is included only for compatibility purposes
P	The P modifier is ignored but is included only for compatibility purposes

<i><Final Result Code></i>	<i>Description</i>
CONNECT	If connection is successfully established, only valid for data connections
CONNECT <text>	If connection is successfully established, only valid for data connections
NO CARRIER	Unable to establish a connection or the connection attempt was aborted by the user
ERROR	An unexpected error occurred while trying to establish the connection
NO DIALTONE	The mobile phone is being used for a voice call or is not within coverage of the network
BUSY	The phone number called is engaged, valid for data and voice connections
OK	Only valid for voice connections

<i><text></i>	<i>Description</i>
28800	Connected with data bit rate of 28800 bits/s (HSCSD)
19200	Connected with data bit rate of 19200 bits/s (HSCSD)
14400	Connected with data bit rate of 14400 bits/s (HSCSD)
9600	Connected with data bit rate of 9600 bits/s
4800	Connected with data bit rate of 4800 bits/s
2400	Connected with data bit rate of 2400 bits/s

2.4 ATH

Hang up

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Terminate the call	ATH	<ul style="list-style-type: none"> • ERROR • OK

Signals the MS to terminate an active call.

2.5 ATL

Monitor Speaker Loudness

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request monitor speaker loudness	ATL[<value>]	<ul style="list-style-type: none"> • OK • ERROR
Shows the current setting	ATL?	L: <value>
Answer an incoming call	ATL=?	L: (list of supported <values>s)

Controls the volume of the monitor speaker. The specific loudness level indicated by “low”, “medium” and “high” is manufacturer specific. It is intended to indicate increasing volume.

<i><value></i>	<i>Description</i>
0	-14 dB (minimum speaker volume)
1	-10.5 dB
2	-7 dB
3	-3.5 dB
4	0 dB (nominal speaker volume)
5	3.5 dB
6	7 dB
7	10.5 dB
8	14 dB (maximum speaker volume)

2.6 ATO

Return to Online Data Mode

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Return to on-line data mode	ATO[<value>]	<ul style="list-style-type: none"> • CONNECT • CONNECT <text> • NO CARRIER • ERROR

Switch to the on-line data mode from the on-line command mode during an active call. Returns ERROR when not in on-line command mode.

<i><value></i>	<i>Description</i>
0	Return to on-line data state from on-line command

2.7 ATP

Select Pulse Dialling

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Select pulse dialling	ATP	OK
Show if the command is supported?	ATP=?	OK

Command is ignored, and is implemented for compatibility only. It would normally cause the next D command to use pulses when dialling the number.

2.8 ATT

Select Tone Dialling

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Select tone dialling	ATT	OK
Show if the command is supported?	ATT=?	OK

Command is ignored, and is implemented for compatibility only. It would normally cause the next D command to use tones when dialling the number.

2.9 ATX

Call Progress Monitoring Control

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set call progress monitoring control	ATX=[<n>] or ATX[<n>]	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	ATX?	X: <n>
Show if the command is supported?	ATX=?	X: (list of supported <n>s)

Defines if the dial-tone detection and busy-tone detection are to be used during a call.

<i><n></i>	<i>Description</i>
0	Body and dial tone detection off. No line speed reported on connection
1	Body and dial tone detection off. Report line speed on connection
2	Busy detection on and dial tone detection off. Report line speed on connection
3	Busy detect off and dial tone on. Report line speed on connection
<u>4</u>	Busy detect and dial tone detection on. Report line speed on connection. Default value

Note! If there is no network available the <n> parameter will decide if “NO DIALTONE” or “NO CARRIER” will be returned. If the call recipient is busy, the <n> parameter will decide if “BUSY” or “NO CARRIER” will be returned.

2.10 AT+CHUP

Hang up Call

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request hang-up	AT+CHUP	<ul style="list-style-type: none"> • OK • ERROR
Show if the commands is supported	AT+CHUP=?	<ul style="list-style-type: none"> • OK • ERROR

Causes the TA to hang-up the current call of the ME.

If no call is present, but an incoming call is notified, then the incoming call shall be rejected.

Note! The purpose of this command is not to replace the V.25ter [4] command H, but to give an assured procedure to terminate an alternating mode call.

2.11 AT+CMOD Call Mode

Description	Command	Possible Responses
Request Call Mode	AT+CMOD=[<mode>]	<ul style="list-style-type: none"> • OK • ERROR
Shows the current setting	AT+CMOD?	<ul style="list-style-type: none"> • +CMOD: <mode> • OK • ERROR
Show if the command is supported	AT+CMOD=?	<ul style="list-style-type: none"> • +CMOD: (list of supported <mode>s) • OK • ERROR

Selects the call mode of further dialing commands (D) or for next answering command (A). Mode can be either single or alternating. In this ETS, terms “alternating mode” and “alternating call” refer to all GSM bearer and teleservices that incorporate more than one basic service (voice, data, fax) within one call.

When single mode is selected the call originating and hang-up procedures are similar to procedures specified in ITU-T Recommendations V.25ter [4], T.31 [5] and T.32 [6]. In GSM there can be voice followed by data (refer GSM 02.02 [7]), alternating voice/data (refer GSM 02.02 [7]) and alternating voice/fax calls (refer GSM 02.03 [8]).

Test command returns values supported by the TA as a compound value.

Note! +CMOD is set to zero after a successfully completed alternating mode call. It is set to zero also after a failed answering. The power-up, factory (&F) and user resets (Z), also set the value to zero. This reduces the possibility that alternating mode calls are originated or answered accidentally.

< mode >	Description
0	Single mode (default) In order to avoid accidental originating or answering of alternating calls is <mode> set to single mode in following cases: - after a successfully completed alternating mode call; - after a unsuccessful answering; - after successfully execution of the commands &F and Z
1	Alternating voice/fax (teleservice # 61). Not Supported
2	Alternating voice/data (bearer service # 61). Not Supported
3	Voice followed by data (bearer service # 81). Not Supported
4..127	Reserved by GSM 07.07. Not Supported

2.12 AT+CVHU Voice Hang-Up

Description	Syntax	Possible Responses
Set Command	+CVHU=[<mode>]	<ul style="list-style-type: none"> +CME ERROR: <err> OK
Read command	+CVHU?	<ul style="list-style-type: none"> +CVHU: <mode> +CME ERROR: <err>
Test if the command is supported	+CVHU=?	+CVHU (list of supported <mode>s)

Selects whether ATH or “drop DTR” causes a voice connection to be disconnected or not. Voice connection also includes alternating mode calls that are currently in voice mode.

Note! When <mode>=2, this command must be viewed in conjunction with the V.25ter [3] command &D, or &D will be ignored.

<mode>	Description
0	“Drop DTR” ignored but OK response given. ATH disconnects
1	“Drop DTR” and ATH ignored but OK response given
2	“Drop DTR” behavior according to &D setting. ATH disconnects. Default

2.13 AT+VTS DTMF and Tone Generation

Description	Command	Possible Responses
Request transmission of DTMF tone(s)	AT+VTS=<DTMF>	OK ERROR
Show if the command is supported	AT+VTS=?	OK ERROR

This command allows the transmission of DTMF tones. These tones may be used, for example, when announcing the start of a recording period. The command is write only. In this profile of commands, the command does not operate in data or fax modes of operation (+FCLASS=0,1,2-7).

Note! The ATD-command is used only for dialing. It is not possible to generate arbitrary DTMF tones using the ATD command.

Note! The AT+VTS command is used only during a voice call.

<i><DTMF></i>	<i>Description</i>
ASCII character string	An ASCII character string with entries in the set 0-9, #, *, A-D separated by commas. Each entry is interpreted as a single ASCII character. Example: The string "8,9" sends two DTMF tones, "8" followed by "9"

3. Control and Status

3.1 ATQ

Result Code Suppression

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set Result Code Suppression	ATQ[=]<value>	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	ATQ?	Q: <value>
Show if the command is supported	ATQ=?	Q: (list of supported <value>s)

Determines whether or not the DCE transmits result codes to the DTE. When result codes are being suppressed, no portion of any intermediate, final, or unsolicited result code - header, result text, line terminator, or trailer - is transmitted.

Note! The Ingo-module triggers on the response from ref. Point E. It is therefore not possible to turn off the response in ref. Point E.

<i><value></i>	<i>Description</i>
<u>0</u>	DCE transmits result codes. Default value
1	Result codes are suppressed and not transmitted

3.2 ATSO

Automatic Answer Control

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Automatic answer control	ATSO=[<rcnt>]	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	ATSO?	<rcnt>
Show if the command is supported	ATSO=?	S0: (list of supported <rcnt>s)

Defines the automatic answering feature of the modem. A non-zero value specifies the number of rings before the call is answered.

Note! Call is always answered in the current fax class, regardless of whether the incoming call is voice, data, or fax.

<i><rcnt></i>	<i>Description</i>
<u>0</u>	Disable automatic answer. Default value
1-7	Answer after the specified number of rings

3.3 ATS2

Escape Sequence Character

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set escape sequence character	ATS2=[<esc>]	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	ATS2	<esc>
Show if the command is supported	ATS2=?	S2: (list of supported <esc>s)

Defines the character to be used as the escape sequence character when switching from on-line data mode to on-line command mode. The response to the command is modified to reflect the change.

<i><esc></i>	<i>Description</i>
<u>43</u>	Escape sequence character. Default value
0 to 255	Escape sequence character

Note! If the <esc> parameter is set to a value in the range of 128-255, the escape sequence detection is disabled.

3.4 ATS3

Command Line Termination Character

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set Command Line Termination Character	ATS3=<value>	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	ATS3?	<value>
Show if the command is supported	ATS3=?	S3: (list of supported <value>s)

This S-parameter represents the decimal IA5 value of the character recognised by the DCE from the DTE to terminate an incoming command line. It is also generated by the DCE as part of the header, trailer, and terminator for result codes and information text, along with the S4 parameter.

The previous value of S3 is used to determine the command line termination character for entry of the command line containing the S3 setting command. However, the result code issued uses the value of S3 as set during the processing of the command line. For example, if S3 was previously set to 13 and the command line "ATS3 30" is issued, the command line is terminated with a <CR> character (IA5 0/13), but the result code issued uses the character with the ordinal value 30 (IA5 2/14) in place of the <CR>.

<i><value></i>	<i>Description</i>
<u>13</u>	Command line termination character, Default value
0 to 127	Command line termination character

3.5 ATS4

Response Formatting Character

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set Response Formatting Character	ATS4=<value>	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	ATS4?	<value>
Show if the command is supported	ATS4=?	S4: (list of supported <value>s)

This S-parameter represents the decimal IA5 value of the character generated by the DCE as part of the header, trailer, and terminator for result codes and information text, along with the S3 parameter (see the description of the V parameter for usage).

If the value of S4 is changed in a command line, the result code issued in response to that command line will use the new value of S4.

<i><value></i>	<i>Description</i>
<u>10</u>	Formatting character. Default value
0 to 127	Formatting character

3.6 AT\$5

Command Line Editing Character (BACKSPACE)

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request Command Line Editing Character	ATS5=<value>	<ul style="list-style-type: none"> • OK • ERROR
Shows the current setting	ATS5?	<value>
Show if the command is supported	ATS5=?	S5: (list of supported <value>s)

This S-parameter represents the decimal IA5 value of the character recognised by the DCE as a request to delete from the command line the immediately preceding character.

<i><value></i>	<i>Description</i>
<u>8</u>	Line editing character. Default value
0 to 127	Line editing character

3.7 AT\$6

Blind Dial Delay Control

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Blind dial delay control	ATS6=[<dly>]	OK
Read the current setting	ATS6?	<dly>
Show if the command is supported	ATS6=?	S6: (list of supported <dly>s)

Defines the number of seconds to wait before call addressing when a dial tone is not detected. This command is ignored by the Infrared Modem and is only included for compatibility.

<i><dly></i>	<i>Description</i>
2	Wait two seconds before blind dialling. Default value.
2-255	Number of seconds to wait before blind dialling

3.8 AT57

Connection Completion Timeout

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set connection completion timeout	ATS7=[<tmo>]	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	ATS7?	<tmo>
Show if the command is supported	ATS7=?	S7: (list of supported <tmo>s)

Defines the maximum time allowed between completion of dialling and the connection being established. If this time is exceeded then the connection is aborted.

<i><tmo></i>	<i>Description</i>
<u>50</u>	Timeout value in seconds. Default value
1-255	Timeout value in seconds

3.9 AT58

Comma Dial Modifier Delay Control

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set Comma Dial Modifier Delay Control	ATS8=[<dly>]	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting.	ATS8?	<dly>
Show if the command is supported.	ATS8=?	S8: (list of supported <dly>s)

<i><dly></i>	<i>Description</i>
<u>2</u>	The value of the dial modifier delay in seconds. Default value
1-255	The value of the dial modifier delay in seconds

3.10 AT\$10

Automatic Disconnect Delay Control

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set Automatic Disconnect Delay Control	AT\$10=[<val>]	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	AT\$10?	<val>
Show if the command is supported	AT\$10=?	\$10: (list of supported <val>s)

Specifies the amount of time that the DCE will remain connected to the line after the absence of received line signals.

<i><val></i>	<i>Description</i>
2	Remains connected for two tenths of a second. Default value
1-254	Number of tenths of a second of delay

3.11 AT*\$ECAM

Ericsson Call Monitoring

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set Call Monitoring on or off	AT*\$ECAM=<onoff>	<ul style="list-style-type: none"> • OK • +CME ERROR: <err> • OK • ERROR
Read the current status for Call Monitoring	AT*\$ECAM?	<ul style="list-style-type: none"> • *\$ECAM: <onoff> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT*\$ECAM=?	<ul style="list-style-type: none"> • *\$ECAM: list of supported <onoff>s • +CME ERROR: <err> • OK • ERROR

This command activates or deactivates the call monitoring function in the ME. When this log function is activated in the ME, the ME informs about call events, such as incoming call, connected, hang up etc.

It is preferable that the current status shall always be sent with result code *\$ECAV when activating the log function. The purpose of this is two fold:

- to gather relevant information for the call log in a TE;

- to make it possible for the TE to display call state information for an ongoing call.

<i><onoff></i>	<i>Description</i>
0	The call log function is disabled (off)
1	The call log function is enabled (on)

<i><ccid></i>	<i>Description</i>
Integer (1-7)	A number which uniquely defines a call in the phone (= number of call control process). There can not be two call id's with the same number simultaneously. The maximum number of call control processes is 7, 5 multiparty members, one call on hold and one waiting call

<i><ccstatus></i>	<i>Description</i>
0	IDLE
1	CALLING (MO)
2	CONNECTING (MO)
3	ACTIVE (connection between A and B)
4	HOLD
5	WAITING (MT)
6	ALERTING (MT)
7	BUSY

<i><calltype></i>	<i>Description</i>
1	VOICE
2	DATA
4	FAX
128	VOICE2

<i><processid></i>	<i>Description</i>
Integer	Reported when returning to the IDLE state (<ccstatus> = 0). 8 = H'08 = CC (Call control) 68 = H'44 = MM (Mobile Management) 69 = H'45 = MS (Mobile Station) 122 = H'7A = RR (Radio Resources)

<i><exit cause></i>	<i>Description</i>
Integer	Exit cause according to GSM 04.08. Reported when returning to IDLE state (<ccstatus> = 0)

<i><number></i>	<i>Description</i>
String	String type phone number of format specified by <i><type></i> . Only valid for <i><ccstatus></i> = 1 (CALLING)

<i><type></i>	<i>Description</i>
Integer	Type of address octet in integer format (refer GSM 04.08 subclause 10.5.4.7). ; default 145 when dialing string includes international access code character "+", otherwise 129. Only valid for <i><ccstatus></i> = 1 (CALLING)

3.12 AT*EDST

Ericsson Daylight Saving Time

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set Daylight Saving Time	AT*EDST=<dst>	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read current Daylight Saving Time	AT*EDST?	<ul style="list-style-type: none"> • *EDST: <dst> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EDST=?	<ul style="list-style-type: none"> • • *EDST: (list of supported <dst>s) • +CME ERROR: <err> • OK • ERROR

This command sets the daylight saving time hours.

Note! This command affects the MS clock set with the AT+CCLK command. To avoid confusion it is recommended the daylight saving time (DST) is set with this command before setting the actual local time with AT+CCLK.

<i><dst></i>	<i>Description</i>
0	Standard time
1	Daylight saving time, +1 hour
2	Daylight saving time, +2 hours

3.13 AT*EMAR *Ericsson Master Reset*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Perform a master reset in the MS	AT*EMAR	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Shows if the command is supported or not	AT*EMAR=?	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR

This command requests the MS to reset user data. The user data in the MS will be reset to the default values. This command also unlocks the MS.

3.14 AT*EPEE *Ericsson Pin Event*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Requests the MS to inform when the PIN code has been inserted	AT*EPEE=<onoff>	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT*EPEE=?	<ul style="list-style-type: none"> • *EPEE: (list of supported <onoff>s) • +CME ERROR: <err> • OK • ERROR
Read the current status for PIN Code Request	AT*EPEE?	<ul style="list-style-type: none"> • *EPEE: <onoff> • +CME ERROR: <err> • OK • ERROR

The command requests the MS to report when the PIN code has been inserted and accepted.

<i><onoff></i>	<i>Description</i>
0	Request for report on inserted PIN code is not activated (off)
1	Request for report on inserted PIN code is activated (on)

3.15 AT*ESMM *Ericsson Settings Minute Minder*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Sets the Minute Minder to on or off	AT*ESMM=<mode>	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read the current setting	AT*ESMM?	<ul style="list-style-type: none"> • *ESMM: <mode> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported or not and the possible settings	AT*ESMM=?	<ul style="list-style-type: none"> • *ESMM: list of supported <mode>s • +CME ERROR: <err> • OK • ERROR

This command sets the minute minder setting to on or off in the MS. Test command returns the <mode> value.

<i><mode></i>	<i>Description</i>
0	OFF, minute minder off. Default setting
1	ON, minute minder on

3.16 AT+CALA *Set Alarm*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set an alarm time in the ME	AT+CALA=<time>	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
List current active alarm settings in ME	AT+CALA?	<ul style="list-style-type: none"> • +CALA: <time> • +CME ERROR: <err> • OK • ERROR
Show list of supported parameter values	AT+CALA=?	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR

Sets an alarm time in the ME. The alarm time is set in minutes and hours. Date, seconds and time zone cannot be set.

The alarm must be set again by the user after it has been released. It will not ring automatically every day at the same time.

The alarm function uses the ring type and the ring level defined with the AT*ERIN and AT*ERIL commands.

<i><time></i>	<i>Description</i>
string type value	Refer to AT+CCLK command. Only minutes and hours are used

3.17 AT+CALD Alarm Delete

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Delete an alarm	AT+CALD=<n>	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Show if the command is supported	AT+CALD=?	<ul style="list-style-type: none"> +CALD: (list of supported <n>s) +CME ERROR: <err> OK ERROR

This command removes an active alarm.

<i><n></i>	<i>Description</i>
Integer type	Index identifying an active alarm

3.18 AT+CAPD Postpone or Dismiss an Alarm

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Postpone or dismiss an alarm	AT+CAPD=[<sec>]	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Show if the command is supported	AT+CAPD=?	<ul style="list-style-type: none"> +CAPD: (list of supported <sec>s) +CME ERROR: <err> OK ERROR

This command controls an active (occurring) alarm by either postponing it or dismissing it.

If more than one alarm occurs at the same time, this command dismisses or postpones the last activated alarm.

<i><sec></i>	<i>Description</i>
0	Dismiss the alarm
1...600	Postpone the alarm (snooze) for <sec> seconds. Not supported
540	Postpone the alarm (snooze) for 540 seconds (9 minutes). This is the only supported value

3.19 AT+CCLK Set Clock and Date

Description	Command	Possible Responses
Set the real time clock of the ME	AT+CCLK=<time>	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Show the current setting	AT+CCLK?	<ul style="list-style-type: none"> +CCLK: <time> +CME ERROR: <err> OK ERROR
Show if the command is supported	AT+CCLK=?	<ul style="list-style-type: none"> OK ERROR

Sets the real time clock of the ME. If setting fails in an ME, error +CME ERROR: <err> is returned. Read command returns the current setting of the clock.

<time>	Description
string type value	<p>Format is "yy/mm/dd, hh:mm:ss±zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -47...+48), e.g. 6th of May 1994, 22:10:00 GMT+2 hours reads "94/05/06,22:10:00+08"</p> <p>NOTE: If the ME does not support time zone information then the three last characters of <time> are not returned by +CCLK?</p>

3.20 AT+CEER Extended Error Report

Description	Command	Possible Responses
Request an Extended Error Report	AT+CEER	<ul style="list-style-type: none"> +CEER: <report> OK ERROR
Show if the command is supported	AT+CEER=?	<ul style="list-style-type: none"> OK ERROR

Causes the TA to return one or more lines of information text <report>. Typically, the text will consist of a single line containing the failure information given by the GSM network in text format.

<report>	Description
characters	<p>The total number of characters, including line terminators, in the information text shall not exceed 2041 characters. Text shall not contain the sequence 0<CR> or OK<CR></p>

3.21 AT+CFUN Set Phone Functionality

Description	Command	Possible Responses
Set MS functionality	AT+CFUN=[<fun>[,<rst>]]	<ul style="list-style-type: none"> +CME ERROR: <err> OK
Show the current setting	AT+CFUN?	<ul style="list-style-type: none"> +CFUN: <fun> +CME ERROR: <err>
Show if the command is supported	AT+CFUN=?	<ul style="list-style-type: none"> +CFUN: (list of supported <fun>s),(list of supported <rst>s) +CME ERROR: <err>

Selects the level of functionality <fun> in the MS. Level “full functionality” results in the highest level of power drawn. “Minimum functionality” results in the minimum power drawn. Manufacturers may also specify levels of functionality between these two end levels. When supported by manufacturers, ME resetting with the <rst> parameter may be utilized.

Test command returns values supported by the ME as a compound.

Note! ‘AT+CFUN=’ is interpreted as ‘AT+CFUN=0’.

<fun>	Description
0	Minimum functionality. Default value. Note: The ME is turned off
1	Full functionality. Note: If previously turned off, the phone is turned on
4	Disable MS transmit and receive RF circuits Not Supported

<rst>	Description
0	Do not reset
1	Reset the MS before setting it to <fun> power level

3.22 AT+CIND Indicator Control

Description	Command	Possible Responses
Set Indicator Control	AT+CIND=[<ind> [,<ind>[,...]]]	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Read the current setting	AT+CIND?	<ul style="list-style-type: none"> +CIND: <ind>,<ind>,... +CME ERROR: <err> OK ERROR
Test if the command is supported	AT+CIND=?	<ul style="list-style-type: none"> +CIND: (<descr>,(list of supported <ind>s)), (<descr>,(list of supported <ind>s)),... +CME ERROR: <err> OK ERROR

Used to set the values of ME indicators. <ind> value 0 means that the indicator is off (or in state which can be identified as “off” state), 1 means that indicator is on (or in a state which is more substantial than “off” state), 2 is more substantial than 1, and so on. If the indicator is a simple on/off style element, it has values 0 and 1. The number of elements is ME specific. If the ME does not allow setting of indicators or it is not currently reachable, +CME ERROR: <err> is returned. If a certain indicator is not writable, it cannot be set. If the parameter is an empty field, the indicator will keep the previous value.

Test command returns pairs, where string value <descr> is a maximum 16 character description of the indicator and compound value is the allowed values for the indicator. If ME is not currently reachable, +CME ERROR: <err> is returned.

<ind>	Description
Integer type	Value shall be in range of corresponding <descr>

<descr>	Description
“battchg”	Battery charge level (0-5) Not supported
“signal”	Signal quality (0-5)
“battery warning”	Battery warning (0-1) Not supported
“charger connected”	Charger connected (0-1) Not supported
“service”	Service availability (0-1) (Net contact status, 1 = Net contact)
“sounder”	Sounder activity (0-1) (ME silent status, 1 = ME silent)
“message”	Message received (0-1)

<i><descr></i>	<i>Description</i>
"call"	Call in progress (0-1)
"vox"	Transmit activated by voice activity (0-1). Not supported
"roam"	Roaming indicator (0-1) (Home net status, 0 = Home Net)
"sms full"	A short message memory storage in the MT has become full (1), or memory locations are available (0); i.e. the range is (0-1)

3.23 AT+CLAC *List all available AT Commands*

<i>Command</i>	<i>Possible Responses</i>
+CLAC	<AT Command1> [<CR> <LF> <AT Command2>[...]] +CME ERROR: <err>
+CLAC=?	+CME ERROR: <err>

Causes the ME to return one or more lines of AT commands.

Note! This command only returns the AT commands that are available to the user.

3.24 AT+CMEE *Mobile Equipment Error*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request GSM Mobile Equipment Error Control	AT+CMEE=[<n>]	<ul style="list-style-type: none"> • OK • ERROR
Read the command	AT+CMEE?	<ul style="list-style-type: none"> • +CMEE: <n> • OK • ERROR
Show if the command is supported	AT+CMEE=?	<ul style="list-style-type: none"> • +CMEE: (list of supported <n>s) • OK • ERROR

Disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the ME. When enabled, ME related errors cause +CME ERROR: <err> final result code instead of the regular ERROR final result code. ERROR is returned normally when error is related to syntax, invalid parameters, or TA functionality.

<i><n></i>	<i>Description</i>
<u>0</u>	Disable +CME ERROR: <err> result code and use ERROR instead. Default value
1	Enable +CME ERROR: <err> result code and use numeric <err> values (refer next subclause)
2	Enable +CME ERROR: <err> result code and use verbose <err> values (refer next subclause)

3.25 AT+CMER *Mobile Equipment Event Reporting*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set phone activity status	AT+CMER=[<mode>[,<keyp>[,<disp>[,<ind>[,<bfr>]]]]]	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read the current setting	AT+CMER?	<ul style="list-style-type: none"> • +CMER: <mode>,<keyp>,<disp>,<ind>,<bfr> • OK • ERROR
Test if the command is supported	AT+CMER=?	<ul style="list-style-type: none"> • +CMER: (list of supported <mode>s), (list of supported <keyp>s), (list of supported <disp>s), (list of supported <ind>s), (list of supported <bfr>s) • OK • ERROR

Enables or disables the sending of unsolicited result codes from ME to TE in the case of key pressings, display changes, and indicator state changes. <mode> controls the processing of unsolicited result codes specified within this command. <bfr> controls the effect on buffered codes when <mode> 1, 2 or 3 is entered. If the ME does not support setting, +CME ERROR: <err> is returned.

<i><mode></i>	<i>Description</i>
<u>0</u>	Buffer unsolicited result codes in the TA; if TA result code buffer is full, codes can be buffered in some other place or the oldest ones can be discarded
1	Not Supported
2	Not Supported
3	Forward unsolicited result codes directly to the TE; TA-TE link specific inband technique used to embed result codes and data when TA is in on-line data mode

<i><keyp></i>	<i>Description</i>
<u>0</u>	No keypad event reporting

<i><disp></i>	<i>Description</i>
<u>0</u>	No display event reporting

<i><ind></i>	<i>Description</i>
<u>0</u>	No indicator event reporting
1	Indicator event reporting using result code +CIEV: <i><ind></i> , <i><value></i> . <i><ind></i> indicates the indicator order number (as specified for +CIND) and <i><value></i> is the new value of indicator. Only those indicator events, which are not caused by +CIND shall be indicated by the TA to the TE
2	Not Supported

<i><bfr></i>	<i>Description</i>
<u>0</u>	TA buffer of unsolicited result codes defined within this command is cleared when <i><mode></i> 1...3 is entered
1	TA buffer of unsolicited result codes defined within this command is flushed to the TE when <i><mode></i> 1...3 is entered (OK response shall be given before flushing the codes). Not Supported

3.26 AT+CPAS *Phone Activity Status*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Execute Phone Activity Status	AT+CPAS[= <i><mode></i>]	<ul style="list-style-type: none"> +CPAS: <i><pas></i> +CME ERROR <i><err></i> OK ERROR
Test if the command is supported	AT+CPAS=?	<ul style="list-style-type: none"> +CPAS: (list of supported <i><pas></i>s) +CME ERROR <i><err></i> OK ERROR

Returns the activity status *<pas>* of the ME. It can be used to interrogate the ME before requesting action from the phone.

When the command is executed without the *<mode>* argument, the command returns *<pas>*-values from 0 to 128 (for supported values see table 1 below). When, on the other hand, the command is executed with the *<mode>* argument set to 1, the command may return Ericsson specific *<pas>* values from 129 to 255 (for supported values see the table below).

Test command returns values supported by the ME as a compound value, refer GSM 07.07.

<i><pas></i>	<i>Description</i>
0	Ready (ME allows commands from TA/TE)
1	Unavailable (ME does not allow commands from TA/TE). Not Supported
2	Unknown (ME is not guaranteed to respond to instructions). Not Supported
3	Ringling (ME is ready for commands from TA/TE, but the ringer is active)
4	Call in progress (ME is ready for commands from TA/TE, but a call is in progress)
5	Asleep (ME is unable to process commands from TA/TE because it is in a low functionality state). Not Supported
6..127	All other values below 128 are reserved by ETS. Not Supported
129	MMI is in idle state, (operator name/clock/date). This state is a sub-state to 'ready' (0) and has the following definition: MMI in Idle state, that is, operator, clock and date (is set) shown on the display No conversation or data call in progress No sub-menus shown on the display 4 Only digits, clear, *, NO and # allowed in this mode, not changing mode
130	Mobile oriented call in progress. This is a sub-state to 'call in progress'
131	Mobile terminated call in progress. This is a sub-state to 'call in progress'
<i><mode></i>	<i>Description</i>
1	Allows the CPAS to return Ericsson specific <pas> values, such as 129, 130 and 131

3.27 AT+CPIN *PIN Control*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request PIN Control	AT+CPIN=<pin>[,<new pin>]	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CPIN?	<ul style="list-style-type: none"> • +CPIN: <code> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CPIN=?	<ul style="list-style-type: none"> • +CME ERROR: <err> • +CPIN: (supported <code>s) • OK • ERROR

Sends the password to the ME, which is necessary to make the ME operational (SIM PIN, SIM PUK or PH-SIM). If the PIN is to be entered twice, the TA autonomously repeats the PIN. If no PIN request is pending, no action is taken towards the ME and an error message (+CME ERROR <err>) is returned to the TE.

If the PIN required is PUK, the second pin is required. This second PIN, <newpin>, is used to replace the old PIN in the SIM.

Note! Commands which interact with the ME that are accepted when the ME has a pending request for SIM PIN, SIM PUK or PH-SIM are: +CGMI, +CGMM, +CGMR, +CGSN, +CFUN, +CMEE +CPIN, L and M.

<i><pin>,<newpin></i>	<i>Description</i>
string	The range for the SIM PIN and the PH- SIM PIN is 4 - 8 digits. The SIM PUK consists of 8 digits

<i><code></i>	<i>Description</i>
READY	ME is not pending for any password
SIM PIN	ME is waiting SIM PIN to be given
SIM PUK	ME is waiting SIM PUK to be given

<i><code></i>	<i>Description</i>
PH-SIM PIN	ME is waiting PHone-to-SIM card password to be given
SIM PIN2	ME is waiting SIM PIN2 to be given. This <i><code></i> is recommended to be returned only when the last executed command resulted in PIN2 authentication failure (i.e. +CME ERROR: 17); if PIN2 is not entered correctly after the failure, it is recommended that ME does not block its operation
SIM PUK2	ME is waiting SIM PUK2 to be given. This <i><code></i> is recommended to be returned only when the last executed command resulted in PUK2 authentication failure (i.e. +CME ERROR:18); if PUK2 and new PIN2 are not entered correctly after the failure, it is recommended that ME does not block its operation.
BLOCKED	The SIM cards is blocked for the user

<i><err></i>	<i>Description</i>
0	Phone failure
5	PH-SIM PIN required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	Incorrect password
24	Text string too long
25	Invalid characters in text string
100	Unknown

3.28 AT+CPWD Change Password

Description	Command	Possible Responses
Request facility lock	AT+CPWD=<fac>,<old pwd>,<newpwd>	<ul style="list-style-type: none"> +CME ERROR <err> OK ERROR
Show if the command is supported	AT+CPWD=?	<ul style="list-style-type: none"> +CPWD: (<fac1>,<pwdlength 1>), (<fac2>,<pwdlength 2>),... +CME ERROR <err> OK ERROR

Sets a new password for the facility lock function defined by command Facility Lock +CLCK.

Test command returns a list of pairs which present the available facilities and the maximum length of their password.

<fac >	Description
"CS"	CNTRL (lock control surface e.g. phone keyboard). Not supported
"PS"	PH-SIM (lock PHone to SIM card) (ME asks password when other than current SIM card inserted)
"SC"	SIM (lock SIM card) (SIM asks password in ME power-up and when this lock command issued)
"P2"	SIM PIN2
"AO"	BAOC (Barr All Outgoing Calls) (refer GSM 02.88 clause 1)
"OI"	BOIC (Barr Outgoing International Calls) (refer GSM 02.88 clause 1)
"AI"	BAIC (Barr All Incoming Calls) (refer GSM 02.88 clause 2)
"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country) (refer GSM 02.88 clause 2)
"OX"	BOIC-exHC (Barr Outgoing International Calls except to Home Country) (refer GSM 02.88 clause 1)
"NT"	barr incoming calls from numbers Not stored to TA memory. Not supported
"NM"	barr incoming calls from numbers Not stored to ME memory. Not supported
"NS"	barr incoming calls from numbers Not stored to SIM memory. Not supported
"NA"	barr incoming calls from numbers Not stored in Any memory. Not supported

<i><fac ></i>	<i>Description</i>
"AB"	All Barring services (refer GSM 02.30)
"AG"	All outGoing barring services (refer GSM 02.30)
"AC"	All inComing barring services (refer GSM 02.30)
"FD"	SIM fixed dialling memory feature. If PIN2 authentication has not been carried out during the current session, PIN2 is required as <passwd>. Not supported

<i><oldpwd></i>	<i>Description</i>
string type	<oldpwd> shall be the same as password specified for the facility from the ME user interface or with the change password command, +CPWD

<i><newpwd></i>	<i>Description</i>
string type	<newpwd> is the new password, maximum length of password can be determined with <pwdlength>

<i><pwdlength></i>	<i>Description</i>
Integer type	Maximum length of the password for the facility

<i><err></i>	<i>Description</i>
0	Phone failure
3	Operation not allowed
5	PH-SIM PIN required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	Incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
23	Text string too long
24	Invalid characters in text string
100	Unknown
101..255	Reserved by ETS

3.29 AT+CR

Service Reporting Control

Description	Command	Possible Responses
Set Service Reporting Control	AT+CR=<mode>	<ul style="list-style-type: none"> • OK • ERROR
Read current setting	AT+CR?	<ul style="list-style-type: none"> • +CR: <mode> • OK • ERROR
Test if the command is supported	AT+CR=?	<ul style="list-style-type: none"> • +CR: (list of supported <mode>s) • OK • ERROR

Enables or disables display of intermediate bearer capability reports during the handshake phase.

<mode>	Description
<u>0</u>	Disable reporting. Default value
1	Enable reporting

3.30 AT+CRC

Cellular Result Code

Description	Command	Possible Responses
Set Cellular Result Code option	AT+CRC=[<mode>]	<ul style="list-style-type: none"> • OK • ERROR
Show the current setting	AT+CRC?	<ul style="list-style-type: none"> • +CRC: <mode> • OK • ERROR
Show if the command is supported	AT+CRC=?	<ul style="list-style-type: none"> • +CRC: (list of supported <mode>s) • OK • ERROR

Controls whether or not the extended format of incoming call indication is used. When enabled, an incoming call is indicated to the TE with unsolicited result code +CRING: <type> instead of the normal RING.

Test command returns values supported by the TA as a compound value.

< mode>	Description
0	Disables extended format
1	Enables extended format

3.31 AT+CSAS *Save Settings*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Save Settings	AT+CSAS[=<profile>]	<ul style="list-style-type: none"> • +CMS ERROR: <err> • OK • ERROR
Get available profiles	AT+CSAS=?	<ul style="list-style-type: none"> • +CSAS: (list of supported <profile>s) • +CMS ERROR: <err> • OK • ERROR

Saves active message service settings to a non-volatile memory. A TA can contain several settings profiles. Settings specified in commands Service Centre Address +CSCA, Set Message Parameters +CSMP and Select Cell Broadcast Message Types +CSCB (if implemented) are saved. Certain settings may not be supported by the storage (e.g. SIM SMS parameters) and therefore can not be saved.

Test command shall display the supported profile numbers for reading and writing of settings.

<i>< profile ></i>	<i>Description</i>
0..255	Manufacturer specific profile number where settings are to be stored. Default is "0".

3.32 AT+CSQ *Signal Strength*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Execute Signal Strength	AT+CSQ	<ul style="list-style-type: none"> • +CSQ: <rssi>,<ber> • +CME ERROR <err> • OK • ERROR
Test if the command is supported	AT+CSQ=?	<ul style="list-style-type: none"> • +CSQ: (list of supported <rssi>s),(list of supported <ber>s) • +CME ERROR <err> • OK • ERROR

Returns the received signal strength indication <rssi> and channel bit error rate <ber> from the ME. Test command returns values supported by the TA as compound values.

<i><rssI></i>	<i>Description</i>
0	-113dBm or less
1	-111dBm
2..30	-109... -53dBm
31	-51dBm or greater
99	Not known or not detectable

<i><ber></i>	<i>Description</i>
0..7	As RXQUAL values in the table in GSM 05.08 [0] subclause 8.2.4
99	Not known or not detectable

3.33 AT+CTZU *Automatic Time Zone Update*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Enable and disable automatic time zone update via NITZ	AT+CTZU=<onoff>	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read current setting	AT+CTZU?	<ul style="list-style-type: none"> • +CTZU: <onoff> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CTZU=?	<ul style="list-style-type: none"> • +CTZU: (list of supported <onoff>s) • +CME ERROR: <err> • OK • ERROR

Enables and disables the automatic time zone update via NITZ. If setting fails in an ME error, +CME ERROR <err> is returned.

<i><onoff></i>	<i>Description</i>
0	The automatic time zone update is disabled (off)
1	The automatic time zone update is enabled (on)

4. Audio

Note! *E2EAMS and *E2APR are new commands that replace the functionality offered by the *EALR, *EAMS, *EARS and *ELAM commands. Use the new commands in new applications. The old commands are included for compatibility.

4.1 AT*E2EAMS Ericsson M2M Audio Profile Modification

Description	Command	Possible Responses
Request operation with audio profile	AT*E2EAMS= <op>[,<TxPGA>, <RxPGA>,<SideToneGain>, <AuxInGain>,<MicInGain>, <TxAGC>,<Volume>, <MaxVolume>,<MicPath>, <SpkPath>,<TxPCM>, <RxPCM>,<HFAlgorithm>, <LocalAudio>,<TxGainLow>, <MicVolt2V>,<SideTone>, <NoiseRed>,<EchoCancel>, <AnalogRing>.,][,<val>]]	<ul style="list-style-type: none"> • ERROR • OK
Display set profile	AT*E2EAMS?	<ul style="list-style-type: none"> • *E2EAMS: <TxPGA>, <RxPGA>, <SideToneGain>, <AuxInGain>, <MicInGain>, <TxAGC>,<Volume>, <MaxVolume>, <MicPath>,<SpkPath>, <TxPCM>,<RxPCM>, <HFAlgorithm>, <LocalAudio>, <TxGainLow>, <MicVolt2V>, <SideTone>,<NoiseRed>, <EchoCancel>, <AnalogRing> • ERROR
Show if the command is supported	AT*E2EAMS=?	<ul style="list-style-type: none"> • *E2EAMS: (list of supported <op>s) • ERROR

This command allows the modification and configuration of the current audio profile. An audio profile is a set of data which uniquely defines the way in which the audio paths, gains, DSP algorithms and switch setting are configured. There are several audio profiles available in non-volatile storage, and the current profile can be modified by use of the AT*E2APR command.

The AT*E2EAMS command allows the user to:

- configure the whole profile, specifying each audio parameter in a comma separated list;
- set a single parameter, given by its parameter number;
- save the current profile to non-volatile memory under the current profile number (see AT*E2APR).

The current audio settings can also be displayed by running the read command AT*E2EAMS?

Default audio settings are given in AT*E2APR.

Abortability:

This command may not be aborted.

Refer to the diagram below to understand which parts of the audio circuit are affected by the various parameters.

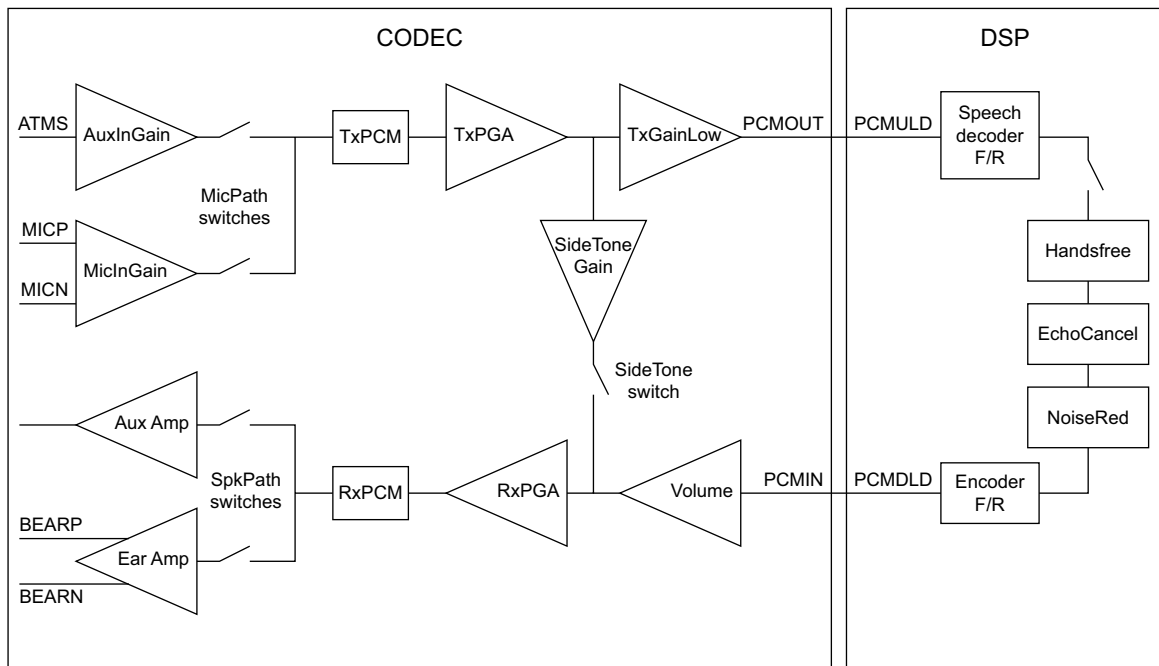


Figure 4.1 Audio diagram of the CODEC

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<i><op></i>	<i>Description</i>
0	Configure current profile (<pr1> to <pr21>)
1	Set <TxPGA>
2	Set <RxPGA>
3	Set <SideToneGain>
4	Set <AuxInGain>
5	Set <MicInGain>
6	Set <TxAGC>
7	Set <Volume>
8	Set <MaxVolume>
9	Set <MicPath>
10	Set <SpkPath>
11	Set <TxPCM>
12	Set <RxPCM>
13	Set <HFAlgorithm>
14	Set <LocalAudio>
15	Set <TxGainLow>
16	Set <MicVolt2V>
17	Set <SideTone>
18	Set <NoiseRed>
19	Set <EchoCancel>
20	Set <AnalogRing>
255	Save current profile to non-volatile storage at current profile number

<i><TxPGA>, <RxPGA></i>	<i>Description</i>
0	-5dB PGA gain
1	-2.5dB PGA gain
2	0dB PGA gain
3	2.5dB PGA gain

<i><TxPGA>, <RxPGA></i>	<i>Description</i>
4	5dB PGA gain
5	7.5dB PGA gain
6	-7.5dB PGA gain
7	-10dB PGA gain

<i><SideToneGain></i>	<i>Description</i>
0	10dB
1	13dB
2	16dB
3	19dB
4	22dB
5	25dB

<i><AuxInputGain></i>	<i>Description</i>
0	MUTE
1	13dB
2	34dB
3	46dB

<i><MicInputGain></i>	<i>Description</i>
0	MUTE
1	13dB
2	25dB
3	34dB
4	46dB

<i><TxAGCGain></i>	<i>Description</i>
0	0dB
1	3dB
2	6dB

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<i><Volume>, <MaxVolume></i>	<i>Description</i>
0	MUTE
1-9	Volume levels 1-9

<i><MicPath>, <SpkPath></i>	<i>Description</i>
0	OFF
1	MUTE
2	Internal (using microphone/speaker)
3	External (using ATMS/AFMS)

<i><TxPCM>, <RxPCM></i>	<i>Description</i>
0	13bit PCM
1	16bit PCM

<i><HFAAlgorithm></i>	<i>Description</i>
0	No handsfree
1	Advanced handsfree
2	Switching handsfree
3	No handsfree handheld
4	No handsfree external

<i><LocalAudio></i>	<i>Description</i>
0	Local audio mode off
1	Local audio microphone/no speaker
2	Local audio no microphone/speaker
3	Local audio microphone/speaker

<i><TxGainLow></i>	<i>Description</i>
0	Tx gain normal
1	Tx gain -7dB

<i><MicVolt2V></i>	<i>Description</i>
0	Microphone voltage at 2.5V
1	Microphone voltage at 2V

<i><SideTone>, <NoiseRed>, <EchoCancel>, <AnalogRing></i>	<i>Description</i>
0	OFF
1	ON

Examples

```
AT*E2EAMS=?
*E2EAMS=(0-21,255)
OK
```

Current default profile is 0:

```
AT*E2EAMS?
*E2EAMS: 2,2,3,2,3,2,5,9,3,3,0,1,0,0,0,1,1,1,1,1,1
OK
```

Sets current profile with these settings:

```
AT*E2EAMS=0,2,1,2,0,0,2,5,9,2,2,0,1,0,0,0,1,1,0,0,1,1
OK
```

Sets TxPGA gain to 0dB:

```
AT*E2EAMS=1,2
OK
```

Turns analog ringing off:

```
AT*E2EAMS=20,0
OK
```

Save current profile to currently loaded profile in non-volatile memory:

```
AT*E2EAMS=255
OK
```

4.2 AT*E2APR M2M Audio Profile Manipulation

Description	Command	Possible Responses
Request operation with audio profile	AT*E2APR=<op>[,<prnum1>[,<prnum2>]]	<ul style="list-style-type: none"> • ERROR • OK • *E2APR: <TxPGA>,<RxPGA>,<SideToneGain>,<AuxInGain>,<MicInGain>,<TxAGC>,<Volume>,<MaxVolume>,<MicPath>,<SpkPath>,<TxPCM>,<RxPCM>,<HFAAlgorithm>,<LocalAudio>,<TxGainLow>,<MicVolt2V>,<SideTone>,<NoiseRed>,<EchoCancel>,<AnalogRing> • OK
Display currently set profile	AT*E2APR?	<ul style="list-style-type: none"> • *E2APR: current <prnum> • ERROR
Shows if the command is supported	AT*E2APR=?	<ul style="list-style-type: none"> • *E2APR: (list of supported <op>s), (list of supported <prnum1>s), (list of supported <prnum2>s) • ERROR

This command allows the manipulation and storage of the audio “profiles” stored in the MS. The requirement for the 2nd and 3rd parameters depend on the operation being carried out.

Using the command you can:

- Set one of the three audio profiles 0, 1 or 2 as the current profile. This will load the profile's settings from NVM and implement them.
- Read one of the audio profiles. The current settings for the profile number defined will be displayed.
- Copy all parameters from one profile into another.
- Reset any of the profiles. This will reinstate the factory defaults for the profile:
 - 0 is the handset profile,
 - 1 is the portable handsfree profile,
 - 2 is the car kit profile.
- Set a profile as the default profile on next power up.

<op>	Description
0	Set profile <prnum1> to set as current
1	Read profile <prnum1> settings
2	Copy profile <prnum1> to <prnum2>
3	Reset profile <prnum1> to factory default
4	Set default profile as <prnum1>. Will store this as default profile in NVM, and use it as default from next power on

<pnum1>, <pnum2>	Description
<u>0</u>	Profile 0 (Factory profile set for handset). Default
1	Profile 1 (Factory profile set for portable handsfree)
2	Profile 2 (Factory profile set for car kit)

Examples

```
AT*E2APR=?  
*E2APR= (0-4),(0-2),(0-2)  
OK
```

Current default profile is profile 0:

```
AT*E2APR?  
*E2APR: 0  
OK
```

Set audio profile now used to profile 1:

```
AT*E2APR=0,1  
OK
```

Audio profile 1 settings:

```
AT*E2APR=1,1  
*E2APR: 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0  
OK
```

Copy audio profile 1 to audio profile 2:

```
AT*E2APR=2,1,2  
OK
```

Reset audio profile 1 with factory default - this also resets the current audio paths to the new profile as 1 is currently used:

```
AT*E2APR=3,1  
OK
```

Sets profile number 1 as the default when module is powered on:

```
AT*E2APR=4,1  
OK
```


4.3 AT*EALR

Ericsson Audio Line Request

Description	Command	Possible Responses
Request the audio lines (ATMS,AFMS)	AT*EALR=<mode>[,<activation>[,<aud_status>]]	<ul style="list-style-type: none"> *EALR: <mode>, <activation>, <resp> OK ERROR
Show the current setting	AT*EALR?	*EALR: <mode>, <activation>, <resp>
Show list of supported parameters	AT*EALR=?	*EALR:(list of supported <mode>s, <activation>s and <aud_status>s parameters)

The AT*EALR command is used by accessories to request the ATMS and AFMS. The command includes two parameters; <mode> and <activation>. The <mode> parameter sets which audio lines are requested and the <activation> parameter is used to indicate if the accessory wants to be activated directly or not. Direct activation means the accessory gets the audio lines immediately if a call is established from the MS (i.e. keypad, voice recognition). If the accessory doesn't request direct activation, it has to indicate to the MS when it wants to get the audio lines (e.g. using AT commands).

The <audio status> parameter is used to demand the audio lines.

This command enables the unsolicited result code

*EALV:<mode>, <activation>, <resp> which is sent to the application when the module wants it to change audio state.

<mode >	Description
0	No request for ATMS or AFMS
1	Request ATMS and not AFMS
2	Request AFMS and not ATMS
3	Request ATMS and AFMS

<activation >	Description
0	Not direct activated audio accessory (e.g. cordless portable hands free)
1	Direct activated audio accessory (e.g. vehicle hands free)

<i><aud_status ></i>	<i>Description</i>
0	No change of the audio status
1	Audio hand over. Accessory hands over control of both the audio lines and the call to the phone
2	Audio demand. Accessory demands control of both the audio lines and the call

<i><resp ></i>	<i>Description</i>
0	Disable ATMS and AFMS
1	Enable ATMS and disable AFMS
2	Disable ATMS and enable AFMS
3	Enable ATMS and AFMS

4.4 AT*EAMS

Ericsson Audio Mode Selection

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Sets the audio mode for the application	AT*EAMS=<internal_voice_alg>[,<noise_reduction>[,<side_tone>[,<short_echo_canceling>[,<ATMS_gain>[,<class>[,<ATMS_sensitivity_deviation_from_class>[,<AFMS_sensitivity_deviation_from_class>]]]]]]]	<ul style="list-style-type: none"> • OK • ERROR
Show the current audio mode setting	AT*EAMS?	*EAMS:<internal_voice_alg>,<noise_reduction>,<side_tone>,<short_echo_canceling>,<AFMS_gain>,<class>,<ATMS_sensitivity_deviation_from_class>,<AFMS_sensitivity_deviation_from_class>
Show list of supported services	AT*EAMS=?	*EAMS: (list of supported <internal_voice_alg>s,<noise_reduction>s,<side_tone>s,<short_echo_canceling>s,<AFMS_gain>s,<class>s,<ATMS_sensitivity_deviation_from_class>s,<AFMS_sensitivity_deviation_from_class>s)

Set the Audio mode selection.

The command must be sent to the MS at the initialization of an audio accessory, but can also be sent later to change the audio mode selection. The command includes the following parameters:

- <internal_voice_alg> sets the voice-processing mode in the phone.

- <noise_reduction> sets the noise reduction functionality in the phone.
- <side_tone> activates the side tone functionality in the phone.
- <short_echo_canceling> sets the short echo canceling functionality in the phone.
- <ATMS_gain> indicates the gain of the signal that is sent to the phone.
- <class> indicates the Hands Free class. The class parameter is used to fine adjust some parameters in the internal voice algorithm.
- <ATMS_sensitivity_deviation_from_class> indicates the ATMS sensitivity deviation from a given class. This parameter is used, for example if an HF product of a certain class has a new microphone that is more sensitive than the old one.
- <AFMS_sensitivity_deviation_from_class> indicates the AFMS sensitivity deviation from a given class. This parameter is used, for example if an HF product of a certain class has a new speaker that is more sensitive than the old one.

Note! The last three parameters in this command (i.e. <class>, <ATMS_sensitivity_deviation_from_class>, <AFMS_sensitivity_deviation_from_class>) are included to give the internal voice algorithm additional information to perform optimally. It is up to the MS to decide how this additional information is used.

<i><internal_voice_alg></i>	<i>Description</i>
0	None
1	Semi Duplex
2	Full Duplex (Note! the internal hands free algorithm in the MS contains echo cancelling)

<i><noise_reduction></i>	<i>Description</i>
0	Off
1	On

<i><side_tone></i>	<i>Description</i>
0	Off
1	On

<i><short_echo_canceling></i>	<i>Description</i>
0	Off
1	On

<i><ATMS_gain></i>	<i>Description</i>
0	Normal (0 dB) (internal voice processing)
1	12 dB from accessory (external voice processing). Not supported

<i><Class></i>	<i>Description</i>
0	None
1	Low end, class reference Hector
2	Mid End, class reference Scott
3	High End, class reference Hasse
4	Large room, class reference Office Hands free. Not supported

<i><ATMS_sensitivity_deviation_from_class></i> , <i><AFMS_sensitivity_deviation_from_class></i>	<i>Description</i>
0	0 dB
1	2,5 dB
2	-2,5 dB
3	5,0 dB
4	-5,0 dB

4.5 AT*EARS

Ericsson Audio Ring Signal

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request analogue ring signal in the loudspeaker	AT*EARS=<mode>	<ul style="list-style-type: none"> • OK • ERROR
Show the current mode setting	AT*EARS?	*EARS: <mode>
Show list of supported modes	AT*EARS=?	*EARS: (list of supported <mode>s)

Used to enable an analogue ring signal as indication of an incoming call in an external loudspeaker (AFMS). The <mode> parameter activates and deactivates the service.

<i><mode ></i>	<i>Description</i>
0	Disable analogue ring signal
1	Enable analogue ring signal

4.6 AT*E2PHFB *Portable Handsfree Button Sense Enable*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set PHF functionality	AT*E2PHFB=<op>	<ul style="list-style-type: none"> • ERROR • OK
Display current setting	AT*E2PHFB?	*E2PHFB: <op>
Show if the command is supported	AT*E2PHFB=?	<ul style="list-style-type: none"> • *E2PHFB: (list of supported <op>s) • ERROR

This command allows the user to set the functionality for a PHF (portable handsfree) button, as used on simple handsfree equipment. When set to ON, the MS will detect the shortcircuit of the ATMS and AFMS lines, and interpret this as a PHF button press. This has the effect of answering/hanging up a call without recourse to AT commands.

<i><op></i>	<i>Description</i>
<u>0</u>	Disable PHF button. Default setting
1	Enable PHF button

4.7 AT*ELAM *Ericsson Local Audio Mode*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set local audio mode	AT*ELAM=<mic>[,<loudspeaker>]	<ul style="list-style-type: none"> • *ELAM: <mic>,<loudspeaker> • OK • ERROR
Show the current service setting	AT*ELAM?	*ELAM: <mic>,<loudspeaker>
Show list of supported parameters	AT*ELAM=?	*ELAM: (list of supported <mic>s and <loudspeaker>s parameters)

Used to route the microphone and/or the loudspeaker signal to the system bus. This function is used when the audio information is to be communicated over the system bus rather than the GSM radio. This functionality can be used by an MC link accessory that communicates with a PSTN adapter.

<i><mic></i>	<i>Description</i>
0	Off
1	Microphone analogue
2	Microphone digital. Not supported

<i><loudspeaker></i>	<i>Description</i>
0	Off
1	Loudspeaker analogue
2	Loudspeaker digital. Not supported

4.8 AT*EMIC

Ericsson Microphone Mode

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Enables/disables the phone microphone	AT*EMIC=<mode>	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Test if the command is supported, show supported values	AT*EMIC=?	<ul style="list-style-type: none"> *EMIC: (list of supported <mode>s) +CME ERROR: <err> OK ERROR
Read the current settings	AT*EMIC?	<ul style="list-style-type: none"> *EMIC: <mode> +CME ERROR: <err> OK ERROR

The command enables/disables the microphone in the module. The microphone should be enabled for each new call, even if it was disabled for the previous call.

<i><mode></i>	<i>Description</i>
0	Microphone is disabled (off)
1	Microphone is enabled (on)

4.9 AT*EMIR

Ericsson Music Mute Indication Request

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request for mute indications	AT*EMIR=<mode>	<ul style="list-style-type: none"> OK ERROR
Show supported message types along with the current service setting	AT*EMIR?	*EMIR: <mode>,<resp>
Show list of supported services	AT*EMIR=?	*EMIR: (list of supported <mode>s)

This command is used to request music mute indications.

A music mute indication is sent to all accessories that have requested the indication when an incoming event (a phone call, an SMS, an e-mail etc.), with an associated audio prompt (beep, melody, etc.), is received by the phone or an internal event such as a calendar event, with an associated audio prompt occurs.

The music mute indication is also sent out when the voice recognition mechanism is activated. The only exception to this is when the Magic Word function is active, as the ASR is then capable of recognising a (predefined) keyword despite background noise.

After the event (when the call has been disconnected, the “new mail” signal has sounded etc.), or when the voice recognition mechanism is deactivated, a new music mute indication with the <resp> parameter set to zero is sent.

Note! The phone shall send the system sound that corresponds to the incoming event (phone conversation, “new mail” signal etc.) over the system bus.

<i><mode ></i>	<i>Description</i>
0	Off, music mute indication result codes will not be sent to the accessory
1	On, music mute indication result codes will be sent to the accessory

<i><resp ></i>	<i>Description</i>
0	Music mute inactive
1	Music mute active

4.10 AT*EPRR *Ericsson Personal Ring Type Read*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Read phone number and ring type	AT*EPRR=<indexr>	<ul style="list-style-type: none"> *EPRR: <indexr>,<number>,<type>,<sound type> +CME ERROR <err> OK ERROR
Show if the command is supported	AT*EPRR=?	<ul style="list-style-type: none"> *EPRR: (list of supported <indexr>s) +CME ERROR <err> OK ERROR

Returns phone number, phone number type and sound type in location number <indexr>. If listing fails an error, +CME ERROR: <err>, is returned.

<i><indexr></i>	<i>Description</i>
1-50	Value of location number

<i><number></i>	<i>Description</i>
string type	Phone number of format <type>

<i><type></i>	<i>Description</i>
integer format	Type of address octet (refer GSM 04.08 [4] section 10.5.4.7)
128	Unknown numbering plan, national / international number unknown
129	ISDN / telephony numbering plan, national / international unknown
145	ISDN / telephony numbering plan, international number
161	ISDN / telephony numbering plan, national number
128 - 255	Other values refer GSM 04.08 [4] section 10.5.4.7

<i><sound type></i>	<i>Description</i>
0	Off. Not supported
1	Low ring signal
2	Medium ring signal
3	High ring signal
4	Mixed ring signal

<i><sound type></i>	<i>Description</i>
5	Beep. Not supported
6	Alarm. Not supported
7	Calendar Tone. Not supported
8	Calendar Click. Not supported
9-10	Reserved. Not supported
11	Melody 1
12-20	Melody 2. Melody 10 reserved for pre-set melodies
21-30	Reserved for melody 11-20. Not supported
31-38	Own melody 1-8
39-50	Reserved for own melodies. Not supported

4.11 AT*EPRW *Ericsson Personal Ringtype Write*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request Personal Ringtype Write command	AT*EPRW=<indexr>,<number>,[<type>],<soundtype>	<ul style="list-style-type: none"> +CME ERROR <err> OK ERROR
Show if the command is supported	AT*EPRW=?	<ul style="list-style-type: none"> *EPRW: (list of supported <indexr>s),<nlength>,(list of supported <type>s),(list of supported <sound type>s) +CME ERROR <err> OK ERROR

Writes phone number, phone number type and sound type in location number <indexr>. It is possible to use wild cards for phone number by substituting the digits with question marks. If writing fails an error, +CME ERROR: <err>, is returned.

If all parameters but <indexr> are omitted, the personal ring type at position <indexr> will be deleted.

<i><indexr></i>	<i>Description</i>
1-50	Value of location number. The location number must be free. If the given location number is not free, ERROR is returned

<i><number></i>	<i>Description</i>
string type	phone number of format <type>

<i><type></i>	<i>Description</i>
Integer format	Type of address octet (refer to GSM 04.08 [4] section 10.5.4.7)
128	Unknown numbering plan, national/international number unknown
129	ISDN/telephony numbering plan, national/international number unknown
145	ISDN/telephony numbering plan, international number
161	ISDN/telephony numbering plan, national number
128 - 255	Other values refer to GSM 04.08 [4] section 10.5.4.7

<i><nlength></i>	<i>Description</i>
integer type	Value indicating the maximum length of field <number>

<i><sound type></i>	<i>Description</i>
0	Off. Not supported
1	Low ring signal
2	Medium ring signal
3	High ring signal
4	Mixed ring signal
5	Beep. Not supported
6	Alarm. Not supported
7	Calendar Tone. Not supported
8	Calendar Click. Not supported
9-10	Reserved. Not supported
11	Melody 1
12-30	Melody 2. Melody 20 reserved for pre-set melodies
31-38	Own melody 1-8
39-50	Reserved for own melodies. Not supported

4.12 AT*ERIL

Ericsson Ring Level Set

Description	Command	Possible Responses
Sets ring volume for the ring signals used for incoming voice (L1 and L2), fax and data calls	AT*ERIL=<volume>[,<c all type> [,<place>]]	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Read the settings of volume for the ring signals	AT*ERIL?	<ul style="list-style-type: none"> *ERIL: <volume1>[,<call type1> [,<place1>] [<CR><LF>... *ERIL: <volume n>[, <call type n> [,<place n>]]]] +CME ERROR: <err> OK ERROR
Test if the command is supported	AT*ERIL=?	<ul style="list-style-type: none"> *ERIL: (list of supported <volume>s)[,(list of supported <call type>s) [,(list of supported <place>s)]] +CME ERROR: <err> OK ERROR

Used to set the volume for the ring signals used for incoming voice, Line 1, Line 2, fax and data calls. The parameter <place> controls the ring level set for different types of modes. The signal volume is specified as “step”, with an increasing volume for each signal, or as a selected level.

Line 1 is the default for <call type> if the parameter is not given.

<volume>	Description
0	Off
1-6	Volume setting, not increasing ring
129-134	Volume setting, increasing ring

<calltype>	Description
1	Line 1
2	Line 2
3	Fax
4	Data
5	Alarm. Not supported

<i><place></i>	<i>Description</i>
0	Hand held
1	Car mounted

4.13 AT*ERIN

Ericsson Ring Set

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Sets ring type for incoming voice (L1 and L2), fax and data calls and alarm	AT*ERIN= <sound type>, [<call type>]	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read the settings of ring type and volume for the call types	AT*ERIN?	<ul style="list-style-type: none"> • *ERIN: <sound type1>,<call type1> [<cr><lf>... <sound="" *erin:="" li="" n>,<call="" n>]<="" type=""> • +CME ERROR: <err> • OK • ERROR </cr><lf>...>
Test if the command is supported	AT*ERIN=?	<ul style="list-style-type: none"> • *ERIN: list of supported <sound type>s, list of supported <call type>s • +CME ERROR: <err> • OK • ERROR

Used to set sound for incoming voice, line L1 and L2, fax, data calls and alarm. For each of the incoming call types and alarm: voice on line 1, voice on line 2, fax calls and data calls and alarm a sound type is selected.

The type of sound is either a ring signal, selected from a predefined set, a melody, selected from a predefined set, or an own melody, selected from a set specified by the user.

Line 1 is the default for <call type> if the parameter is not given.

<i><call type></i>	<i>Description</i>
1	Line 1
2	Line 2
3	Fax
4	Data
5	Alarm

<i><sound type></i>	<i>Description</i>
0	Off. Not supported
1	Low ring signal
2	Medium ring signal
3	High ring signal
4	Mixed ring signal
5	Beep. Not supported
6	Alarm. Not supported
7	Calendar Tone. Not supported
8	Calendar Click. Not supported
9-10	Reserved. Not supported
11-20	Melody 1. Melody 10 reserved for preset melodies
21-30	Reserved. Not supported
31-38	Own melodies 1-8
39-5	Reserved for own melodies. Not supported

4.14 AT*ERIP

Ericsson Ring Signal Playback Command

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Plays the selected sound type at specified volume level	AT*ERIP = <volume>,<sound type>	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT*ERIP=?	<ul style="list-style-type: none"> • *ERIP: (list of supported <volume>s),(list of supported <sound type>s) • OK • ERROR

Used to play one of the sound types which are available as ring signals/message signals on the module. The signal volume may not be chosen as “step”; with an increasing volume for each signal. If value 1 is chosen for parameter <volume>, nothing should happen. Signal volume may be chosen as a selected level.

<i><volume></i>	<i>Description</i>
0	Off
1	Step. Not Supported
2-n	Volume setting

Refer to the AT*ERIN command for the <sound type> parameter.

4.15 AT*ESMA Ericsson Set Message Alert Sound

Description	Command	Possible Responses
Sets the answer mode settings in the MS	AT*ESAM=<mode>	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Read the current setting	AT*ESAM?	<ul style="list-style-type: none"> *ESAM: <mode> +CME ERROR: <err> OK ERROR
Test if the command is supported	AT*ESAM=?	<ul style="list-style-type: none"> *ESAM: list of supported <mode>s +CME ERROR: <err> OK ERROR

<mode >	Description
0	Answer mode is not set to "Any key", or "Auto" (off)
1	Any Key mode on
2	Auto mode on

4.16 AT*ESOM Ericsson Settings Own Melody

Description	Command	Possible Responses
Sets the own melodies in the MS	AT*ESOM=[<melody index>], <melody string>	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Shows the current settings, i.e. the currently stored melodies	AT*ESOM?	<ul style="list-style-type: none"> *ESOM: <melody index>, <melody string 1>, <CR><LF>.....*ESOM: <melody index>, <melody string n> +CME ERROR: <err> OK ERROR
Shows if the command is supported	AT*ESOM=?	<ul style="list-style-type: none"> *ESOM: (list of supported <melody index>),(list of supported <pause>s),(list of supported <prefix>s),(list of supported <tone>s), <mlength>,<mtones> +CME ERROR: <err> OK ERROR

Sets the user defined own melodies in the MS. The <prefix> and <tone> indicates together the tone frequency and duration. The <pause> sets a pause between tones.

Test command returns the possible values of <melody index>, <pause>, <prefix>, <tone>, <mlength> and <mtones>.

<i><melody index></i>	<i>Description</i>
1-4	Melody 1 – 4. Default setting: 1

<i><melody string></i>	<i>Description</i>
string	A sequence of <tones> and <pause> entries. The <tones> may be preceded by one or two <prefix>(s)

<i><pause></i>	<i>Description</i>
p	Pause

<i><prefix></i>	<i>Description</i>
#	Half tone higher
(b)	Half tone lower
+	One octave higher

<i><tones></i>	<i>Description</i>
c,d,e,f,g,a,b	Short tones
C,D,E,F,G,A,B	Long tones

<i><mtones></i>	<i>Description</i>
integer	Indicating the maximum number of tones in a melody

<i><mlength></i>	<i>Description</i>
integer	Indicating the maximum length of <melody string>

4.17 AT*EXVC *Ericsson SET External Volume Control*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Sets the maximum volume level on the audio lines	AT*EXVC=<external volume>	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported and show the possible report settings	AT*EXVC=?	<ul style="list-style-type: none"> • *EXVC: (list of supported <external volume>s) • +CME ERROR: <err> • OK • ERROR
Read the current setting	AT*EXVC?	<ul style="list-style-type: none"> • *EXVC: <external volume> • +CME ERROR: <err> • OK • ERROR

Used to set or query whether an external accessory such as the vehicle handsfree controls the audio volume.

By default, the <external volume> is turned off, i.e. the volume over AFMS is controlled by the phone MMI.

The set command is effective only as long as the phone senses that it is connected to an external accessory that has issued the command. Once the phone and the accessory are disconnected the <external volume> setting returns to default.

<i><external volume></i>	<i>Description</i>
0	The phone MMI controls audio volume over AFMS
1	Audio volume over AFMS is output at maximum level that is no clipping occurs. An external accessory such as a vehicle kit controls the actual volume level heard by the user

4.18 ATM

Monitor Speaker Control

<i>Description</i>	<i>Syntax</i>	<i>Possible Responses</i>
Set monitor speaker control	ATM[=][<speaker>]	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	ATM?	M: <speaker>
Show if the command is supported	ATM=?	M: (list of supported <speaker>s)

Define the activity of the speaker. This command is ignored by the modem and is only included for compatibility.

<i><speaker></i>	<i>Description</i>
<u>0</u>	Off during the entire call. Default value
1-3	Different "on" modes

5. Data - CSD/HSCSD

5.1 AT+CBST *Select Bearer Service Type*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Select bearer service type	AT+CBST=[<speed>,<name>,<ce>]]	<ul style="list-style-type: none"> • OK • ERROR
Read the command	AT+CBST?	<ul style="list-style-type: none"> • +CBST: <speed>,<name>,<ce> • OK • ERROR
Test if the command is supported	AT+CBST=?	<ul style="list-style-type: none"> • +CBST: (list of supported <speed>s,list of supported <name>s, list of supported <ce>s) • OK • ERROR

Selects the bearer service <name> with data rate <speed>, and the connection element <ce> to be used when data calls are originated. Values may also be used during mobile terminated data call setup, especially in the case of single numbering scheme calls.

Test command returns values supported by the TA as compound values.

<i><speed></i>	<i>Description</i>
0	Auto selection of baud rate
4	2400bps V.22bis
6	4800bps V.32
7	9600bps V.32
12	9600bps V.34
14	14400bps V.34
15	19200bps V.34
16	28800bps V.34
68	2400bps V.110 (ISDN)
70	4800bps V.110 (ISDN)
71	9600bps V.110 (ISDN)
75	14400bps V.110 (ISDN)

<i><speed></i>	<i>Description</i>
79	19200bps V.110 (ISDN)
80	28800bps V.110 (ISDN)
81	38400bps V.110 (ISDN)
82	48000bps V.110 (ISDN)
83	56000bps V.110 (ISDN)

<i><name></i>	<i>Description</i>
0	Asynchronous connection (UDI or 3.1kHz modem)
1	Data circuit synchronous (UDI or 3.1kHz modem). Not supported
2	PAD Access (Asynchronous) (UDI). Not supported
3	Packet access (synchronous) (UDI). Not supported
4	Data circuit asynchronous (RDI). Not supported
5	Data circuit synchronous (RDI). Not supported
6	PAD Access (Asynchronous) (RDI). Not supported
7	Packet access (synchronous) (RDI). Not supported

<i><ce></i>	<i>Description</i>
0	transparent. Not supported
1	Non transparent
2	Both, transparent preferred. Not supported
3	Both, non-transparent preferred. Not supported

5.2 AT+CRLP *Radio Link Protocol*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set radio link protocol	AT+CRLP=[<iws>[,<mws>[,<T1>[,<N2>[,<ver>[,<T4>]]]]]]	<ul style="list-style-type: none"> • OK • ERROR
Read the command	AT+CRLP?	<ul style="list-style-type: none"> • +CRLP: <iws>,<mws>,<T1>,<N2>[,<ver1>[,<T4>]] [<CR><LF> • +CRLP: <iws>,<mws>,<T1>,<N2>[,<ver2>[,<T4>]] [...] • OK • ERROR
Test if the command is supported	AT+CRLP=?	<ul style="list-style-type: none"> • +CRLP: (list of supported <iws>s), (list of supported <mws>s), (list of supported <T1>s), (list of supported <N2>s)[,<ver1>[, (list of supported <T4>s)]] [<CR><LF>+CRLP: (list of supported <iws>s), (list of supported <mws>s), (list of supported <T1>s), (list of supported <N2>s)[,<ver2>[, (list of supported <T4>s)]] [...] • OK • ERROR

Radio link protocol (RLP) parameters used when non-transparent data calls are originated may be altered with this command. Available command subparameters depend on the RLP versions implemented by the device (e.g. <ver> may not be available if device supports only versions 0 and 1).

Note! If radio link protocol is not used, but some other error correcting protocol (for transparent data calls), V.25ter [4] Error Control Selection test command +ES=? may be used to indicate the presence of the protocol.

Read command returns current settings for each supported RLP version <verx>. Only RLP parameters applicable to the corresponding <verx> are returned.

Test command returns values supported by the TA as a compound value. If ME/TA supports several RLP versions <verx>, the RLP parameter value ranges for each <verx> are returned in a separate line.

<i><iws></i>	<i>Description</i>
120 0 - 496	IWF to MS window size

<i><mws></i>	<i>Description</i>
$\frac{120}{0 - 496}$	MS to IWF window size
<i><T1></i>	<i>Description</i>
$\frac{48}{38 - 100}$	Acknowledgment timer T1 (*10ms)
<i><N2></i>	<i>Description</i>
$\frac{6}{0 - 255}$	Re-transmission attempts N2
<i><T4></i>	<i>Description</i>
$\frac{5}{3 - 255}$	Re-sequencing period T4 (*10ms)
<i><ver></i>	<i>Description</i>
Integer	RLP version. When version indication is not present, <ver>=0 is assumed

6. Data - GPRS

6.1 AT+CGACT PDP Context Activate or Deactivate

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Activate or deactivate the specified PDP context(s)	+CGACT=[<state> [,<cid>[,<cid>[...]]]]	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read the command	+CGACT?	<ul style="list-style-type: none"> • +CGACT: <cid>, <state>[<CR><LF>+CGACT: <cid>, <state>[...]] • OK • ERROR
Test if the command is supported	+CGACT=?	<ul style="list-style-type: none"> • +CGACT: (list of supported <state>s) • OK • ERROR

Used to activate or deactivate the specified PDP context(s).

After the command has completed, the MS remains in V.250 command state. If the MS is already in the requested state, the command is ignored and OK is returned. If the requested state cannot be achieved, ERROR or +CME: ERROR is returned. If the MS is not attached to the GPRS service when the activation form of the command is executed, the MS first performs a GPRS attach and then attempts to activate the specific contexts.

If no <cid>s are specified the activation form of the command activates all defined contexts.

If no <cid>s are specified the deactivation form of the command deactivates all active contexts.

<i><state></i>	<i>Description</i>
0	PDP context activation deactivated
1	PDP context activation activated

<i><cid></i>	<i>Description</i>
Integer type	A numeric parameter which specifies a specific PDP context definition

6.2 AT+CGATT GPRS Attach or Detach

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Attach or detach MS to the GPRS/packet domain/packet domain service	+CGATT=[<state>]	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read the command	+CGATT?	<ul style="list-style-type: none"> • +CGATT: <state> • OK • ERROR
Test if the command is supported	+CGATT=?	<ul style="list-style-type: none"> • +CGATT: (list of supported <state>s) • OK • ERROR

Used to attach the MS to, or detach the MS from, the GPRS/packet domain service. After the command has completed, the MS remains in V.250 command state. If the MS is already in the requested state, the command is ignored and the OK response is returned. If the requested state cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses (enabled by the +CMEE command) are listed in subclause 1.2.3.

Any active PDP contexts will be automatically deactivated when the attachment state changes to detached.

Note! This command has the characteristics of both the V.250 action and parameter commands. Hence it has the read form in addition to the execution/set and test forms.

<i><state></i>	<i>Description</i>
0	Detached
1	Attached

6.3 AT+CGDATA Enter Data State

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Establish GPRS/packet domain connection	+CGDATA=[<L2p>,[cid [,cid>[...]]]]	<ul style="list-style-type: none"> • CONNECT • ERROR • OK • ERROR
Test if the command is supported	+CGDATA=?	<ul style="list-style-type: none"> • +CGDATA: (list of supported <L2P>s) • OK • ERROR

Causes the MS to perform whatever actions are necessary to establish communication between the TE and the network using one or more GPRS/packet domain PDP types. This may include performing a GPRS/packet domain attach and one or more PDP context activations.

<i><L2P></i>	<i>Description</i>
PPP	Point-to-point protocol for a PDP such as IP
M-xxxx	Manufacturer specific protocol (xxx is an alphanumeric string)

6.4 AT+CGDCONT Define PDP Context

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Select PDP context parameters	+CGDCONT=[<cid> [,<PDP_type> [,<APN> [,<PDP_addr> [,<d_comp> [,<h_comp> [,<pd1> [... [,pdN]]]]]]]]]]	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Read the command	+CGDCONT?	<ul style="list-style-type: none"> +CGDCONT: <cid>, <PDP_type>, <APN>, <PDP_addr>, <d_comp>, <h_comp> [, <pd1> [, ... [, pdN]]] [<CR><LF>+CGDCONT: <cid>, <PDP_type>, <APN>, <PDP_addr>, <d_comp>, <h_comp> [, <pd1> [, ... [, pdN]]] [...]] OK ERROR
Test if the command is supported	+CGDCONT=?	<ul style="list-style-type: none"> +CGDCONT: (range of supported <cid>s), <PDP_type>, ..., (list of supported <d_comp>s), (list of supported <h_comp>s) [, (list of supported <pd1>s) [, ... [, (list of supported <pdN>s)]]] [<CR><LF>+CGDCONT: (range of supported <cid>s), <PDP_type>, ..., (list of supported <d_comp>s), (list of supported <h_comp>s) [, (list of supported <pd1>s) [, ... [, (list of supported <pdN>s)]]] [...]] OK ERROR

Specifies PDP context parameter values for a PDP context identified by the (local) context identification parameter, <cid>.

<i><cid></i>	<i>Description</i>
Integer type	(PDP Context Identifier) a numeric parameter which specifies a particular PDP context definition. The parameter is local to the TE-MS interface and is used in other PDP context-related commands. The range of permitted values (minimum value = 1) is returned by the test form of the command
1-10	Supported values. Ericsson specific

<i><PDP_type></i>	<i>Description</i>
X25	ITU-T/CCITT X.25 layer 3. Not supported
IP	Internet Protocol (IETF STD 5)
OSPIH	Internet Hosted Octet Stream Protocol. Not supported
PPP	Point to Point Protocol (IETF STD 51). Not supported

<i><APN></i>	<i>Description</i>
String type	(Access Point Name) a string parameter which is a logical name that is used to select the GGSN or the external packet data network. If the value is null or omitted, then the subscription value will be requested

<i><PDP_address></i>	<i>Description</i>
String type	A string parameter that identifies the MS in the address space applicable to the PDP. If the value is null or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested

<i><d_comp></i>	<i>Description</i>
0	PDP data compression OFF
1	PDP data compression ON
2..255	Reserved

<i><h_comp></i>	<i>Description</i>
0	PDP header compression OFF
1	PDP header compression ON
2..255	Reserved

<i><pdN></i>	<i>Description</i>
String type	Zero to N string parameters whose meanings are specific to the <i><PDP_type></i>

6.5 AT+CGEREP GPRS Event Reporting

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set command	+CGEREP=[<mode>[,<bfr>]]	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read the command	+CGEREP?	<ul style="list-style-type: none"> • +CGEREP: <mode>,<bfr> • OK • ERROR
Test if the command is supported	+CGEREP=?	<ul style="list-style-type: none"> • +CGEREP: (list of supported <mode>s),(list of supported <bfr>s) • OK • ERROR

Enables or disables the sending of unsolicited result codes, +CGEV: XXX from MS to TE in the case of certain events occurring in the GPRS/packet domain MS or the network.

<i><mode></i>	<i>Description</i>
0	Buffer unsolicited result codes in the MS. No codes are forwarded to the TE
1	Discard unsolicited result codes when MS-TE link is reserved; otherwise forward them directly to the TE

<i><bfr></i>	<i>Description</i>
0	MS buffer of unsolicited result codes defined within this command is cleared when <mode> 1 or 2 is entered

6.6 AT+CGPADDR Show PDP Address

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Show PDP addresses for specified CIDs	+CGPADDR=[<cid> [,<cid> [...]]]	<ul style="list-style-type: none"> +CGPADDR: <cid>,<PDP_addr> [<CR><LF>+CGPADDR: <cid>,<PDP_addr> [...]] OK ERROR
Test if the command is supported	+CGPADDR=?	<ul style="list-style-type: none"> +CGPADDR: (list of defined <cid>s) OK ERROR

Returns a list of PDP addresses for the specified context identifiers. The test command returns a list of defined <cid>s.

<i><cid></i>	<i>Description</i>
Integer type	Parameter which specifies a particular PDP context definition (see +CGDCONT command). If no <cid> is specified, the addresses for all defined contexts are returned

<i><PDP_address></i>	<i>Description</i>
String type	A string that identifies the MS in the address space applicable to the PDP. The address may be static or dynamic. For a static address, it will be the one set by the +CGDCONT and +CGDSCONT commands when the context was defined. For a dynamic address it will be the one assigned during the last PDP context activation that used the context definition referred to by <cid>. <PDP_address> is omitted if none is available

6.7 AT+CGQMIN Quality of Service Profile (Minimum Acceptable)

Description	Command	Possible Responses
Set minimum acceptable profile	+CGQMIN=[<cid> [,<precedence> [,<delay> [,<reliability> [,<peak> [,<mean>]]]]]]	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Read the command	+CGQMIN?	<ul style="list-style-type: none"> +CGQMIN: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>[<CR><LF>+CGQMIN: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>[...]] OK ERROR
Test if the command is supported	+CGQMIN=?	<ul style="list-style-type: none"> +CGQMIN: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s)[<CR><LF>+CGQMIN: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s)[...]] OK ERROR

Allows the TE to specify a minimum acceptable profile which is checked by the MS against the negotiated profile returned in the Activate PDP Context Accept message.

The set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. Since this is the same parameter that is used in the +CGDCONT command, the +CGQMIN command is effectively an extension to the +CGDCONT command. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

A special form of the set command, +CGQMIN= <cid> causes the minimum acceptable profile for context number <cid> to become undefined. In this case no check is made against the negotiated profile.

<cid>	Description
Integer type	Parameter which specifies a particular PDP context definition

<i><precedence></i>	<i>Description</i>
0	Subscribed (from network) value used
1	High priority
2	Normal priority
3	Low priority

<i><delay></i>	<i>Description</i>
0	Subscribed (from network) value used
1-4	Delay class

<i><reliability></i>	<i>Description</i>
0	Subscribed (from network) value used
1-5	Reliability class

<i><peak></i>	<i>Description</i>
0	Subscribed (from network) value used
1	Up to 1 000 (8 kbits/s)
2	Up to 2 000 (16 kbits/s)
3	Up to 4 000 (32 kbits/s)
4	Up to 8 000 (64 kbits/s)
5	Up to 16 000 (128 kbits/s)
6	Up to 32 000 (256 kbits/s)
7	Up to 64 000 (512 kbits/s)
8	Up to 128 000 (1 024 kbits/s)
9	Up to 256 000 (2 048 kbits/s)

<i><mean></i>	<i>Description</i>
0	Subscribed (from network) value used
1	Best effort
2	100 (~0.22 bits/s)
3	200 (~0.44 bits/s)
4	500 (~1.11 bits/s)
5	1 000 (~2.2 bits/s)
6	2 000 (~4.4 bits/s)
7	5 000 (~11.1 bits/s)

<i><mean></i>	<i>Description</i>
8	10 000 (~22 bits/s)
9	20 000 (~44 bits/s)
10	50 000 (~111 bits/s)
11	100 000 (~0.22 kbits/s)
12	200 000 (~0.44 kbits/s)
13	500 000 (~1.11 kbits/s)
14	1 000 000 (~2.2 kbits/s)
15	2 000 000 (~4.4 kbits/s)
16	5 000 000 (~11.1 kbits/s)
17	10 000 000 (~22 kbits/s)
18	20 000 000 (~44 kbits/s)
31	50 000 000 (~111 kbits/s)

6.8 AT+CGQREQ *Quality of Service Profile (Requested)*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set quality of service profile	+CGQREQ=[<cid> [,<precedence> [,<delay> [,<reliability> [,<peak> [,<mean>]]]]]]]	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read the command	+CGQREQ?	<ul style="list-style-type: none"> • +CGQREQ: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>[<CR><LF>+CGQREQ: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>[...]] • OK • ERROR
Test if the command is supported	+CGQREQ=?	<ul style="list-style-type: none"> • +CGQREQ: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s) [<CR><LF>+CGQREQ: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s)[...]] • OK • ERROR

Allows the TE to specify a quality of service profile that is used when the MS sends an activate PDP context request message to the network.

The set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. Since this is the same parameter that is used in the +CGDCONT command, the +CGQREQ command is effectively an extension to the +CGDCONT command. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

A special form of the set command, +CGQREQ= <cid> causes the requested profile for context number <cid> to become undefined.

<i><cid></i>	<i>Description</i>
Integer type	Parameter which specifies a particular PDP context definition

<i><precedence></i>	<i>Description</i>
0	Subscribed (from network) value used
1	High priority
2	Normal priority
3	Low priority

<i><delay></i>	<i>Description</i>
0	Subscribed (from network) value used
1-4	Delay class

<i><reliability></i>	<i>Description</i>
0	Subscribed (from network) value used
1-5	Reliability class

<i><peak></i>	<i>Description</i>
0	Subscribed (from network) value used
1	Up to 1 000 (8 kbits/s)
2	Up to 2 000 (16 kbits/s)
3	Up to 4 000 (32 kbits/s)
4	Up to 8 000 (64 kbits/s)
5	Up to 16 000 (128 kbits/s)
6	Up to 32 000 (256 kbits/s)
7	Up to 64 000 (512 kbits/s)
8	Up to 128 000 (1 024 kbits/s)
9	Up to 256 000 (2 048 kbits/s)

<i><mean></i>	<i>Description</i>
0	Subscribed (from network) value used
1	Best effort
2	100 (~0.22 bits/s)
3	200 (~0.44 bits/s)
4	500 (~1.11 bits/s)
5	1 000 (~2.2 bits/s)
6	2 000 (~4.4 bits/s)
7	5 000 (~11.1 bits/s)
8	10 000 (~22 bits/s)
9	20 000 (~44 bits/s)
10	50 000 (~111 bits/s)
11	100 000 (~0.22 kbits/s)
12	200 000 (~0.44 kbits/s)
13	500 000 (~1.11 kbits/s)
14	1 000 000 (~2.2 kbits/s)
15	2 000 000 (~4.4 kbits/s)
16	5 000 000 (~11.1 kbits/s)
17	10 000 000 (~22 kbits/s)
18	20 000 000 (~44 kbits/s)
31	50 000 000 (~111 kbits/s)

6.9 AT+CGREG GPRS Network Registration Status

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set command	AT+CGREG=[<n>]	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Read the current settings	AT+CGREG?	<ul style="list-style-type: none"> +CGREG: <n>,<stat>[,<lac>,<ci>] +CME ERROR: <err> OK ERROR
Test if the command is supported	AT+CGREG=?	<ul style="list-style-type: none"> +CGREG: (list of supported <n>s) OK ERROR

Controls the presentation of an unsolicited result code +CGREG: <stat> when <n>=1 and there is a change in the GPRS/packet domain network registration status of the MS, or code +CGREG: <stat>[,<lac>,<ci>] when <n>=2 and there is a change of the network cell.

Note! If the GPRS/Packet Domain MS also supports circuit mode services, the +CGREG command and +CGREG: result code apply to the registration status and location information for those services.

<i><n></i>	<i>Description</i>
0	Disable network registration unsolicited result code
1	Enable network registration unsolicited result code
2	Enable network registration and location information unsolicited result code

<i><stat></i>	<i>Description</i>
0	Not registered, MS is not searching for a new operator to register with
1	Registered, home network
2	Not registered, but MS is searching for a new operator to register with
3	Registration denied
4	Unknown
5	Registered, roaming

<i><lac></i>	<i>Description</i>
String type	Two byte location area code in hexadecimal format

<i><ci></i>	<i>Description</i>
String type	Two byte cell ID in hexadecimal format

6.10 AT+CGSMS Select Service for MO SMS Messages

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set service or service preference	+CGSMS=[<service>]	<ul style="list-style-type: none"> • OK • ERROR
Read the command	+CGSMS?	<ul style="list-style-type: none"> • +CGSMS: <service> • OK • ERROR
Test if the command is supported	+CGSMS=?	<ul style="list-style-type: none"> • +CGSMS: (list of available <service>s) • OK • ERROR

Used to specify the service or service preference that the MS will use to send MO SMS messages. The read command returns the currently selected service or service preference.

<i><services></i>	<i>Description</i>
0	GPRS/packet domain
1	Circuit switched
2	GPRS/packet domain preferred (use circuit switched if GPRS/packet domain not available)
3	Circuit switched preferred (use GPRS/packet domain if circuit switched not available)

7. Data - HSCSD

7.1 AT+CHSC HSCSD Current Call Parameters

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Show current HSCSD call parameters	AT+CHSC	<ul style="list-style-type: none"> +CHSC:<rx>,<tx>,<aiur>,<coding> +CME ERROR: <err> OK ERROR
Test if command is supported	AT+CHSC=?	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR

Returns information about the current HSCSD call parameters, i.e. the current number of receive and transmit timeslots, air interface user rate and channel coding.

<i><rx></i>	<i>Description</i>
0	No HSCSD call is active. See also note below
1	The number of receive timeslots currently in use is 1
2	The number of receive timeslots currently in use is 2
3	The number of receive timeslots currently in use is 3. Not supported
4	The number of receive timeslots currently in use is 4. Not supported

<i><tx></i>	<i>Description</i>
0	No HSCSD call is active. See also note below
1	The number of transmit timeslots currently in use is 1
2	The number of transmit timeslots currently in use is 2. Not supported
3	The number of transmit timeslots currently in use is 3. Not supported
4	The number of transmit timeslots currently in use is 4. Not supported

<i><aiur></i>	<i>Description</i>
0	No HSCSD call is active. See also note below.
1	Current air interface user rate is 9.6 kbits/s
2	Current air interface user rate is 14.4 kbits/s
3	Current air interface user rate is 19.2 kbits/s
4	Current air interface user rate is 28.8 kbits/s
5	Current air interface user rate is 38.4 kbits/s. Not supported
6	Current air interface user rate is 43.2 kbits/s. Not supported
7	Current air interface user rate is 57.6 kbits/s. Not supported

<i><coding></i>	<i>Description</i>
0	No HSCSD call is active. See also note
1	Current channel coding is 4.8 kbits/s (TCH/F4.8). Not supported
4	Current channel coding is 9.6 kbits/s (TCH/F9.6)
8	Current channel coding is 14.4 kbits/s (TCH/F14.4)

7.2 AT+CHSD

HSCSD Device Parameters

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Show HSCSD features supported by the ME/TA	AT+CHSD	<ul style="list-style-type: none"> +CHSD: <mclass>,<maxRx>,<maxTx>,<sum>,<codings> +CME ERROR: <err> OK ERROR
Test if command is supported	AT+CHSD=?	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR

Shows information about HSCSD features supported by the ME/TA.

<i><mclass></i>	<i>Description</i>
2	Multislot class is 2

<i><maxRx></i>	<i>Description</i>
2	Maximum number of receive timeslots that ME can use is 2

<i><maxTx></i>	<i>Description</i>
1	Maximum number of transmit timeslots that ME can use is 1

<i><sum></i>	<i>Description</i>
3	Total number of receive and transmit timeslots that ME can use at the same time is 3 (i.e. 2+1). The following applies in a HSCSD call: 2 (receive slots) + (transmit slots) <i><sum></i>
<i><codings></i>	<i>Description</i>
1	Indicates that the accepted channel coding for the next established non-transparent HSCSD call is 4.8 kbits/s only. Not supported
4	Indicates that the accepted channel coding for the next established non-transparent HSCSD call is 9.6 kbits/s only
5	Indicates that the accepted channel codings for the next established non-transparent HSCSD call are both 4.8 kbits/s and 9.6 kbits/s. Not supported
8	Indicates that the accepted channel coding for the next established non-transparent HSCSD call is 14.4 kbits/s only
12	Indicates that the accepted channel codings for the next established non-transparent HSCSD call are both 9.6 kbits/s and 14.4 kbits/s

7.3 AT+CHSN

HSCSD Non Transparent Call Configuration

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set HSCSD configuration. This command is also used during a call if new <i><wAiur></i> and/or <i><wRx></i> are/is desired	AT+CHSN=[<i><wAiur></i> [, <i><wRx></i> [, <i><topRx></i> [, <i><codings></i>]]]]	<ul style="list-style-type: none"> • +CME ERROR: <i><err></i> • OK • ERROR
Show current non-transparent HSCSD setting	AT+CHSN?	<ul style="list-style-type: none"> • +CHSN: <i><wAiur></i>, <i><wRx></i>, <i><topRx></i>, <i><codings></i> • +CME ERROR: <i><err></i> • OK • ERROR
Test if command is supported and show parameter ranges	AT+CHSN=?	<ul style="list-style-type: none"> • +CHSN: (list of supported <i><wAiur></i>s), (list of supported <i><wRx></i>s), (list of supported <i><topRx></i>s), (list of supported <i><codings></i>s) • +CME ERROR: <i><err></i> • OK • ERROR

Controls parameters for non-transparent HSCSD calls. Changing *<topRx>* or *<codings>* during a call does not affect the current call. Changing *<wAiur>* or *<wRx>* affects the current call only if *<topRx>* was non-zero when the call was established. When using the command

in this way it comes in the “action” command category. This is what is referred to as user initiated up- and down-grading in GSM 02.34 [4] and GSM 03.34 [7].

Note! Recommended value for parameter <speed> in AT+CBST [11] is 0.

<i><wAur></i>	<i>Description</i>
0	TA/ME shall calculate a proper number of receive timeslots from currently selected fixed network user rate (<speed> parameter from +CBST command, ref [11]) and <codings>, and <wRx> (or <maxRx> from +CHSD command if <wRx>=0) See note below.
1	Wanted air interface user rate is 9.6 kbit/s
2	Wanted air interface user rate is 14.4 kbit/s
3	Wanted air interface user rate is 19.2 kbit/s
4	Wanted air interface user rate is 28.8 kbit/s
5	Wanted air interface user rate is 38.4 kbit/s. Not supported
6	Wanted air interface user rate is 43.2 kbit/s. Not supported
7	Wanted air interface user rate is 57.6 kbit/s. Not supported

<i><wRx></i>	<i>Description</i>
0	TA/ME shall calculate a proper number of receive timeslots from currently selected <wAur> and <codings> See note below
1	Wanted number of receive timeslots is 1
2	Wanted number of receive timeslots is 2
3	Wanted number of receive timeslots is 3. Not supported
4	Wanted number of receive timeslots is 4. Not supported

<i><topRx></i>	<i>Description</i>
0	Indicates that the user is not going to change <wAur> and /or <wRx> during the next call
1	Top value for <wRx> that user is going to request during the next established non-transparent HSCSD call is 1
2	Top value for <wRx> that user is going to request during the next established non-transparent HSCSD call is 2
3	Top value for <wRx> that user is going to request during the next established non-transparent HSCSD call is 3. Not supported
4	Top value for <wRx> that user is going to request during the next established non-transparent HSCSD call is 4. Not supported

<i><codings></i>	<i>Description</i>
1	Indicates that the accepted channel coding for the next established non-transparent HSCSD call is 4.8 kbit/s only. Not supported
4	Indicates that the accepted channel coding for the next established non-transparent HSCSD call is 9.6 kbit/s only
5	Indicates that the accepted channel codings for the next established non-transparent HSCSD call are both 4.8 kbit/s and 9.6 kbit/s. Not supported
8	Indicates that the accepted channel coding for the next established non-transparent HSCSD call is 14.4 kbit/s only
12	Indicates that the accepted channel codings for the next established non-transparent HSCSD call are both 9.6 kbit/s and 14.4 kbit/s

7.4 AT+CHSR

HSCSD Parameters Report

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set HSCSD parameters reporting on or off	AT+CHSR=[<mode>]	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Show current setting	AT+CHSR?	<ul style="list-style-type: none"> • +CHSR: <mode> • +CME ERROR: <err> • OK • ERROR
Test if command is supported and show parameter range	AT+CHSR=?	<ul style="list-style-type: none"> • +CHSR: (list of supported <modes>s) • +CME ERROR: <err> • OK • ERROR

Sets the HSCSD parameter reporting on or off. If enabled, the intermediate result code +CHSR is activated.

<i><mode></i>	<i>Description</i>
0	Disable reporting
1	Enable reporting

7.5 AT+CHSU

HSCSD Automatic User Initiated Upgrading

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set HSCSD automatic user initiated upgrading on or off	AT+CHSU=[<mode>]	<ul style="list-style-type: none"> • OK • ERROR
Show current setting	AT+CHSU?	<ul style="list-style-type: none"> • +CHSU=<mode> • OK • ERROR
Test if command is supported and show parameter range	AT+CHSU=?	<ul style="list-style-type: none"> • +CHSU: (list of supported <modes>s) • OK • ERROR

Enables or disables the HSCSD automatic user-initiated upgrade.

<i><mode></i>	<i>Description</i>
0	Disable use of UP bit for upgrading
1	Enable use of UP bit for upgrading

8. Data - WAP

8.1 AT*EWBA Ericsson WAP Bookmark Add

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Add or delete a bookmark in the list of bookmarks	AT*EWBA=<bmix> [,<URL>[,<title>]]	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
List content of bookmark list	AT*EWBA?	<ul style="list-style-type: none"> *EWBA: <bmix1>,<URL1>,<title1>[<CR><LF>*EWBA: <bmix2>,<URL2>,<title2>[...]] +CME ERROR: <err> OK ERROR
Show if the command is supported.	AT*EWBA=?	<ul style="list-style-type: none"> *EWBA: (list of supported <bmix>s),<nURL>,<ntitle> +CME ERROR: <err> OK ERROR

This command adds or deletes a bookmark in the list of bookmarks.

To add a bookmark the <bmix> parameter should be set to 0. The bookmark is always added to the last position of the bookmark list.

If the <title> parameter is omitted the bookmark title is set to the first <ntitle> number of characters of the <URL>.

If the <URL> parameter exceeds <nURL> number of characters, the bookmark URL is truncated to the last '/' character among the last <nURL> number of characters.

To delete a bookmark from the list, the <bmix> parameter should be set to a value greater than 0. The <URL> and the <title> parameters must be omitted.

<i><bmix></i>	<i>Description</i>
0	Add the bookmark to the last position in the list of bookmarks. This value is only valid for adding bookmarks
1	Reserved. The index 1 is reserved for the bookmark to Ericsson Mobile Internet and should not be altered or deleted
2..25	Index to list of bookmarks. These values are only valid for deleting bookmarks

<i><URL></i>	<i>Description</i>
String type	The URL representing the bookmark

<i><nURL></i>	<i>Description</i>
Integer number	Maximum length of the <i><URL></i> -parameter

<i><title></i>	<i>Description</i>
String type	The title representing the bookmark. If omitted the bookmark title is set equal to the first <i><ntitle></i> number of characters of the <i><URL></i>

<i><ntitle></i>	<i>Description</i>
Integer number	Maximum length of the <i><title></i> -parameter

8.2 AT*EWBR

Ericsson WAP Bookmark Read

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Read bookmark in list of bookmarks	AT*EWBR=<bmix>	<ul style="list-style-type: none"> *EWBR: <URL>,<title> +CME ERROR: <err> OK ERROR
Show if the command is supported	AT*EWBR=?	<ul style="list-style-type: none"> *EWBR: (list of supported <bmix>s) +CME ERROR: <err> OK ERROR

This command reads a bookmark in the bookmark list.

<i><bmix></i>	<i>Description</i>
Integer type	Index to the bookmark in the bookmark list

<i><URL></i>	<i>Description</i>
String type	The URL representing the bookmark

<i><title></i>	<i>Description</i>
String type	The title representing the bookmark. If omitted the bookmark title is set equal to the URL

8.3 AT*EWCG *Ericsson WAP CSD Gateway*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set primary and secondary WAP gateway	AT*EWCG=<primsec>,<gateway>	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Read primary and secondary WAP gateway	AT*EWCG?	<ul style="list-style-type: none"> *EWCG: <primsec1>,<gateway1>[<CR><LF>*EWCG: <primsec2>,<gateway2>] +CME ERROR: <err> OK ERROR
Show if the command is supported	AT*EWCG=?	<ul style="list-style-type: none"> *EWCG: (list of supported <primsec>s),<ngateway> +CME ERROR: <err> OK ERROR

Sets the primary and secondary gateways for the WAP browser used when CSD is the preferred bearer. The gateways are either an IP address or a URL on the network where the gateway can be reached.

<i><primsec></i>	<i>Description</i>
1	Set primary gateway
2	Set secondary gateway. Not supported

<i><gateway></i>	<i>Description</i>
String type	Gateway address

<i><ngateway></i>	<i>Description</i>
Integer type	Maximum length of gateway address

8.4 AT*EWCT *Ericsson WAP Connection Timeout*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set timeout for WAP download	AT*EWCT=<sec>	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read current setting	AT*EWCT?	<ul style="list-style-type: none"> • *EWCT: <sec> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EWCT=?	<ul style="list-style-type: none"> • *EWCT: (list of supported <sec>s) • +CME ERROR: <err> • OK • ERROR

Sets the timeout period used when connecting to a WAP supplier, i.e. the time the WAP browser will wait for a CSD call to be established.

<i><sec></i>	<i>Description</i>
Integer type	Number of seconds

8.5 AT*EWDT *Ericsson WAP Download Timeout*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set timeout for WAP download	AT*EWDT=<sec>	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read current setting	AT*EWDT?	<ul style="list-style-type: none"> • *EWDT: <sec> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EWDT=?	<ul style="list-style-type: none"> • *EWDT: (list of supported <sec>s) • +CME ERROR: <err> • OK • ERROR

This command sets the server response timeout period used when downloading a WAP page.

<i><sec></i>	<i>Description</i>
Integer type	Number of seconds

8.6 AT*EWHP *Ericsson WAP Homepage*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set URL to WAP homepage	AT*EWHP=<URL>	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Read URL to WAP homepage	AT*EWHP?	<ul style="list-style-type: none"> *EWHP: <URL> +CME ERROR: <err> OK ERROR
Show if the command is supported	AT*EWHP=?	<ul style="list-style-type: none"> *EWHP: <nURL> +CME ERROR: <err> OK ERROR

This command sets the homepage (i.e. the start page) for the WAP browser.

<i><URL></i>	<i>Description</i>
String type	The URL representing the homepage

<i><nURL></i>	<i>Description</i>
Integer number	Maximum length of the <URL>-parameter

8.7 AT*EWIL *Ericsson WAP Image Load*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Enable and disable image download in WAP browser	AT*EWIL=<onoff>	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Read setting for image download in WAP browser	AT*EWIL?	<ul style="list-style-type: none"> *EWIL: <onoff> +CME ERROR: <err> OK ERROR
Show if the command is supported	AT*EWIL=?	<ul style="list-style-type: none"> *EWIL: (list of supported <onoff>s) +CME ERROR: <err> OK ERROR

Enables and disables image download in the WAP browser.

<i><onoff></i>	<i>Description</i>
0	Disable image download
1	Enable image download

8.8 AT*EWLI *Ericsson WAP Login*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Setup user identity and password for WAP proxy	AT*EWLI=<user>,<password>	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Read user identity	AT*EWLI?	<ul style="list-style-type: none"> *EWLI: <user> OK ERROR
Show if the command is supported	AT*EWLI=?	<ul style="list-style-type: none"> *EWLI: <nuser>,<npassword> +CME ERROR: <err> OK ERROR

This command sets up user identity and password to be used for logging in to a WAP proxy; i.e. connecting to a WAP service provider.

<i><user></i>	<i>Description</i>
String type	User name for the WAP connection

<i><password></i>	<i>Description</i>
String type	Password for the WAP connection

<i><nuser></i>	<i>Description</i>
Integer number	Maximum length for username

<i><npassword></i>	<i>Description</i>
Integer number	Maximum length for password

8.9 AT*EWPA *Ericsson WAP Push Access Setting*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Sets the push access	AT*EWPA=<onoff>	<ul style="list-style-type: none"> • OK • +CME ERROR <err>
Reads the current settings	AT*EWPA?	*EWPA: <onoff>
Tests if the command is supported	AT*EWPA=?	<ul style="list-style-type: none"> • *EWPA: (list of supported <onoff>s) • +CME ERROR <err>

The command is used to decide if message push is allowed.

<i><onoff></i>	<i>Description</i>
0	Always ask
1	Message push disabled
2	Message push enabled

8.10 AT*EWPB *Ericsson WAP Preferred Bearer*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set preferred WAP carrier	AT*EWPB=<pbearer> [,<IA_index>]	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read preferred WAP carrier	AT*EWPB?	<ul style="list-style-type: none"> • *EWPB: <pbearer> [,<IA_index>] • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EWPB=?	<ul style="list-style-type: none"> • *EWPB: (list of supported <pbearer>s), (list of supported <IA_index>s) • +CME ERROR: <err> • OK • ERROR

This command sets the preferred bearer for WAP. If Internet account is chosen as the preferred bearer, the index of the Internet account to be used shall be sent as the second parameter: <IA_index>. If SMS is chosen as the preferred bearer a second parameter is ignored.

<i><pbearer></i>	<i>Description</i>
1	SMS
2	Not supported
3	Internet account

<i><IA_index></i>	<i>Description</i>
0	Always ask
1–65000	Index of Internet account to be used by the WAP browser

8.11 AT*EWPN *Ericsson WAP Profile Name*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set WAP profile name	AT*EWPN=<profile>,<name>	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
List WAP profile names	AT*EWPN?	<ul style="list-style-type: none"> *EWPN: <profile1>,<name1>,<lock_state>[<CR><LF>] *EWPN: <profile2>,<name2>,<lock_state>[...] +CME ERROR: <err> OK ERROR
Show if the command is supported	AT*EWPN=?	<ul style="list-style-type: none"> *EWPN: (list of supported <profile>s), <nlength>,(list of supported <lock_state>s) +CME ERROR: <err> OK ERROR

Sets the name of the profile defined by <profile>.

<i><profile></i>	<i>Description</i>
1	WAP settings profile number 1
2	WAP settings profile number 2
...	...
n	WAP settings profile number <i>n</i>

<i><name></i>	<i>Description</i>
String value	WAP profile name. Max length defined by <nlength>

<i><nlength></i>	<i>Description</i>
Integer value	Max length of WAP profile name

<i><lock_state></i>	<i>Description</i>
0	The profile is not locked
1	The profile is locked

8.12 AT*EWPR *Ericsson WAP Profile*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set active WAP profile	AT*EWPR=<profile>	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Query active WAP profile	AT*EWPR?	<ul style="list-style-type: none"> • *EWPR: <profile> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EWPR=?	<ul style="list-style-type: none"> • *EWPR: (list of supported <profile>s) • +CME ERROR: <err> • OK • ERROR

Selects active WAP settings profile.

<i><profile></i>	<i>Description</i>
1	WAP settings profile number 1
2	WAP settings profile number 2
...
n	WAP settings profile number <i>n</i>

9. GPS Interoperability

9.1 AT*EENMEA NMEA (GPS) Mode on UART2

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Enable NMEA commands on the UART	AT*EENMEA=<mode>	<ul style="list-style-type: none"> • OK • ERROR • +CME ERROR: <err>
Show the current setting	AT*EENMEA?	<ul style="list-style-type: none"> • *EENMEA:<mode> • +CME ERROR: <err>
Shows if the command is supported	AT*EENMEA=?	<ul style="list-style-type: none"> • *EENMEA: (list of supported <mode>s) • +CME ERROR: <err>

This command enables transmission of NMEA commands from UART1 to UART2 and vice versa. The module acts as a transparent link between the GPS device connected to UART2 and the application communicating with it on UART1.

When the application sends the command AT*EENMEA=2 the module is able to handle both AT and NMEA commands simultaneously. If the OK response is received the application can start handling both NMEA and AT commands. Otherwise the response ERROR is returned.

In the mode with simultaneous AT and NMEA commands, <CR> is required after each NMEA command and after the last AT command before the new NMEA. NMEA commands must start with a \$. All NMEA commands are forwarded to UART2. All NMEA responses from UART2 are displayed as responses to UART1 along with AT responses.

By sending AT*EENMEA=0, the application ends AT and NMEA commands, simultaneous handling mode. It sends OK, and then returns to AT mode.

The port rate of UART1 for NMEA commands can be controlled using the AT*NMPR command.

<i>Responses</i>	<i>Description</i>
OK	The requested action has been performed
ERROR	Following causes of error are considered: - incorrect syntax - NMEA commands have already been enabled in other 07.10 channels

<i><mode></i>	<i>Description</i>
<u>0</u>	Disable NMEA communication. Default
1	Enable NMEA communication in NMEA "only" mode. Not supported
2	Enable NMEA communication simultaneously with AT commands

9.2 AT*E2NMPR Ericsson M2M Set NMEA (GPS) Port Rate

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request operation to set data rate for GPS/NMEA Port	AT*E2NMPR=<pr>	<ul style="list-style-type: none"> • ERROR • OK
Displays current setting	AT*E2NMPR?	*E2NMPR: <pr>
Show if the command is supported	AT*E2NMPR=?	<ul style="list-style-type: none"> • *E2NMPR: (list of supported <pr>s) • ERROR

This command allows the user to set the physical Data rate for the GPS/NMEA port. The port rate will be set for the GPS/NMEA port only when NMEA is active - see AT*EENMEA.

<i><op></i>	<i>Description</i>
0	600 Baud rate
1	1200 Baud rate
2	2400 Baud rate
3	4800 Baud rate
<u>4</u>	9600 Baud rate. Default setting
5	19200 Baud rate
6	38400 Baud rate
7	57600 Baud rate
8	115200 Baud rate
9	230400 Baud rate
10	460800 Baud rate

Examples

```
AT*E2NMPR=?
*E2NMPR=(0,1,2,3,4,5,6,7,8,9,10)
OK
Port rate currently set:
```

AT*E2NMPR?

*E2NMPR: 4

OK

Set GPS/NMEA port rate to 4800 baud:

AT*E2NMPR=2

OK

10. Internet

10.1 AT*ENAD Ericsson Internet Account Define

Description	Command	Possible Responses
Define an Internet account	AT*ENAD=[<index>][,<name>,<userid>,<password>,<bearer>,(bearer_settings)] If <bearer>=0 (bearer_settings):=<dialup_nr>,<dial_type>,<data_rate> If <bearer>=1 (bearer_settings):=<pref_serv>,<pap_chap> If <bearer>=2 (bearer_settings):=<bt_device_address>	<ul style="list-style-type: none"> *ENAD:<index>[,<cid>] +CME ERROR <err>
Read the current settings	AT*ENAD?	*ENAD:list of <index>s with corresponding <name>,<userid>,<bearer> followed by the list of bearer dependent parameters If <bearer>=0 (bearer_settings):=<dialup_nr>,<dial_type>,<data_rate>,<lock_state> If <bearer>=1 (bearer_settings):=<pref_serv>,<pap_chap>,<cid>,<lock_state> If <bearer>=2 (bearer_settings):=<bt_device_address>,<lock_state> +CME ERROR <err>
Test if the command is supported	AT*ENAD=?	*ENAD:list of supported <index>s,max length of <name>,max length of <userid>,max length of <password>,(0),max length of ,list of supported <dial_type>s,list of supported <data_rate>s,list of supported <lock_state>s *ENAD:list of supported <index>s,max length of <name>,max length of <userid>,max length of <password>,(1),list of supported <pref_serv>s,list of supported <pap_chap>s,list of supported <lock_state>s *ENAD:list of supported <index>s,max length of <name>,max length of <userid>,max length of <password>,(2),max length of <bt_device_address>,<lock_state>s +CME ERROR <err>

This command is used for defining an Internet account.

<i><index></i>	<i>Description</i>
integer 1-65000	Each Internet account is given a unique index
<i><name></i>	<i>Description</i>
string (maximum of 20, 16-bit characters)	Each Internet account has a username
<i><userid></i>	<i>Description</i>
string (max 30 8-bit characters)	The user ID to be used when setting up the connection
<i><passwd></i>	<i>Description</i>
string (maximum of 30, 8-bit characters)	The passwd to be used when setting up the connection
<i><bearer></i>	<i>Description</i>
0	Circuit switched dial-up
1	Packet domain service
2	Bluetooth. Not supported
3	SMS. Not supported
<i><dialup_nr></i>	<i>Description</i>
string (max 30 8-bit characters)	The phone number to be used when setting up the connection
<i><dial_type></i>	<i>Description</i>
0	GSM data (CSD)
1	Digital (ISDN)

<i><data_rate></i>	<i>Description</i>
1	9600
2	14400
3	19200
4	28800

<i><cid></i>	<i>Description</i>
integer	ID number of a PDP context as defined in AT+CGDCONT (\$15)

<i><pref_serv></i>	<i>Description</i>
0	Automatic
1	Packet domain service only

<i><pap_chap></i>	<i>Description</i>
0	Normal: only PAP allowed
1	Secure: only CHAP allowed
2	None: no authentication scheme is used

<i><bt_device_address></i>	<i>Description</i>
48 bit IEEE address, six groups of two hexadecimal numbers separated by ":". E.g. "1A:3C:CD:33:1F:G8"	This parameter is used to set the Bluetooth device address for the Bluetooth connection being set up

<i><lock_state></i>	<i>Description</i>
0	The account is not locked
1	The account is locked

11. Identification

11.1 AT *Attention Command*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Checks the communication between the MS and application	AT	<ul style="list-style-type: none">• OK• +CME ERROR <err>

This command is used to determine the presence of an MS. If the MS supports AT commands, it returns an OK final result code.

11.2 AT&F *Set to Factory Defined Configuration*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Execute	AT&F	<ul style="list-style-type: none">• OK• ERROR
Execute	AT&F=<profile>	<ul style="list-style-type: none">• OK• ERROR
Show if supported and list available parameter range	AT&F=?	&F: (list of supported <profile>s)

This command instructs the DCE to set all parameters to default values specified by the manufacturer, which may take in consideration hardware configuration and other manufacturer defined criteria.

<i><profile ></i>	<i>Description</i>
0	Select the factory profile to restore

11.3 AT&W

Store User Profile

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Stores the current user profile to non volatile memory	AT&W=[<pr>] or AT&W[<pr>]	<ul style="list-style-type: none"> • OK • ERROR
Show if the command is supported	AT&W=?	&W: (list of supported <pr>s)

This command stores the current user profile in non-volatile memory.

<i>< pr ></i>	<i>Description</i>
0	Stores current settings in User Profile 0

11.4 AT*

List all Supported AT Commands

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
List all implemented AT commands	AT*	<AT Command1> [<CR> <LF> <AT Command2>[...]] / <AT Command1> [<CR> <LF> <AT Command2>[...]]

Lists all the commands supported by the MS.

11.5 AT*ESIR

Read MS System Interface Release

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Read MS system interface release	AT*ESIR	*ESIR:<x>.<y>
Show if the command is supported	AT*ESIR=?	<ul style="list-style-type: none"> • OK • ERROR

Causes the MS to return the interface release.

<i><x></i>	<i>Description</i>
Integer type	Major version (one digit)

<i><y></i>	<i>Description</i>
Integer type	Minor version (one digit)

11.6 AT+CGMI Read MS Manufacturer Identification

Description	Command	Possible Responses
Request manufacturer identification	AT+CGMI	<manufacturer> +CME ERROR: <err>
Show if the command is supported	AT+CGMI=?	<ul style="list-style-type: none"> • OK • ERROR

Causes the MS to return one or more lines of information text.]

<manufacturer>	Description
SONY ERICSSON	This company's name in upper case letters

11.7 AT+CGMM Read MS Model Identification

Description	Command	Possible Responses
Request the model identification	AT+CGMM	<model type><model name> +CME ERROR: <err>
Show if the command is supported	AT+CGMM=?	<ul style="list-style-type: none"> • OK • ERROR

Causes the MS to return one or more lines of information text <model>, determined by the MS manufacturer. It is intended to permit the user of the ITAE/ETAE to identify the specific model of the MS to which it is connected. Typically the text will consist of a single line containing the name of the product, but manufacturers may choose to provide more information if desired.

<model type>	Description
String type	A unique ASCII character/digit string, always 10 characters long. Spaces are used when the number of characters/digits is less than 10

<model name>	Description
String type	Model name for the transceiver unit, for example, GM47

11.8 AT+CGMR Read MS Revision Identification

Description	Command	Possible Responses
Request MS revision identification string	AT+CGMR	<revision> +CME ERROR: <err>
Show if the command is supported	AT+CGMR=?	<ul style="list-style-type: none"> • OK • ERROR

This command causes the MS to return a string containing information about the software version.

<revision>	Description
String type	An ASCII string containing date (year, month, day, hour, minute) plus KRC number. Example: 9710051610 CXC125112

11.9 AT+CGSN Read MS Product Serial Number Identification

Description	Command	Possible Responses
Request product serial number	AT+CGSN	<ul style="list-style-type: none"> • +CGSN: <sn> • +CME ERROR: <err>
Show if the command is supported	AT+CGSN=?	<ul style="list-style-type: none"> • OK • ERROR

This command causes the MS to return the IMEI (International Mobile station Equipment Identity), which identifies the individual ME.

<sn>	Description
String	The IMEISV, which is the IMEI (International Mobile station Equipment Identity; refer GSM 03.03 [4]) number of the ME and the software version number . Text shall not contain the sequence 0<CR> or OK<CR>

11.10 AT+GMI *Read Manufacturer Identification*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request manufacturer identification	AT+GMI	<manufacturer>
Test if command is supported	AT+GMI=?	<ul style="list-style-type: none"> • OK • ERROR

This command causes the DCE to transmit one or more lines of information text. Typically, the text will consist of a single line containing the name of the manufacturer, but may provide more information such as address and telephone number for customer service.

<i><manufacture></i>	<i>Description</i>
string type	The total number of characters, including line terminators, in the information text returned in response to this command shall not exceed 2048 characters. Note that the information text shall not contain the sequence "0 " or "OK", so that DTE can avoid false detection of the end of this information text

11.11 AT+GMM *Read Model Identification*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request revision identification	AT+GMM	<model>
Test if command is supported	AT+GMM=?	<ul style="list-style-type: none"> • OK • ERROR

This command causes the DCE to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the DCE to identify the specific model of device. Typically, the text will consist of a single line containing the name of the product, but manufacturers may choose to provide any information desired.

<i><model></i>	<i>Description</i>
string type	The total number of characters, including line terminators, in the information text returned in response to this command shall not exceed 2048 characters. Note that the information text shall not contain the sequence "0 " or "OK", so that DTE can avoid false detection of the end of this information text

11.12 AT+GMR *Read Revision Identification*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request revision identification	AT+GMR	<revision>
Test if command is supported	AT+GMR=?	<ul style="list-style-type: none"> • OK • ERROR

This command returns a manufacturer specified software revision name in a text string.

<i><revision></i>	<i>Description</i>
string type	The total number of characters, including line terminators, in the information text returned in response to this command shall not exceed 2048 characters. Note that the information text shall not contain the sequence "0" or "OK", so that DTE can avoid false detection of the end of this information text

11.13 ATI *Identification Information*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Execute	ATI[<value>]	<information>

This command causes the DCE to transmit one or more lines of text, followed by a final result code. As an option, <value> can be used to select from among multiple types of identifying information as shown in the table below.

This command provides compatibility with Microsoft Windows 95.

<i><value ></i>	<i>Description</i>
0	Same information as +GMM command (model identification)
1	Same information as +GMR command (revision identification)
3	Modem model description
5	Active settings
7	Modem configuration profile (brief listing of the modem functionality: fax classes, Bluetooth, IrDA, modem type, etc.)
8	DCE hardware type version
9	PnP (plug and play) information
10	Same information as +GMI command (manufacturer identification). Not supported

12. Input/Output

12.1 AT*E2IO *Ericsson M2M Input/Output Read/Write*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request operation of the I/O signals	AT*E2IO=<op>,<io> [,<val>][,<adc_val>]	<ul style="list-style-type: none"> • ERROR • OK • *E2IO: <op>,<io>[,<val>][,<adc_val>] OK
Show if the command is supported	AT*E2IO=?	<ul style="list-style-type: none"> • *E2IO: (list of supported <op>s), <io>s,(list of supported <val>s), (list of supported <adc_val>s) • ERROR

Controls the operation of the general purpose I/O signals. It is possible to perform up to 5 operations. The operations are as follows:

- Read the state of the input/output signals. Digital state or digital value of an ADC input or the DAC output.

In case of a digital I/O, the command has the following aspect:

```
AT*E2IO=0,"I1"
*E2IO: 0,"I1",0
OK
```

If the requested read is focused on analogue information, the digital read is as follows:

```
AT*E2IO=0,"AD1"
*E2IO: 0,"AD1",,62
OK
```

- Write: fixes an output with a specific value. Two possible values for digital sources or 256 values for the analogue ones. The response is OK or ERROR if giving an output to the signal is not possible.
- Configure: configuration is applicable to those signals that are bi-directional. Configuration changes the signal direction. The response is OK, or ERROR if the signal is not bi-directional.
- Configure check: checks the state of the I/Os.
- Trigger: the MS can be programmed to send an unsolicited result code whenever a change in one of the inputs has been produced. The trigger has to be configured for each input.

- **Trigger check: checks the state of the inputs..**

<i><op></i>	<i>Description</i>
0	Read
1	Write
2	Configure
3	Configure check
4	Trigger
5	Trigger check

<i><io></i>	<i>Description</i>
"I1"	Digital Input 1. Supported Operations: 0,2,3,4,5
"I2"	Digital Input 2. Supported Operations: 0,2,3,4,5
"I3"	Digital Input 3. Supported Operations: 0,2,3,4,5
"I4"	Digital Input 4. Supported Operations: 0,2,3,4,5
"I5"	Digital Input 5. Supported Operations: 0,4,5
"O1"	Digital Output 1. Supported Operations: 0,1,2,3
"O2"	Digital Output 2. Supported Operations: 0,1,2,3
"O3"	Digital Output 3. Supported Operations: 0,1,2,3
"O4"	Digital Output 4. Supported Operations: 0,1,2,3
"O5"	Digital Output 5. Supported Operations: 0,1
"O6"	Digital Output 6. Supported Operations: 0,1
"O7"	Digital Output 7. Supported Operations: 0,1
"DA1"	Digital/Analogue Input: Supported Operations: 0,1
"AD1"	Analogue/Digital Output 1: Supported Operations: 0
"AD2"	Analogue/Digital Output 2: Supported Operations: 0
"AD3"	Analogue/Digital Output 3: Supported Operations: 0

<i><val></i>	<i>Description</i>
0	The digital I/O is not active. The logic value is FALSE
1	The digital I/O is active. Logic value is TRUE

<i><adc_val></i>	<i>Description</i>
0-255	The decimal value shall represent the analogue voltage it is hold on the I/O. Applicable only to A/D or D/A signals

13. Interface

13.1 AT+CPIN *PIN Control*

See 3.27, AT+CPIN PIN Control

13.2 AT&C *Circuit 109 (DCD) Control*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set behavior of carrier detect	AT&C[<value>]	OK ERROR

Determines the behaviour of the carrier detect.

<i><value></i>	<i>Description</i>
0	DCD always on
1	DCD follows the connection. Default value

13.3 AT&D *Circuit 108 (DTR) Response*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Control actions from DTE	AT&D[<value>]	OK ERROR

Controls all actions initiated by data terminal ready from DTE.

<i><value></i>	<i>Description</i>
0	Ignore. Default value
1	When in on-line data mode, switch to on-line command mode. For all other states, see <value>=2
2	Disconnect and switch to off-line command mode

13.4 AT+WS46 *Mode Selection*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Sets the cellular protocol mode	AT+WS46=n	<ul style="list-style-type: none"> • OK • ERROR
Queries the current cellular protocol mode	AT+WS46?	<ul style="list-style-type: none"> • <n> OK • ERROR
Queries the possible cellular protocol modes	AT+WS46=?	<ul style="list-style-type: none"> • (list of supported <n>s) OK • ERROR

Allows an accessory to query and control the cellular protocol mode of the phone.

<i><n> parameter</i>	<i>Description</i>
12	This value is used for GSM at 900 Mhz., DCS-1800, and PCS-1900 phones

13.5 ATE *Command Echo*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request Command Echo	ATE[<value>]	<ul style="list-style-type: none"> • OK • ERROR
Show the current setting	ATE?	<value>
Show if the command is supported	ATE=?	E: (list of supported <value>s)

The setting of this parameter determines whether or not the DCE echoes characters received from the DTE during command state and online command state.

<i><value></i>	<i>Description</i>
0	DCE does not echo characters during command state and online command state
1	DCE echoes characters during command state and online command state. Default value

13.6 ATV

DCE Response Format

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set DCE response format	ATV[=]<value>	<ul style="list-style-type: none"> OK ERROR
Read the current setting	ATV?	V: <value>
Show if the command is supported	ATV=?	V: (list of supported <value>s)

Select either descriptive or numeric response codes.

<i><value></i>	<i>Description</i>
0	Display numeric result codes
1	Display verbose result codes. Default value

List of result codes

<i>ATV1</i>	<i>ATV0</i>	<i>Description</i>
OK	0	Acknowledges execution of a command
CONNECT	1	A connection has been established; the DCE is moving from command state to online data state
RING	2	The DCE has detected an incoming call signal from the network
NO CARRIER	3	The connection has been terminated or the attempt to establish a connection failed
ERROR	4	Command not recognized, command line maximum length exceeded, parameter value invalid, or other problem with processing the command line
NO DIALTONE	6	No dial tone detected
BUSY	7	Engaged (busy) signal detected
NO ANSWER	8	"@" (Wait for Quiet Answer) dial modifier was used, but remote ringing followed by five seconds of silence was not detected before expiration of the connection timer
CONNECT <TEXT>	Manufacturer -specific	Same as CONNECT, but includes manufacturer-specific text that may specify DTE speed, line speed, error control, data compression, or other status

13.7 ATZ

Reset to Default Configuration

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Execute	ATZ	<ul style="list-style-type: none"> • OK • ERROR
Execute	ATZ=<profile>	<ul style="list-style-type: none"> • OK • ERROR
Show if supported and list available parameter range	ATZ=?	Z: (list of supported <profile>s)

This command instructs the DCE to set all parameters to their default values as specified by the user. Consider hardware configuration switches or non-volatile parameter storage (if implemented) when using this command.

Commands included on the same command line as the Z command will be ignored.

<i><profile ></i>	<i>Description</i>
0	Select the user profile to restore

13.8 AT+CMUX Switch to 07.10 Multiplex Protocol

Description	Command	Possible Responses
Switch to 07.10	AT+CMUX=<transparency>[,<subset>[,<port_speed>[,<N1>[,<T1>[,<N2>[,<T2>[,<T3>[,<k>]]]]]]]]	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Returns current setting for multiplexer	AT+CMUX?	<ul style="list-style-type: none"> +CMUX:<transparency>,<subset>,<port_speed>,<N1>,<T1>,<N2>,<T2>,<T3>[,<k>] +CME ERROR: <err>
Show list of supported services	AT+CMUX=?	<ul style="list-style-type: none"> +CMUX: (list of supported <transparency>s), (list of supported <subset>s), (list of supported <port_speed>s), (list of supported <N1>s), (list of supported <T1>s), (list of supported <N2>s), (list of supported <T2>s), (list of supported <T3>s), (list of supported <k>) +CME ERROR: <err>

The command is used to turn on the multiplexer. Only “no transparency” is supported. The parameter <k> is not used.

<transparency>	Description
0	No transparency
1	HDLC Transparency. Not supported

<subset>	Description
0	Only UIH frames used
1	UI frames may be used. Not supported
2	I frames may be used (error recovery is activated). Not supported

<port_speed>	Description
1	9600 bit/s
2	19200 bit/s
3	38400 bit/s
4	57600 bit/s
5	115200 bit/s
6	230400 bit/s. Not supported

<i><N1></i>	<i>Description</i>
1..128	Maximum frame size. Only <N1>=31 supported
31	Default maximum frame size
<i><T1></i>	<i>Description</i>
1..255	Acknowledgement timer (tens of milliseconds). Only <T1>=10 supported
10	100ms default timer
<i><N2></i>	<i>Description</i>
1..100	Maximum number of re-transmissions. Only <N2>=3 supported
3	Default maximum number of re-transmissions
<i><T2></i>	<i>Description</i>
2..255	Control channel response timer (tenths of milliseconds). Only <T2>=30 supported
30	300ms default timer
<i><T3></i>	<i>Description</i>
1..255	Wake up response timer (seconds). Only <T3>=10 supported
10	10s default timer
<i><k></i>	<i>Description</i>
0	Window size
1..7	Window size. Not supported

13.9 AT+CRES *Restore Settings*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Restore settings	AT+CRES[=<profile>]	<ul style="list-style-type: none"> +CMS ERROR: <err> OK ERROR
Get available profiles	AT+CRES=?	<ul style="list-style-type: none"> +CRES: (list of supported <profile>s) +CMS ERROR: <err> OK ERROR

Restores message service settings from non-volatile memory to active memory. A TA can contain several profiles of settings. Settings specified in commands Service Centre Address +CSCA, Set Message Parameters +CSMP and Select Cell Broadcast Message Types +CSCB (if implemented) are restored. Certain settings, such as SIM SMS parameters, cannot be restored.

<i>< profile ></i>	<i>Description</i>
<u>0</u> .2	Profile number where settings are to be stored. Default is zero

13.10 AT+ICF *Cable Interface Character Format*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Defines DTE-DCE character framing	AT+ICF=[format[,parity]]	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	AT+ICF?	<ul style="list-style-type: none"> • +ICF: <format>,<parity> • OK • ERROR
Show if the command is supported	AT+ICF=?	<ul style="list-style-type: none"> • +ICF: (list of supported <format>s), (list of supported <parity>s) • OK • ERROR

This extended-format compound parameter is used to determine the local serial port start-stop (asynchronous) character framing used by the DCE to accept DTE commands, and while transmitting information text and result code, if this is not automatically determined; (**Not supported**) +IPR=0 forces +ICF=0 (see +IPR).

<i><format></i>	<i>Description</i>
0	auto detect. Not supported
1	8 Data 2 Stop. Not supported
2	8 Data 1 Parity 1 Stop. Not supported
<u>3</u>	8 Data 1 Stop. Default value
4	7 Data 2 Stop. Not supported
5	7 Data 1 Parity 1 Stop. Not supported
6	7 Data 1 Stop. Not supported

<i><parity></i>	<i>Description</i>
0	Odd. Not supported
1	Even. Not supported
2	Mark. Not supported
<u>3</u>	Space. Default value

13.11 AT+IFC *DTE-DCE Local Flow Control*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Defines DTE-DCE local flow control	AT+IFC=[<by_te>,<by_ta>]]	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	AT+IFC?	+IFC: <by_te>,<by_ta>
Show if the command is supported	AT+IFC=?	+IFC: (list of supported <by_te>s,<by_ta>s)

Defines the flow control between the modem and the computer when in on-line data mode.

No flow control is enabled in any of the command modes.

<i><by_te></i>	<i>Description</i>
0	No flow control on DTE
1	Xon/Xoff flow control on DCE. Control characters are removed by the DCE interface
2	RTS flow control on DCE. Default value
3	Xon/Xoff flow control on DCE. Control characters are passed to the remote DCE/DTE

<i><by_ta></i>	<i>Description</i>
0	No flow control on DCE
1	Xon/Xoff flow control on DTE
2	CTS flow control on DCE. Default value

13.12 AT+ILRR *Cable Interface Local Rate Reporting*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Defines DTE-DCE character framing	AT+ILRR=<value>	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	AT+ILRR?	+ILRR:<value>
Show if the command is supported	AT+ILRR=?	+ILRR:(list of supported <values>s)

Specifies whether or not the extended-format “+ILRR:<rate>” information text is transmitted from the DCE to the DTE. The <rate> reported shall represent the current (negotiated or renegotiated) DTE-DCE rate. If enabled, the intermediate result code is transmitted after any modulation, error control or data compression reports are

transmitted, and before any final result code (e.g. CONNECT) is transmitted. The <rate> is applied after the final result code is transmitted.

<value>	Description
0	Disables reporting of local port rate (+ILRR: is not transmitted). Default value
1	Enables reporting of local port rate (+ILRR: is transmitted)

13.13 AT+IPR

Cable Interface Port Command

Description	Command	Possible Responses
Defines fixed DTE rate	AT+IPR=[rate]	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	AT+IPR?	<ul style="list-style-type: none"> • +IPR:<rate> • OK • ERROR
Show if the command is supported	AT+IPR=?	<ul style="list-style-type: none"> • +IPR: (), (list of fixed-only <rate>s)] • OK • ERROR

Specifies the data rate at which the DCE will accept commands, in addition to 1200 bit/s or 9600 bit/s (as required in v25ter [1], subclause 4.3). It may be used to select operation at rates used by the DTE, which the DCE is not capable of automatically detecting.

(Not supported) Specifying a value of 0 disables the function and allows operation only at rates automatically detectable by the DCE.

The specified rate takes effect following the issuance of any result code(s) associated with the current command line.

<rate>	Description
Discrete integer value	<p>The <rate> value specified shall be the rate in bits per second at which the DTE-DCE interface should operate, e.g. "19200" or "115200". The rates supported by a particular DCE are manufacturer specific.</p> <p>The following rates, are supported (with two exceptions);</p> <p>1200 2400 4800 9600 14400 (Not supported) 19200 28800 (Not supported) 38400 57600 76800 115200 230400 460800</p>

13.14 AT*E2ESC M2M Escape Sequence Guard Time

<i>Description</i>	<i>Syntax</i>	<i>Possible responses</i>
Set GPRS online command guard time	AT*E2ESC=[<gt;]	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	AT*E2ESC?	*E2ESC: <gt;
Show if the command is supported	AT*E2ESC=?	<ul style="list-style-type: none"> • OK • ERROR

Defines a guard time for the escape sequence in GPRS to return to on-line command mode i.e. if +++AT<CR> is received either as part of the data stream or a terminating string from the application and no further data is received for the duration of the guard time the module will go into on line command mode. This guards against the module accidentally going into on line command mode.

<i><gt;</i>	<i>Description</i>
0	No guard time. Default value
1-10	Guard time in seconds

14. Network

14.1 AT*E2CD Ericsson M2M Cell Description

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request network cell description	AT*E2CD=<n>	<ul style="list-style-type: none"> • ERROR • OK
Read the command	AT*E2CD?	<ul style="list-style-type: none"> • *E2CD: <n>,<lac>,<ci>,<ta> • ERROR
Show if the command is supported	AT*E2CD=?	<ul style="list-style-type: none"> • *E2CD: (list of supported <n>s) • ERROR

Controls the presentation of an unsolicited result code E2CD: when <n>=1, or when there is a change in one of the network cell parameters, E2CD: <lac>,<ci>,<ta>.

Read command returns the status of result code presentation and several values, which show the network cell parameters.

Location information <lac>, <ci> and <ta> are returned only when <n>=1 and the ME is registered in the network. To know if the ME is registered use the AT+CREG command. If the ME is not registered in the cellular network an ERROR message is returned.

<i><n></i>	<i>Description</i>
0	Disable network location information unsolicited result code, (default)
1	Enable network location information unsolicited result code *E2CD: <lac>,<ci>,<ta>

<i><lac></i>	<i>Description</i>
String type	Two byte location area code in hexadecimal format

<i><ci></i>	<i>Description</i>
string type	Two byte cell ID in hexadecimal format

<i><ta></i>	<i>Description</i>
0-63	According to GSM 04.18 V8.6.0, the coding of the timing advance value is the binary representation of the timing advance in bit periods; 1 bit period = 48/13 is. <ta> is the integer representation of the timing advance in binary format
64-255	Reserved

14.2 AT*E2EMM Ericsson M2M Engineering Monitoring Mode

Description	Command	Possible Responses
Set the response presentation mode	AT*E2EMM=<n>[,<m>]	<ul style="list-style-type: none"> • ERROR • OK
Display mode neighbour cells are taken from the toplist		<p>*E2EMM: Serving Cell MCC,MNC,LAC,CellID,BSIC,Ch[,Rxl,C1,C2][,RxlFull,RxlSub,RxQFull,RxQSub,TA,TN], <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>[,<rxl>,<c1>,<c2>][,<rxlFull>,<rxlSub>,<rxqfull>,<rxqsub>,<ta>,<tn>], NeighBours Cells MCC,MNC,LAC,CellID,BSIC,Ch,Rxl[,C1,C2], <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] ... <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] OK</p>
Compact mode. The first cell is the serving cell, the rest are neighbour cells taken from the toplist		<p>*E2EMM: <mcc>,<mnc>,<ci>,<bsic>,<ch>[,<rxl>][,<rxlSub>,<rxqsub>,<ta>],<mcc>,<mnc>,<ci>,<bsic>,<ch>,<rxl>,<mcc>,<mnc>,<ci>,<bsic>,<ch>,<rxl>, ... <mcc>,<mnc>,<ci>,<bsic>,<ch>,<rxl> OK</p>
Verbose mode. The first cell is the serving cell and the rest are neighbour cells as provided by the network in the system info. messages (2 and 5) and via the AT*E2NBTS command		<p>*E2EMM: <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>[,<rxl>,<c1>,<c2>][,<rxlFull>,<rxlSub>,<rxqfull>,<rxqsub>,<ta>,<tn>], <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] ... <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] OK</p>
Reduced display mode - info. as display mode but without text headings or <CR><LF> separators, neighbour cells from top list		<p>*E2EMM: <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>[,<rxl>,<c1>,<c2>][,<rxlFull>,<rxlSub>,<rxqfull>,<rxqsub>,<ta>,<tn>], <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] ... <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] OK</p>
Read the command	AT*E2EMM?	<ul style="list-style-type: none"> • *E2EMM: <n> • ERROR
Show if the command is supported	AT*E2EMM=?	<ul style="list-style-type: none"> • *E2EMM: (list of supported <n>s),(list of supported <m>s) • ERROR

There are four presentation format modes (Display, Compact, Verbose, and Reduced Display) and two response types (one shot response or continuous unsolicited responses).

The purpose of the presentation format mode Display is to display the data in a readable form, including headers and line breaks (<CR><LF>). This format is, however, not well suited for machine decoding. The formats Verbose, Compact and Reduced Display do not have headers or line breaks. Verbose mode displays more parameters than the compact mode.

The response types give the user the choice of one a shot information or an unsolicited response with <m> seconds between each response.

Examples

AT*E2EMM=1

```
*E2EMM:<CR><LF>
Serving Cell<CR><LF>
MCC,MNC,LAC,CellID,BSIC,Ch[,Rxl,C1,C2][,RxlFull,RxlSub,Rx
QFull,RxQSub,TA,TN]<CR><LF>
<mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>[,<rxl>,<c1>,<c2>][,<rxlFull>,
<rxlSub>,<rxqfull>,<rxqsub>,<ta>,<tn>]<CR><LF>
NeighBours Cells<CR><LF>
MCC,MNC,LAC,CellID,BSIC,Ch,Rxl[,C1,C2]<CR><LF>
<mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>]<CR><LF>
<mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>]<CR><LF>
...
<mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>]<CR><LF>
OK
```

AT*E2EMM=3

```
*E2EMM: <servcell mcc>,<servcell mnc>,<servcell ci>,<servcell
bsic>,<servcell ch>[,<servcell rxl>][,<servcell rxlSub>,<servcell
rxqsub>,<servcell ta>],<neighborcell1 mcc>,<neighborcell1
mnc>,<neighborcell1 ci>,<neighborcell1 bsic>,<neighborcell1
ch>,<neighborcell1 rxl>,<neighborcell2 mcc>,<neighborcell2
mnc>,<neighborcell2 ci>,<neighborcell2 bsic>,<neighborcell2
ch>,<neighborcell2 rxl>,
...
<neighborcelln mcc>,<neighborcellnmnc>,<neighborcellnci>,
<neighborcelln bsic>,<neighborcelln ch>,<neighborcelln
rxl><CR><LF>
OK
```

AT*E2EMM=5

```
*E2EMM: <servcell mcc>,<servcell mnc>,<servcell lac>,<servcell
ci>,<servcell bsic>,<servcell ch>[,<servcell rxl>,<servcell
C1>,<servcell C2>][,<servcell rxlFull>,<servcell rxlSub>,<servcell
rxqfull>,<servcell rxqsub>,<servcell tn>,<servcell ta>],
```

```

<neighborcell1 mcc>,<neighborcell1 mnc>,<neighborcell1
lac>,<neighborcell1 ci>,<neighborcell1 bsic>,<neighborcell1
ch>,<neighborcell1 rxl>[,<neighborcell1 C1>,<neighborcell1
C2>],<neighborcell2 mcc>,<neighborcell2 mnc>,<neighborcell2
lac>,<neighborcell2 ci>,<neighborcell2 bsic>,<neighborcell2
ch>,<neighborcell2 rxl>[,<neighborcell2 C1>,<neighborcell2 C2>],
...
<neighborcelln mcc>,<neighborcellnmnc>,<neighborcelln
lac>,<neighborcelln ci>,<neighborcelln bsic>,<neighborcelln
ch>,<neighborcelln rxl> [,<neighborcelln C1>,<neighborcelln
C2>]<CR><LF>
OK

```

AT*E2EMM=7

```

*E2EMM:<servcell mcc>,<servcell mnc>,<servcell lac>,<servcell
ci>,<servcell bsic>,<servcell ch>[,<servcell rxl>,<servcell
c1>,<servcell c2>][,<servcell rxlFull>,<servcell rxlSub>,<servcell
rxqfull>,<servcell rxqsub>,<servcell ta>,<servcell tn>],<neighborcell1
mcc>,< neighborcell1 mnc>,<neighborcell1 lac>,<neighborcell1
ci>,<neighborcell1 bsic>,<neighborcell1 ch>,<neighborcell1 rxl>[,<
neighborcell1 c1>,<neighborcell1 c2>],<neighborcell2
mcc>,<neighborcell2 mnc>,<neighborcell2 lac>,<neighborcell2
ci>,<neighborcell2 bsic>,<neighborcell2 ch>,<neighborcell2
rxl>[,<neighborcell2 c1>,<neighborcell2c2>]
...
<neighborcelln mcc>,<neighborcelln mnc>,<neighborcelln
lac>,<neighborcelln ci>,<neighborcelln bsic>,<neighborcelln
ch>,<neighborcelln rxl>[,<neighborcelln c1>,<neighborcelln c2>]
OK

```

The mode setting <n> in the set command has the combination listed in the table below.

When <n>=5, the shot information is the same as in <n> = 1, but neighbouring cells, which have to be up to 16. This is the information that comes from the Serving Cell through the BCCH, reporting the BTS that are on the Serving Cell's surroundings.

<n>	Description
<u>0</u>	Disable network monitoring unsolicited result code. Default
1	One shot presentation of the network location information. Display mode with headers and <CR><LF> line separators
2	Enable network location information unsolicited result code in Display mode (like n=1). There will be continuous unsolicited information responses <m> seconds apart
3	One shot presentation of the compact network location information

<i><n></i>	<i>Description</i>
4	Enable compact network location information unsolicited result code. There will be continuous unsolicited information responses <m> seconds apart
5	One shot presentation of the network location information (verbose format), including 16 BTSs, coming from the Serving Cell signalling information
6	As n=5 format but there will be continuous unsolicited information responses <m> seconds apart
7	One shot presentation of the network information (same information as in n=1) but no headers or <CR><LF> line separators. Neighbor cells from the Toplist
8	As n=7 format but there will be continuous unsolicited information responses <m> seconds apart
<i><m></i>	<i>Description</i>
1-255	Integer type giving time (in seconds) between unsolicited responses. Default=5
<i><mcc></i>	<i>Description</i>
Integer type	Three digits in decimal format. The Mobile Country Code identifies the PLMN serving cell country according to ITU
<i><mnc></i>	<i>Description</i>
Integer type	Two digits in decimal format. The Mobile Network Code identifies the PLMN operator in the serving cell
<i><lac></i>	<i>Description</i>
Integer type	Two byte location area code in hexadecimal format
<i><ci></i>	<i>Description</i>
Integer type	Two byte cell ID in hexadecimal format
<i><bsic></i>	<i>Description</i>
Integer type	One byte Base Stations Identification code in hexadecimal format
<i><ch></i>	<i>Description</i>
(0-1023)	It represents the ARFCN that shows the Absolute RF Channel, which identifies the BCCH carrier

<i><rxl></i>	<i>Description</i>
Integer type	Received Signal Strength level in dBm measured on idle mode

<i><rxlfull></i>	<i>Description</i>
Integer type	Received Signal Strength level in dBm. The Rx Level is taken in the Downlink and statistically is applied to 100 TDMA frames of the TCH or during a SACCH multiframe

<i><rxlsub></i>	<i>Description</i>
Integer type	Received Signal Strength level in dBm. The Rx Level is taken from the DownLink signal and the average is applied to subset of SACCH frames

<i><rxqfull></i>	<i>Description</i>
0	BER < 0.1%
1	0.26% < BER < 0.30%
2	0.51% < BER < 0.64%
3	1.0% < BER < 1.3%
4	1.9% < BER < 2.7%
5	3.8% < BER < 5.4%
6	7.6% < BER < 11.0%
7	BER > 15.0%

<i><mcc></i>	<i>Description</i>
Integer type	Three digits in decimal format. The Mobile Country Code identifies the PLMN serving cell country according to ITU

<rxqsub> is the parameter that indicates the quality in the received signal on dedicated mode. The measurement average is applied to a subset of a SACCH multiframe.

<i><rxqsub></i>	<i>Description</i>
0	BER < 0.1%
1	0.26% < BER < 0.30%
2	0.51% < BER < 0.64%
3	1.0% < BER < 1.3%

<i><rxqsub></i>	<i>Description</i>
4	1.9% < BER < 2.7%
5	3.8% < BER < 5.4%
6	7.6% < BER < 11.0%
7	BER > 15.0%

<i><c1></i>	<i>Description</i>
Integer	Path Loss criterion parameter for neighbour cells. The MS calculates this parameter, in idle mode, to decide if the cell is suitable to camp on. After the calculation the criterion is $C1 > 0$. See GSM 05.08

<i><c2></i>	<i>Description</i>
Integer	Cell reselection parameter for neighbour cells. This parameter shall optimise the selected cell reselection

<i><ta></i>	<i>Description</i>
0-63	According to GSM 04.18 V8.6.0, the coding of the timing advance value is the binary representation of the timing advance in bit periods; 1 bit period = 48/13 is. <i><ta></i> is the integer representation of the timing advance in binary format
64-255	Reserved

<i><tn></i>	<i>Description</i>
0-7	Its value indicates the time slot number in a traffic channel

14.3 AT*E2SPN *M2M Service Provider Indication*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request service provider indication	AT*E2SPN	<ul style="list-style-type: none"> • *E2SPN: <spi> • +CME ERROR: <err>
Show if the command is supported	AT*E2SPN=?	<ul style="list-style-type: none"> • OK • ERROR

Causes the MS to return the service provider name stored in the SIM card (<spi> parameter). The text will consist of a maximum of 16 bytes containing the service provider name stored in the EFSPN file in the SIM card (see GSM 11.11).

<i><spi></i>	<i>Description</i>
String	String type field of maximum length 16 bytes; character set as specified by command Select TE character set +CSCS

14.4 AT*EALS *Ericsson Request ALS Status*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Requests current status for ALS	AT*EALS	<ul style="list-style-type: none"> • *EALS: <status> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT*EALS=?	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR

Used to request the MS to give ALS (Alternate Line Services) status. The information is available on the SIM card. If ALS is active, the user has two lines for voice calls. The line number or name tag for the line is then indicated on the display.

<i><status></i>	<i>Description</i>
0	ALS function is not active (off)
1	ALS function is active (on)

14.5 AT*ECSP *Ericsson Customer Service Profile*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Read the customer service profile from the SIM	AT*ECSP=<service group>	<ul style="list-style-type: none"> • *ECSP: <service group>,<services> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT*ECSP=?	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR

This command is used to read the customer service profile (CSP) from the SIM. CSP is a list on the SIM, which indicates the services that are user accessible. Each of the services has a related bit within the CSP. The services are grouped into service groups, with a maximum of 8 services in a group. For each service group, a bit mask tells which services are available (bit=1). Unused bits are set to 0.

<i><service group></i>	<i>Description</i>
Byte	Each service group has a corresponding number, service group code

<i><services></i>	<i>Description</i>
byte	Bit mask (8 bits), indicating the services within the service group Bit=0: unused or unavailable service Bit=1: available service

14.6 AT*EPNR *Ericsson Read SIM Preferred Network*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Read entries in SIM preferred list	AT*EPNR=<format> [,<index1> [,<index2>]]	<ul style="list-style-type: none"> *EPNR: <index1>,<oper1>[...] *EPNR: <index2>,<oper2> +CME ERROR: <err> OK ERROR
Test if the command is supported and list the possible settings	AT*EPNR=?	<ul style="list-style-type: none"> *EPNR: (list of supported <index>s), (list of supported <format>s) +CME ERROR: <err> OK ERROR

This command is used to read the SIM preferred list of networks (EFPLMNsel).

<i><index1></i>	<i>Description</i>
integer	Start index (>0)

<i><index2></i>	<i>Description</i>
integer	Stop index (>0)

<i><format></i>	<i>Description</i>
2	Numeric <oper>

<i><oper></i>	<i>Description</i>
string	String indicates the code for the operator. E.g. GSM - Sweden - Europolitan: "24008" (3 + 2). PCS: 3 digits for country and 3 digits for network

14.7 AT*EPNW *Ericsson Write SIM Preferred Network*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Write/delete entries in SIM preferred list	AT*EPNW=[<index>] [,<format>,<oper>]	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported and list the possible settings	AT*EPNW=?	<ul style="list-style-type: none"> • *EPNW: (list of supported <index>s), (list of supported <format>s) • +CME ERROR: <err> • OK • ERROR

This command is used to edit the SIM preferred list of networks (EFPLMNsel). The entry field <oper> contains mobile country code (MCC) and mobile network code (MNC).

<i><index></i>	<i>Description</i>
Integer	Index to entry in SIM preferred list. The SIM preferred list contains at least 8 positions according to GSM 11.11

<i><format></i>	<i>Description</i>
0	Long format alphanumeric <oper>. Not supported
1	Short format alphanumeric <oper>. Not supported
2	Numeric <oper>

<i><oper></i>	<i>Description</i>
String	String indicates the code for the operator. E.g. GSM – Sweden - Europolitan: "24008" (3 + 2). PCS: 3 digits for country and 3 digits for network

14.8 AT*E2SSN *Ericsson M2M SIM Serial Number*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request SIM Serial number	AT*E2SSN?	*E2ESSN: <SSN>
Shows if the command is supported	AT*E2SSN=?	<ul style="list-style-type: none"> • OK • ERROR

This command requests the SIM serial number held in the ICCid field (address 2FE2) on the SIM and returns all valid characters to the TE. This field is detailed in GSM 11.11 section 10.1.1.

<i><SSN></i>	<i>Description</i>
String without double quotes	SIM serial number

EXAMPLES

```
AT*E2SSN?
8944110063503224707
OK
```

:- where the raw data contained in the ICCid field on the SIM is 984411003605234207F7.

```
Test command:
AT*E2SSN=?
OK
```

14.9 AT*ESLN *Ericsson Set Line Name*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Sets the line name tag in the MS	AT*ESLN=<line> [<i>,<name></i>]	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Read the current setting	AT*ESLN?	<ul style="list-style-type: none"> *ESLN: <line1>,<name1><CR><LF> *ESLN: <line2>,<name2> +CME ERROR: <err> OK ERROR
Test if the command is supported and list the possible settings	AT*ESLN=?	<ul style="list-style-type: none"> *ESLN: (list of supported <line>s),<lname> +CME ERROR: <err> OK ERROR

Sets the name tag for a selected line.

<i><line></i>	<i>Description</i>
0	Default. This means that the two lines will use the default name tags, i.e. "L1" and "L2"
1	Line 1
2	Line 2

<i><name></i>	<i>Description</i>
String	Characters for name tag This parameter is optional when <line> is set to 0

<i><lname></i>	<i>Description</i>
Integer	Max. number of characters to use in <name> string (20)

14.10 AT+CIMI Subscriber Identification

Description	Syntax	Possible Responses
Read IMSI	AT+CIMI	<ul style="list-style-type: none"> • <IMSI> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CIMI=?	<ul style="list-style-type: none"> • OK • ERROR

Causes the TA to return <IMSI>, identifying the individual SIM attached to the ME.

<IMSI>	Description
string without double quotes	International Mobile Subscriber Identity

14.11 AT+CLCK Facility Lock

Description	Command	Possible Responses
Request facility lock	AT+CLCK=<fac>, <mode>[,<passwd> [,<class>]]	<ul style="list-style-type: none"> • when <mode>=2 and command successful: +CLCK: <status>[,<class1> [<CR><LF>+CLCK: <status>,<class2>[...]] • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CLCK=?	<ul style="list-style-type: none"> • +CLCK: (list of supported <fac>s) • +CME ERROR <err> • OK

The command is used to lock, unlock or interrogate an ME or a network facility <fac>. A password is normally needed to carry out such actions.

Call barring facilities are based on GSM supplementary services (refer to GSM 02.88 [6]). The interaction of these, with other commands based on other GSM supplementary services, is described in the GSM standard.

<fac >	Description
"CS"	CNTRL (lock CoNTRoL surface (e.g. phone keyboard))
"PS"	PH-SIM (lock PHone to SIM card) (ME asks password when other than current SIM card inserted)
"SC"	SIM (lock SIM card) (SIM asks password in ME power-up and when this lock command issued)
"P2"	SIM PIN2

<i><fac ></i>	<i>Description</i>
"AO"	BAOC (bar all outgoing calls)
"OI"	BOIC (bar outgoing international calls)
"AI"	BAIC (bar all incoming calls)
"IR"	BIC-Roam (bar incoming calls when roaming outside the home country)
"OX"	BOIC-exHC (bar outgoing international calls except to home country)
"NT"	Bar incoming calls from numbers Not stored to TA memory. Not Supported
"NM"	Bar incoming calls from numbers Not stored to ME memory. Not Supported
"NS"	Bar incoming calls from numbers Not stored to SIM memory. Not Supported
"NA"	Bar incoming calls from numbers Not stored in Any memory. Not Supported
"AB"	All barring services
"AG"	All out going barring services
"AC"	All in coming barring services
"PN"	Network personalization
"PU"	Network subset personalization
"PP"	Service provider personalization
"PC"	Corporate personalization

<i><mode></i>	<i>Description</i>
0	Unlock
1	Lock
2	Query status
10	Full lock (only valid for <fac>="PS", after power on always ask for password)

<i><status></i>	<i>Description</i>
0	Not active
1	Active

<i><passw></i>	<i>Description</i>
string type	Is the same as password specified for the facility from the ME user interface or with change password command, +CPWD

<i><classx></i>	<i>Description</i>
1	Voice L1
2	Data
4	Fax
8	Short message service
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access
128	Voice L2
1..30	When "no reply" is enabled or queried, this gives the time in seconds to wait before the call is forwarded. Default value is 20

14.12 AT+CNUM Subscriber Number

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request subscriber number	AT+CNUM	<ul style="list-style-type: none"> +CNUM: [<alpha1>],<number1>,<type1> [,<speed>,<service>[,<itc>]] [<CR> <LF>+CNUM: [<alpha2>],<number2>,<type2> [,<speed>,<service> [,<itc>]] [...]] +CME ERROR: <err> OK ERROR
Show if the command is supported	AT+CNUM=?	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR

This command returns the MSISDNs related to the subscriber (this information can be stored in the SIM or in the ME). If subscriber has different MSISDN for different services, each MSISDN is returned in a separate line.

<i><alphax></i>	<i>Description</i>
Alphanumeric string	Associated with <numberx>; used character set should be the one selected with the Select TE character set command, +CSCS

<i><numberx></i>	<i>Description</i>
String type	Phone number of format specified by <typex>

<i><typex></i>	<i>Description</i>
Integer format	Type of address, (refer to GSM 04.08 [3] subclause 10.5.4.7)

<i><speed></i>	<i>Description</i>
data rate	As defined in subclause 6.7 GSM 07.07 [1]

<i><service></i>	<i>Description</i>
0	Asynchronous modem
1	Synchronous modem. Not supported
2	PAD access (asynchronous). Not supported
3	Packet access (synchronous). Not supported
4	Voice
5	Fax
6..127	All other values below 128 are reserved by GSM 07.07 [1]. Not supported

<i><itc></i>	<i>Description</i>
0	3.1 kHz
1	UDI

14.13 AT+COPS Operator Selection

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request operator selection	AT+COPS=[<mode> [,<format> [,<oper>]]]	<ul style="list-style-type: none"> • +CME ERROR <err> • OK • ERROR
Shows the current setting	AT+COPS?	<ul style="list-style-type: none"> • +COPS: <mode>[,<format>, <oper>] • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+COPS=?	<ul style="list-style-type: none"> • +COPS: list of supported (<stat>,long alphanumeric <oper>, short alphanumeric <oper>,numeric <oper>)s • +CME ERROR <err> • OK • ERROR

Forces an attempt to select and register the GSM network operator.

<i><mode></i>	<i>Description</i>
0	Automatic (<oper> field is ignored)
1	Manual (<oper> field shall be present)
3	Set only <format> (for read command +COPS?), do not attempt registration/de-registration (<oper> field is ignored); this value is not applicable in read command response
4	Manual/automatic (<oper> field shall be present); if manual selection fails, automatic mode (<mode>=0) is entered

<i><format></i>	<i>Description</i>
0	Automatic (<oper> field is ignored)
1	Short format alphanumeric <oper>
2	Numeric <oper>

<i><oper></i>	<i>Description</i>
string type	Format determined by the <format> setting

<i><stat></i>	<i>Description</i>
0	Unknown
1	Available
2	Current
3	Forbidden

14.14 AT+CREG Network Registration

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request network registration	AT+CREG=[<n>]	<ul style="list-style-type: none"> • +CME ERROR <err> • OK • ERROR
Read the command	AT+CREG?	<ul style="list-style-type: none"> • +CREG: <n>,<stat> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CREG=?	<ul style="list-style-type: none"> • +CREG: (list of supported <n>s) • +CME ERROR <err> • OK • ERROR

Controls the presentation of the unsolicited result code +CREG.

<i><n></i>	<i>Description</i>
0	Disable network registration unsolicited result code, (default)
1	Enable network registration unsolicited result code

<i><stat></i>	<i>Description</i>
0	Not registered, ME is not currently searching for a new operator to register with
1	Registered, home network
2	Not registered, but ME is currently searching for a new operator to register with
3	Registration denied

15. Phonebook

15.1 AT*E2PBCS Ericsson M2M Phonebook Check Sum

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request phone book checksum	AT*E2PBCS	<ul style="list-style-type: none">• *E2PBCS: <cks>• +CME ERROR: <err>
Show if the command is supported	AT*E2PBCS=?	<ul style="list-style-type: none">• OK• ERROR

Causes the ME to return the phone book checksum <cks> stored internally . Phone book checksum is recalculated whenever there is a change in the phone book. By requesting the checksum, the external application can detect if the phone book in the ME has changed, without downloading the whole phone book.

During the SIM initialisation process, it takes some time to download the phone book from the SIM card to the ME, depending on the number of entries. In case the command is invoked before the checksum has been calculated, the ME gives an ERROR message.

<i><cks></i>	<i>Description</i>
Hex type	1 byte in hexadecimal (between ""), containing the checksum

15.2 AT*ESAG Ericsson Add to Group

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Adds a new item to the group with <gindex>	AT*ESAG=<gindex>,<type>,<itemindex>	<ul style="list-style-type: none">• +CME ERROR: <err>• OK• ERROR
Show if the command is supported and list the possible settings	AT*ESAG=?	<ul style="list-style-type: none">• *ESAG: (list of supported <gindex>s, list of supported <type>s• OK• ERROR

This command adds a contact or a phone number to the current group.

<i><gindex></i>	<i>Description</i>
1-10	The group index within the hierarchical phone book

<i><type></i>	<i>Description</i>
1	Contact
2	Phone number

<i><itemindex></i>	<i>Description</i>
Integer	The index of the contact/group/phone number to add. The <i><itemindex></i> parameter has the following meaning: if the item to add is a contact, the <i><itemindex></i> is the index of the contact in the contacts book. If the item to add is a phone number the <i><itemindex></i> is the index in the phone book

15.3 AT*ESCG *Ericsson Create Group*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Adds a new group to the hierarchical phone book	AT*ESCG=<name>	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Shows if the command is supported	AT*ESCG=?	<ul style="list-style-type: none"> • *ESCG: <maxnamelength> • +CME ERROR: <err> • OK • ERROR

This command creates a new group in the hierarchical phone book. The group is stored at the first available position. There are 10 group positions in the hierarchical phone book.

<i><name></i>	<i>Description</i>
String	The group name. Character set as specified by command Select TE Character Set (AT+CSCS)

<i><maxnamelength></i>	<i>Description</i>
integer	The maximum length of the grouping (bytes)

15.4 AT*ESCN Ericsson Set Credit Card Number

Description	Command	Possible Responses
Set up a credit card number	AT*ESCN=<mode> [,<passwd>][,<indexn>] [,<asn>,<type>,<name>,<vercode>[,<send order>]]	<ul style="list-style-type: none"> +CME ERROR: <err> when mode=3:*ESCN: <indexn>,<asn>,<type>,<name>,<vercode>,<send order> When mode=4:*ESCN: <selindexn> OK ERROR
Test if the command is supported	AT*ESCN=?	<ul style="list-style-type: none"> *ESCN: (list of supported <index>s),(list of supported <mode>s),(list of supported <send order>s) +CME ERROR: <err> OK ERROR

Command is used to:

- set up a credit card number in the ME.
- disable credit card calls.
- enable one of the credit card call services.
- query the settings for one of the services.
- query the active credit call access server.

<mode>	Description
0	Settings for a credit card call (<passwd>, <indexn>, <asn>,<type>,<name>,<vercode> [,<send order>]). The four (4) parameters (<passwd>, <indexn>, <asn>, <vercode>) are mandatory when <mode> = 0. If all those are not submitted ERROR will be returned
1	Disable credit card calling (<passwd>). If any other parameters are submitted, they are ignored
2	Enable one of the credit card call services (<passwd>, <indexn>). If any other parameters are submitted, they are ignored
3	Query (<passwd>, <indexn>). If any other parameters are submitted, they are ignored
4	Query for the selected credit call access server. If any parameters are submitted, they are ignored

<passwd>	Description
String	character string, phone lock code "PS", PH-SIM

<i><indexn></i>	<i>Description</i>
1	Index number to the first credit card call access server
2	Index number to the second credit card call access server

<i><selindexn></i>	<i>Description</i>
0	Credit card calling disabled
1	Index number to the first credit card call access server
2	Index number to the second credit card call access server

<i><asn></i>	<i>Description</i>
String	Character string <0..9,+>, max. 20 characters Phone number of format specified by <typex>

<i><type></i>	<i>Description</i>
Integer format	Type of address

<i><name></i>	<i>Description</i>
String	Character string of the name tag, for M&M. Maximum of 18 characters

<i><vercode></i>	<i>Description</i>
String	Character string <0..9,#,*>. Maximum of 20 characters

<i><send order></i>	<i>Description</i>
1	Verification code first (default)
2	phone number to call first

15.5 AT*ESDG *Ericsson Delete Group*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Deletes a group defined in the hierarchical phone book	AT*ESDG=<gindex>	<ul style="list-style-type: none"> +CME ERROR: <err> OK
Show if the command is supported and list the possible <gindex>	AT*ESDG=?	<ul style="list-style-type: none"> *ESDG: list of <gindex>s OK

This command deletes the group at position <gindex> from the hierarchical phone book.

<i><gindex></i>	<i>Description</i>
1-10	The group index

15.6 AT*ESDI *Ericsson Delete Group Item*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Deletes the item in group <gindex> with position <index>	AT*ESDI=<gindex>,<index>	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Show if the command is supported	AT*ESDI=?	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR

The command deletes the item with <index> in the group with <gindex>.

<i><gindex></i>	<i>Description</i>
1-10	The groups index within the hierarchical phone book

<i><index></i>	<i>Description</i>
1-15	The items index within the group

15.7 AT*ESGR *Ericsson Group Read*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Lists the groups defined in the hierarchical phone book	AT*ESGR	<ul style="list-style-type: none"> • *ESGR: <gindex1>, <name1>[<CR><LF><gindex2>, <name2>..] • OK • ERROR
Shows if the command is supported	AT*ESGR=?	OK

This command lists the groups in the hierarchical phone book.

<i><gindex></i>	<i>Description</i>
1-10	The group index

<i><name></i>	<i>Description</i>
String	The group name

15.8 AT*ESIL *Ericsson Silence Command*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Sets the MS to silent mode	AT*ESIL=[<mode>]	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read the current setting	AT*ESIL?	<ul style="list-style-type: none"> • *ESIL: <mode> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported and list the possible settings	AT*ESIL=?	<ul style="list-style-type: none"> • *ESIL: (list of supported <mode>s) • +CME ERROR: <err> • OK • ERROR

This command orders the phone to be in silent mode. When the phone is in silent mode, all sounds from the MS are prevented. An icon will show the user that silent mode is active.

<i><mode></i>	<i>Description</i>
0	Silent mode off. Default setting
1	Silent mode on

15.9 AT*ESNU *Ericsson Settings Number*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Sets a number in the MS	AT*ESNU=<type>,<number> [<i>,<number type></i>]	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Test if the command is supported and show possible settings	AT*ESNU=?	<ul style="list-style-type: none"> *ESNU: (list of supported <type>s) +CME ERROR: <err> OK ERROR
Read the current setting	AT*ESNU?	<ul style="list-style-type: none"> *ESNU: <type 1>,<number 1>,<number type 1><CR><LF> ... *ESNU: <type n>,<number n>,<number type n> +CME ERROR: <err> OK ERROR

This command sets a <type> number, in the format <number type>, in the MS.

<i><type></i>	<i>Description</i>
0	Voice L1
1	Voice L2
2	Fax
3	Data

<i><number type></i>	<i>Description</i>
129	Default setting when dialling string does not include the international access code character '+'
145	Default setting when dialling string includes the international access code character '+'

<i><number></i>	<i>Description</i>
0-9, +	Number

15.10 AT+CPBF *Phonebook Find*

<i>Description</i>	<i>Syntax</i>	<i>Possible Responses</i>
Shows the current setting	+CPBF=<findtext>	<ul style="list-style-type: none"> +CPBF: <index1>,<number>,<type>,<text>[[...]<CR><LF>+CPBF: <index2>,<number>,<type>,<text>] +CME ERROR: <err> OK ERROR
Show if the command is supported	+CPBF=?	<ul style="list-style-type: none"> +CPBF: <nlength>,<tlength> +CME ERROR: <err> OK ERROR

Returns phone book entries whose alphanumeric field starts with <findtext>.

<i><findtext ></i>	<i>Description</i>
string type	Field of maximum length <tlength>; character set as specified by the select TE character set command, +CSCS

15.11 AT+CPBR *Phonebook Read*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Read phone book entries	+CPBR=<index1> [,<index2>]	<ul style="list-style-type: none"> +CPBR:<index1>,<number>,<type>,<text>[[,<text_date>,<text_time>]<CR><LF>+CPBR: <index2>,<number>,<type>,<text>[,<text_date>,<text_time>]] +CME ERROR <err> OK ERROR
Test if the command is supported	+CPBR=?	<ul style="list-style-type: none"> +CPBR: (list of supported <index>s),<nlength>,<tlength> +CME ERROR <err> OK ERROR

Returns phone book entries in location number range <index1>...<index2> from the current phone book memory storage selected with +CPBS. If <index2> is left out, only location <index1> is returned. Entry fields returned are location number <indexn>, phone number stored there <number> (of format <type>) and text <text> associated with the number.

<i><indexn></i>	<i>Description</i>
integer type	Values in the range of location numbers of phone book memory

<i><number></i>	<i>Description</i>
string type	Phone number of format <type>

<i><type></i>	<i>Description</i>
129	ISDN/telephony numbering plan, national/international unknown
145	ISDN/telephony numbering plan, international number
161	ISDN/telephony numbering plan, national number
128 - 255	Other values refer to GSM 04.08 [4] section 10.5.4.7

<i><text></i>	<i>Description</i>
string type	Field of maximum length <tlength>; character set as specified by the select TE character set command, +CSCS.

<i><nlength></i>	<i>Description</i>
integer type	Value indicating the maximum length of field <number>

<i><tlength ></i>	<i>Description</i>
integer type	Value indicating the maximum length of field <text>

15.12 AT+CPBS Phone Storage

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set phone book storage	AT+CPBS=<storage>	<ul style="list-style-type: none"> • +CME ERROR <err> • OK • ERROR
Read the current setting	AT+CPBS?	<ul style="list-style-type: none"> • +CPBS: <storage> [,<used>,<total>] • +CME ERROR <err> • OK • ERROR
Test if the command is supported	AT+CPBS=?	<ul style="list-style-type: none"> • +CPBS: (list of supported <storage>s) • +CME ERROR <err> • OK • ERROR

Selects phone book memory storage <storage>, which is used by other phone book commands.

<i><storage></i>	<i>Description</i>
"FD"	SIM fix-dialing-phone book
"LD"	SIM Last-dialing-phone book. Not supported
"ME"	ME phone book
"MT"	Combined ME and SIM phone books. Not supported
"SM"	SIM phone book
"TA"	TA phone book. Not supported
"DC"	ME dialed calls list (30 entries)
"RC"	ME received calls list (30 entries)
"MC"	ME missed calls list (30 entries)
"MV"	ME Voice Activated Dialing list. Not supported
"SG"	SMS group list, Ericsson specific. Not supported
"CA"	Callers allowed, Ericsson specific. Not supported
"EN"	SIM emergency number (+CPBW is not applicable for this storage)
"BC"	Own business card. Not supported
"HP"	Hierarchical phone book. Not supported

<i><passwd></i>	<i>Description</i>
String	Represents the password required when selecting password protected <storage>s, for example PIN2 for "FD"

15.13 AT+CPBW Phonebook Write

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request phone book write	AT+CPBW=[<index>][,<number>[,<type>[,<text>]]]	<ul style="list-style-type: none"> +CME ERROR <err> OK ERROR
Show if the command is supported	AT+CPBW=?	<ul style="list-style-type: none"> +CPBW: (list of supported <index>s),<nlength>,(list of supported <type>s),<tlength> +CME ERROR <err> OK ERROR

Writes phone book entry in location number <index> in the current phone book memory storage area, selected with AT+CPBS. If the <number> and <text> parameters are omitted, the entry is deleted. If <index> is omitted but <number> is included, the entry is written to the first free location in the phone book.

<i><index></i>	<i>Description</i>
integer type	Values in the range of location numbers of phone book memory

<i><number></i>	<i>Description</i>
string type	Phone number of format <type>

<i><type ></i>	<i>Description</i>
integer format	Type of address octet, default 145 when dialing string includes international access code character "+", otherwise 129. (refer to GSM 04.08 [4] subclause 10.5.4.7)
129	ISDN/telephony numbering plan, national/international unknown. Default if no "+" in sca.
145	ISDN/telephony numbering plan, international number. Default if "+" in sca.
161	ISDN/telephony numbering plan, national number
128-255	Other values refer GSM 04.08 section 10.5.4.7

<i><text ></i>	<i>Description</i>
string type	Field of maximum length <tlength>; character set as specified by the select TE character set command, +CSCS

<i><nlength></i>	<i>Description</i>
integer type	Value indicating the maximum length of field <number>

<i><tlength ></i>	<i>Description</i>
integer type	Value indicating the maximum length of field <text>

16. Short Message Services - Point to Point

16.1 AT+CPIN PIN Control

See 3.27, AT+CPIN PIN Control

16.2 AT*ESMA Ericsson Set Message Alert Sound

See 4.15, AT*ESMA Ericsson Set Message Alert Sound

16.3 AT+CGSMS Select Service for MO SMS Messages

See 6.10, AT+CGSMS Select Service for MO SMS Messages

16.4 AT+CSCA Service Centre Address

Common for both PDU and Text Modes

Description	Command	Possible Responses
Set service centre address	AT+CSCA=<sca> [,<tosca>]	<ul style="list-style-type: none"> • OK • ERROR
Show the current setting	AT+CSCA?	<ul style="list-style-type: none"> • +CSCA: <sca>,<tosca> • OK • ERROR
Show if the command is supported	AT+CSCA=?	<ul style="list-style-type: none"> • OK • ERROR

Updates the SMSC address, through which mobile originated SMs are transmitted. In text mode, the setting is used by send (+CMGS) and write (+CMGW) commands. In PDU mode, the setting is used by the same commands, but only when the length of the SMSC address coded into <pdu> parameter equals zero. Note that a “+” in front of the number in <sca> has precedence over the <tosca> parameter, so that a number starting with “+” will always be treated as an international number.

<sca>	Description
string type	GSM 04.11 (3G TS 24.011) RP SC address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set

<i><tosca></i>	<i>Description</i>
integer type	GSM 04.11 (3G TS 24.011) RP SC address type-of-address octet in integer format
<u>129</u>	ISDN/telephony numbering plan, national/international unknown. Default if no "+" in sca.
<u>145</u>	ISDN/telephony numbering plan, international number. Default if "+" in sca.
161	ISDN/telephony numbering plan, national number
128-255	Other values refer GSM 04.08 section 10.5.4.7

16.5 AT+CMGF Message Format

Common for both PDU and Text Modes

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set message format	AT+CMGF=<mode>	<ul style="list-style-type: none"> • OK • ERROR
Read the current setting	AT+CMGF?	<ul style="list-style-type: none"> • +CMGF: <mode> • OK • ERROR
Show if the command is supported	AT+CMGF=?	<ul style="list-style-type: none"> • +CMGF: (list of supported <mode>s) • OK • ERROR

This command tells the TA, which input and output format to use for messages. <mode> indicates the format of messages used with send, list, read and write commands, and unsolicited result codes resulting from received messages. Mode can be either PDU mode (entire TP data units used) or text mode (headers and body of the messages given as separate parameters).

Test command returns supported modes as a compound value.

<i><mode></i>	<i>Description</i>
<u>0</u>	PDU mode
1	Text mode

16.6 AT+CMGW Write Message to Memory

PDU Mode

Description	Command	Possible Responses
Write message to memory	AT+CMGW=<length> [,<stat>]<CR> PDU is given <ctrl-Z/ESC>	<ul style="list-style-type: none"> +CMGW: <index> +CMS ERROR: <err> OK ERROR
Show if the command is supported	AT+CMGW=?	<ul style="list-style-type: none"> OK ERROR

Stores a message to memory storage <mem2>. Memory location <index> of the stored message is returned. By default message status will be set to 'stored unsent', but parameter <stat> allows other status values to be given. ME/TA manufacturer may choose to use different default <stat> values for different message types. Entering PDU is the same as specified by the send message command, +CMGS. If writing fails, final result code +CMS ERROR: <err> is returned.

<stat>	Description
0	Received unread message (i.e. new message). Not supported
1	Received read message. Not supported
<u>2</u>	Stored unsent message (only applicable to SMs)
3	Stored sent message (only applicable to SMs). Not supported
16	Template message. Not supported

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<length>	Description
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<pdu>	Description
...	In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) In the case of CBS: GSM 03.41 TPDU in hexadecimal format

Text Mode

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Write message to memory	AT+CMGW [=<oa/da> [,<toa/toda>[,<stat>]]] <CR> Text is entered <ctrl-Z/ESC>	<ul style="list-style-type: none"> • +CMGW: <index> • +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMGW=?	<ul style="list-style-type: none"> • OK • ERROR

Stores message (either SMS-DELIVER or SMS-SUBMIT) to memory storage <mem2>. Memory location <index> of the stored message is returned. By default message status will be set to 'stored unsent', but parameter <stat> allows also other status values to be given. The entering of text is done as specified in the send message command, +CMGS. If writing fails, final result code +CMS ERROR: <err> is returned.

Note! SMS-COMMANDs and SMS-STATUS-REPORTs cannot be stored in text mode.

<i><stat></i>	<i>Description</i>
0	Received unread message (new message). Not supported
1	Received read message. Not supported
2	Stored unsent message (only applicable to SMS)
3	Stored sent message (only applicable to SMS). Not supported

<i><oa></i>	<i>Description</i>
String type	GSM 03.40 TP-Originating-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toa>

<i><da></i>	<i>Description</i>
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

<i><toa></i>	<i>Description</i>
String type	GSM 04.11 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)

<i><tda></i>	<i>Description</i>
String type	GSM 04.11 TP-Destination- Address Type-of-Address octet in integer format (when first character of <da> is +(IRA 43) default is 145, otherwise default is 129)
<i><index></i>	<i>Description</i>
Integer type	Value in the range of location numbers supported by the associated memory

16.7 AT+CMGS Send Message

PDU Mode

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Send message	AT+CMGS=<length> <CR> PDU is given <ctrl-Z/ ESC>	<ul style="list-style-type: none"> • +CMGS: <mr>[,<ackpdu>] • +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMGS=?	<ul style="list-style-type: none"> • OK • ERROR

Sends a message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. Optionally, when AT+CSMS <service> value is 1 and there is network support, <ackpdu> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. This command is abortable.

- <length> must indicate the number of octets coded in the TP layer data unit to be given (i.e. SMSC address octets are excluded).
- The TA shall send a four character sequence <CR><LF><greater_than><space> (IRA 13, 10, 62, 32) after command line is terminated with <CR>; after that PDU can be given from TE to ME/TA.
- The DCD signal is in the ON state as PDU is given.
- The echoing of given characters back from the TA is controlled by V.25ter echo command E.
- The PDU shall be hexadecimal format (similarly as specified for <pdu>) and given in one line; ME/TA converts this coding into the actual octets of PDU.
- When the length octet of the SMSC address (given in the <pdu>) equals zero, the SMSC address set with command Service Centre Address +CSCA is used.
- Sending can be cancelled by giving <ESC> character (IRA 27).

- <ctrl-Z> (IRA 26) must be used to indicate the ending of PDU.

<mr>	Description
Integer type	GSM 03.40 TP-Message-Reference in integer format

<length>	Description
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<ackpdu>	Description
...	GSM 03.40 RP-User-Data element of RP-ACK PDU; format is same as for <pdu> in case of SMS, but without GSM 04.11 SC address field and parameter shall be bounded by double quote characters like a normal string type parameter

Text Mode

Description	Command	Possible Responses
Send message	AT+CMGS=<da> [<i>,<tda></i>] <CR> <i>Text is entered</i> <ctrl-Z/ESC>	<ul style="list-style-type: none"> • +CMGS: <mr>[<i>,<scts></i>] • +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMGS=?	<ul style="list-style-type: none"> • OK • ERROR

Sends a message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. Optionally, when AT+CSMS <service> value is 1 and there is network support, <scts> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. This command is abortable.

- The entered text (GSM 03.40 TP-Data-Unit) is sent to address <da> and all current settings (refer Set Text Mode Parameters +CSMP and Service Centre Address +CSCA) are used to construct the actual PDU in the ME/TA.
- The TA shall send a four character sequence <CR><LF><greater_than><space> (IRA 13, 10, 62, 32) after the command line is terminated with <CR>; after that text can be entered from the TE to the ME/TA.
- The DCD signal is in the ON state as text is entered.
- The echoing of entered characters back from the TA is controlled by V.25ter echo command E.

- The entered text should be formatted as follows:

if <dc> (set with +CSMP) indicates that GSM 03.38 default alphabet is used and <fo> indicates that GSM 03.40 TP-User-Data-Header-Indication is not set:

if TE character set other than "HEX" (refer command Select TE Character Set +CSCS in TS 07.07): ME/TA converts the entered text into GSM alphabet according to rules of Annex A; backspace can be used to delete last character and carriage returns can be used (previously mentioned four character sequence shall be sent to the TE after every carriage return entered by the user);

if TE character set is "HEX": the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts to 7-bit characters of GSM alphabet (e.g. 17 (IRA 49 and 55) will be converted to character P (GSM 23));

if <dc> indicates that 8-bit or UCS2 data coding scheme is used or <fo> indicates that GSM 03.40 TP-User-Data-Header-Indication is set: the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts into 8-bit octet (e.g. two characters 2A (IRA 50 and 65) will be converted to an octet with integer value 42).

- Sending can be cancelled by giving <ESC> character (IRA 27).
- <ctrl-Z> (IRA 26) must be used to indicate the ending of the message body.

<da>	Description
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <tda>
<tda>	Description
String type	GSM 04.11 TP-Destination- Address Type-of-Address octet in integer format (when first character of <da> is +(IRA 43) default is 145, otherwise default is 129
<mr>	Description
String type	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer <dt>)
<mr>	Description
Integer	GSM 03.40 TP-Message-Reference

16.8 AT+CMSS Send From Storage

PDU mode

Description	Command	Possible Responses
Send from storage	AT+CMSS=<index>	<ul style="list-style-type: none"> • +CMSS: <mr> • +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMSS=?	<ul style="list-style-type: none"> • OK • ERROR

Sends message with location value <index> from message storage <mem2> to the network (SMS-SUBMIT or SMS-COMMAND). Reference value <mr> is returned to the TE on successful message delivery. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. This command is abortable.

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<mr>	Description
Integer type	GSM 03.40 TP-Message-Reference in integer format

Text Mode

Description	Command	Possible Responses
Send from storage	AT+CMSS=<index> [,<da> [,<tda>]]	<ul style="list-style-type: none"> • +CMSS: <mr> [,<scts>] • +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMSS=?	<ul style="list-style-type: none"> • OK • ERROR

Sends message with location value <index> from message storage <mem2> to the network (SMS-SUBMIT or SMS-COMMAND). Reference value <mr> is returned to the TE on successful message delivery. Optionally, when +CSMS <service> value is 1 and network supports, <scts> is returned. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. This command is abortable.

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<i><da></i>	<i>Description</i>
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <tda>
<i><tda></i>	<i>Description</i>
String type	GSM 04.11 TP-Destination- Address Type-of-Address octet in integer format (when first character of <da> is +(IRA 43) default is 145, otherwise default is 129)
<i><scts></i>	<i>Description</i>
String type	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer <dt>)
<i><mr></i>	<i>Description</i>
Integer type	GSM 03.40 TP-Message-Reference in integer format

16.9 AT+CMGC Send Command

PDU Mode

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Send command message	AT+CMGC=<length><CR><pdu><ctrl-Z/ESC>	<ul style="list-style-type: none"> if PDU mode (+CMGF=0) and sending successful: +CMGC: <mr>[,<ackpdu>] if sending fails: +CMS ERROR: <err> OK ERROR
Show if the command is supported	AT+CMGC=?	<ul style="list-style-type: none"> OK ERROR

Sends a command message from a TE to the network (SMS-COMMAND). The entering of PDU is as specified in the send message command, +CMGS. Message reference value <mr> is returned to the TE on successful message delivery. Optionally (when +CSMS <service> value is 1 and network supports) <ackpdu> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. This command is abortable.

<i><length></i>	<i>Description</i>
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)
<i><pdu></i>	<i>Description</i>
String	In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) In the case of CBS: GSM 03.41 TPDU in hexadecimal format
<i><mr></i>	<i>Description</i>
Integer type	GSM 03.40 TP-Message-Reference in integer format
<i><ackpdu></i>	<i>Description</i>
String	GSM 03.40 RP-User-Data element of RP-ACK PDU; format is same as for <pdu> in case of SMS, but without GSM 04.11 SC address field and parameter shall be bounded by double quote characters like a normal string type parameter

Text Mode

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Send command message	AT+CMGC=<fo>,<ct>[,<pid>[,<mn>[,<da>[,<toda>]]]] <CR> Text is entered <ctrl-Z/ESC>	<ul style="list-style-type: none"> if PDU mode (+CMGF=1) and sending successful: +CMGC: <mr>[,<scts>] if sending fails: +CMS ERROR: <err> OK ERROR
Show if the commands is supported	AT+CMGC=?	<ul style="list-style-type: none"> OK ERROR

Sends a command message from a TE to the network (SMS-COMMAND). The entering of text is as specified in the send message command, +CMGS, but the format is fixed to be a sequence of two IRA character long hexadecimal numbers, which the ME/TA converts into 8-bit octets (refer to +CMGS). Message reference value <mr> is returned to the TE on successful message delivery. Optionally, when +CSMS <service> value is 1 and there is network support, <scts> is returned. Values can be used to identify message upon unsolicited

delivery status report result code. If sending fails in a network or an ME error, final result code **+CMS ERROR: <err>** is returned. This command is abortable.

<i><fo></i>	<i>Description</i>
0	First octet of SMS-DELIVER in integer format
1	First octet of SMS_SUBMIT in integer format
2	First octet of SMS-STATUS-REPORT in integer format
3	First octet of SMS-COMMAND in integer format

<i><ct></i>	<i>Description</i>
Integer	GSM 03.40 TP-Command-Type (default 0)

<i><pid></i>	<i>Description</i>
0-255	Protocol Identifier in integer format. Default value = 0. According to 07.05 section 9.2.3.9

<i><mn></i>	<i>Description</i>
Integer	GSM 03.40 TP-Message-Number

<i><da></i>	<i>Description</i>
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +cscs). Type of address given by <i><toda></i>

<i><toda></i>	<i>Description</i>
String type	GSM 04.11 TP-Destination- Address Type-of-Address octet in integer format (when first character of <i><da></i> is +(IRA 43) default is 145, otherwise default is 129)

<i><mr></i>	<i>Description</i>
Integer type	GSM 03.40 TP-Message-Reference in integer format

<i><scts></i>	<i>Description</i>
String type	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer <i><dt></i>)

16.10 AT+CPMS Preferred Message Storage

Common for both PDU and Text Modes

Description	Command	Possible Responses
Set preferred message storage	AT+CPMS=<mem1> [,<mem2>] [,<mem3>]	<ul style="list-style-type: none"> +CPMS: <used1>,<total1>,<used2>,<total2>,<used3>,<total3> +CMS ERROR: <err> OK ERROR
Read the command	AT+CPMS?	<ul style="list-style-type: none"> +CPMS: <mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>,<mem3>,<used3>,<total3> +CMS ERROR: <err> OK ERROR
Show if the command is supported	AT+CPMS=?	<ul style="list-style-type: none"> +CPMS: (list of supported <mem1>s),(list of supported <mem2>s),(list of supported <mem3>s) OK ERROR

Selects memory storage <mem1>, <mem2> and <mem3> to be used for reading, writing, etc. If chosen storage is not appropriate for the ME (but is supported by the TA), final result code +CMS ERROR: <err> shall be returned.

Test command returns lists of memory storage supported by the TA.

<mem1>	Description
string type	Memory from which messages are read and deleted (commands List Messages +CMGL, Read Message +CMGR and Delete Message +CMGD)
"ME"	ME message storage
"SM"	SIM message storage

<mem2>	Description
string type	Memory to which writing and sending operations are made (commands Send Message from Storage +CMSS and Write Message to Memory +CMGW)
"ME"	ME message storage
"SM"	SIM message storage

<i><mem3></i>	<i>Description</i>
string type	Memory to which received SMs are preferred to be stored (unless forwarded directly to TE). Received CBMs are always stored in "BM" (or some manufacturer specific storage) unless directly forwarded to TE
"ME"	ME message storage
"SM"	SIM message storage

<i><used1>,<used2>,<used3></i>	<i>Description</i>
integer type	Total number of messages currently in <mem1>, <mem2> and <mem3> respectively

<i><total1>,<total2> ,<total3></i>	<i>Description</i>
integer type	Total number of message locations in <mem1>, <mem2> and <mem3> respectively

16.11 AT+CNMI New Message Indications to TE

PDU Mode

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set new message indication to TE	AT+CNMI=[<mode> [,<mt>[,<bm>[,<ds>[,<bfr>]]]]]	<ul style="list-style-type: none"> • +CMS ERROR: <err> • OK • ERROR
Shows the current setting	AT+CNMI?	<ul style="list-style-type: none"> • +CNMI: <mode>,<mt>,<bm>,<ds>,<bfr> • OK • ERROR
Show if the command is supported	AT+CNMI=?	<ul style="list-style-type: none"> • +CNMI: (list of supported <mode>s), (list of supported <mt>s), (list of supported <bm>s), (list of supported <ds>s), (list of supported <bfr>s) • OK • ERROR

Selects the procedure for the way in which new messages received from the network, are indicated to the TE when it is active, e.g. DTR signal is ON. If the TE is inactive (DTR signal is OFF), message receiving is carried out as specified in GSM 03.38 (3G TS 23.038).

If the command fails and the error is related to mobile equipment or network, the final result code CMS ERROR: <err> is returned.

<i><mode></i>	<i>Description</i>
3	Forward unsolicited result codes directly to the TE. TA-TE link specific inband technique used to embed result codes and data when TA is in on-line data mode

<i><mt></i>	<i>Description</i>
0	No SMS-DELIVER indications are routed to the TE. No class, Class 0, class 1 and class 3 use <mem3> as preferred storage. Class 2 messages shall be stored in the SIM. If it is not possible then the MS shall send an error message accordingly to GSM 03.38
1	SMS-DELIVER is stored into ME/TA and the indication of the memory location is routed to the TE using unsolicited result code: +CMTI: <mem>,<index>
2	Class 0, class 1, and class 3 SMS-DELIVERS are routed directly to the TE using the unsolicited result code but not stored in ME/TA: +CMT:[<alpha >], <length><CR><LF><pdu> (PDU mode enabled) Class 2 data coding scheme result in indication as defined in <mt>=1
3	Class 3 SMS-DELIVERS are routed directly to TE using unsolicited result codes +CMT: <length><CR><LF><pdu>. Class 3 SMS-DELIVER is not stored in ME/TA. Messages of other data coding schemes result in indication as defined in <mt>=1

<i><bm></i>	<i>Description</i>
0	Store message to "BM" (or some manufacturer specific memory). No CBM indications are routed to the TE
2	New CBMs are routed directly to the TE using unsolicited result code: +CBM: <length><CR><LF><pdu> (PDU mode enabled). New CBMs are not stored in CBM memory

<i><ds></i>	<i>Description</i>
0	No SMS-STATUS-REPORTs are routed to the TE. SMS-STATUS-REPORT is stored in ME/TA
1	SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: +CDS: < length>< CR>< LF>< pdu> (PDU mode enabled). SMS-STATUS-REPORT is not stored in ME/TA
2	SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: +CDSI: < mem><index> (PDU mode enabled). SMS-STATUS-REPORT is stored in ME/TA

<i><bfr></i>	<i>Description</i>
<u>Q</u>	TA buffer of unsolicited result codes defined within this command is flushed to the TE when <i><mode></i> 1..2 is entered (OK response shall be given before flushing the codes). Not supported

Unsolicited Result codes:

+CMT: *<length><CR><LF><pdu>*

+CMTI: *<mem>,<index>*

+CBM: *<length><CR><LF><pdu>*

+CDS: *<length><CR><LF><pdu>*

+CDSI: *<mem><index>*

Text Mode

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set new message indication to TE	AT+CNMI=[<i><mode></i> [, <i><mt></i> [, <i><bm></i> [, <i><ds></i> [, <i><bfr></i>]]]]]	<ul style="list-style-type: none"> • +CMS ERROR: <i><err></i> • OK • ERROR
Shows the current setting	AT+CNMI?	<ul style="list-style-type: none"> • +CNMI: <i><mode>,<mt>,<bm>,<ds>,<bfr></i> • OK • ERROR
Show if the command is supported	AT+CNMI=?	<ul style="list-style-type: none"> • +CNMI: (list of supported <i><mode></i>s), (list of supported <i><mt></i>s), (list of supported <i><bm></i>s), (list of supported <i><ds></i>s), (list of supported <i><bfr></i>s) • OK • ERROR

Selects the procedure for the way in which new messages received from the network, are indicated to the TE when it is active, e.g. DTR signal is ON. If TE is inactive (DTR signal is OFF), message receiving is carried out as specified in GSM 03.38 (3G TS 23.038).

If the command fails and the error is related to mobile equipment or network, the final result code CMS ERROR: *<err>* is returned.

<i><mode></i>	<i>Description</i>
3	Forward unsolicited result codes directly to the TE. TA-TE link specific inband technique used to embed result codes and data when TA is in on-line data mode

<i><mt></i>	<i>Description</i>
<u>0</u>	No SMS-DELIVER indications are routed to the TE. No class, Class 0, class 1 and class 3 use <mem3> as preferred storage. Class 2 messages shall be stored in the SIM. If it is not possible then the MS shall send an error message accordingly to GSM 03.38
1	SMS-DELIVER is stored into ME/TA and the indication of the memory location is routed to the TE using unsolicited result code: +CMTI: <mem>,<index>
2	Class 0, class 1, and class 3 SMS-DELIVERS are routed directly to the TE using the unsolicited result code: +CMT:<oa>, [<alpha>, <scts> [,<tooa>,<fo>,<pid>,<dc>,<sca>,<tosca>,<length>]-<CR><LF><data> (text mode enabled). About parameters in italics, refer to the show text mode command, +CSDH
3	Class 3 SMS-DELIVERS are routed directly to TE using unsolicited result codes +CMT:<oa>, [<alpha>, <scts> [,<tooa>,<fo>,<pid>,<dc>,<sca>,<tosca>,<length>]-<CR><LF><data> (Text Mode enabled). About parameters in italics, refer to the show text mode command, +CSDH. Messages of other data coding schemes result in indication as defined in <mt>=1
<i><bm></i>	<i>Description</i>
<u>0</u>	Store message to "BM" (or some manufacturer specific memory). No CBM indications are routed to the TE
2	New CBMs are routed directly to the TE using unsolicited result code: +CBM: <sn>,<mid>,<dc>,<page>,<pages><CR><LF><data> (Text mode enabled)
<i><ds></i>	<i>Description</i>
0	No SMS-STATUS-REPORTs are routed to the TE
1	SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: : +CDS: <fo>,<mr>,<ra>,<tora>,<scts>,<dt>,<st> (Text mode enabled). SMS-STATUS-REPORT is not stored in ME/TA
2	SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: +CDSI: < mem><index> (Text mode enabled). SMS-STATUS-REPORT is stored in ME/TA
<i><bfr></i>	<i>Description</i>
<u>0</u>	TA buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1..2 is entered (OK response shall be given before flushing the codes). Not supported

Unsolicited Result codes:

+CMT:<oa>, [*<alpha>*, *<scts>*]
 [,*<toa>*,*<fo>*,*<pid>*,*<dcs>*,*<sca>*,*<tosca>*,*<length>*]*<CR><LF>*
<data> (Text Mode enabled). Refer to the show text mode command,
 +CSDH for information on the parameters in italics.
 +CMTI: *<mem>*,*<index>*
 +CBM: *<sn>*,*<mid>*,*<dcs>*,*<page>*,*<pages>**<CR><LF>**<data>*
 +CDS: *<fo>*,*<mr>*,[*<ra>*],[*<tora>*],*<scts>*,*<dt>*,*<st>*
 +CDSI: *<mem>**<index>*

16.12 AT+CMGR Read Message

PDU Mode

Description	Command	Possible Responses
Read message	AT+CMGR= <i><index></i>	<ul style="list-style-type: none"> +CMGR: <i><stat></i>,[<i><alpha></i>],<i><length></i>]<i><CR><LF></i><i><pdu></i> +CMS ERROR: <i><err></i> OK ERROR
Show if the command is supported	AT+CMGR=?	<ul style="list-style-type: none"> OK ERROR

Returns message with location value *<index>* from preferred message storage *<mem1>* to the TE. Status of the message and entire message data unit *<pdu>* is returned. If status of the message is 'received unread', status in the storage changes to 'received read'. If reading fails, final result code +CMS ERROR: *<err>* is returned.

<i><stat></i>	Description
0	Received unread message (i.e. new message)
1	Received read message
2	Stored unsent message (only applicable to SMS)
3	Stored sent message (only applicable to SMS)
16	Template message. Not supported

<i><index></i>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<i><alpha></i>	Description
String type	Manufacturing specific. Should be left empty but not omitted

<i><length></i>	<i>Description</i>
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<i><pdu></i>	<i>Description</i>
	In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) In the case of CBS: GSM 03.41 TPDU in hexadecimal format

Text Mode

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Read message	AT+CMGR= <index>	<ul style="list-style-type: none"> • if text mode (+CMGF=1), command successful and SMS-DELIVER:+CMGR: <stat>,<oa>,[<alpha>],<scts>,[<toa>],<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data> • if text mode (+CMGF=1), command successful and SMS-SUBMIT:+CMGR: <stat>,<da>,[<alpha>],[<toda>],<fo>,<pid>,<dcs>,[<vp>],<sca>,<tosca>,<length>]<CR><LF><data> • if text mode (+CMGF=1), command successful and SMS-STATUS-REPORT:+CMGR: <stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st> • if text mode (+CMGF=1), command successful and SMS-COMMAND:+CMGR: <stat>,<fo>,<ct>[,<pid>,[<mn>],[<da>],[<toda>],<length>]<CR><LF><cdata>] • if text mode (+CMGF=1), command successful and CBM storage:+CMGR: <stat>,<sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data> • +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMGR=?	<ul style="list-style-type: none"> • OK • ERROR

Returns messages with location index <index> from message storage <mem1> to the TE. About text mode parameters in *Italics*, refer command Show Text Mode Parameters (+CSDH). If the status of the message is 'received unread', status in the storage changes to 'received read'. If listing fails final result code +CMS ERROR: <err> is returned.

<i><index></i>	<i>Description</i>
Integer type	Value in the range of location numbers supported by <mem1>

<i><stat></i>	<i>Description</i>
0	Received unread message (new message)
1	Received read message
2	Stored unsent message (only applicable to SMS)
3	Stored sent message (only applicable to SMS)
4	All messages (only applicable to +CMGL command). Not supported

<i><oa></i>	<i>Description</i>
String type	GSM 03.40 TP-Originating-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toa>

<i><da></i>	<i>Description</i>
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

<i><toda></i>	<i>Description</i>
String type	GSM 04.11 TP-Destination- Address Type-of-Address octet in integer format (when first character of <da> is +(IRA 43) default is 145, otherwise default is 129)

<i><toa></i>	<i>Description</i>
String type	GSM 04.11 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)

<i><tora></i>	<i>Description</i>
String type	GSM 04.11 TP-Recipient-Address Type-of-Address octet in integer format (default refer <toda>)

<i><alpha></i>	<i>Description</i>
String type	Manufacturing specific. Should be left empty but not omitted, i.e. commas shall mark the place were it should be. Used character set should be the one selected with command Select TE Character Set +CSCS

<i><scts></i>	<i>Description</i>
String type	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer <dt>)

<i><length></i>	<i>Description</i>
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<data>

The entered text should be formatted as follows:

if *<dc>* (set with +CSMP) indicates that GSM 03.38 default alphabet is used and *<fo>* indicates that GSM 03.40 TP-User-Data-Header-Indication is not set:

if TE character set other than "HEX" (refer command Select TE Character Set +CSCS in TS 07.07): ME/TA converts the entered text into GSM alphabet according to rules of Annex A; backspace can be used to delete last character and carriage returns can be used (previously mentioned four character sequence shall be sent to the TE after every carriage return entered by the user);

if TE character set is "HEX": the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts to 7-bit characters of GSM alphabet (e.g. 17 (IRA 49 and 55) will be converted to character P (GSM 23));

if *<dc>* indicates that 8-bit or UCS2 data coding scheme is used or *<fo>* indicates that GSM 03.40 TP-User-Data-Header-Indication is set: the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts into 8-bit octet (e.g. two characters 2A (IRA 50 and 65) will be converted to an octet with integer value 42);

sending can be cancelled by giving *<ESC>* character (IRA 27)
<ctrl-Z> (IRA 26) must be used to indicate the ending of the message body

<i><fo></i>	<i>Description</i>
0	First octet of SMS-DELIVER in integer format
1	First octet of SMS_SUBMIT in integer format
2	First octet of SMS-STATUS-REPORT in integer format
3	First octet of SMS-COMMAND in integer format

<i><mr></i>	<i>Description</i>
Integer	GSM 03.40 TP-Message_Reference

<i><ra></i>	<i>Description</i>
String type	GSM 03.40 TP-Recipient-Address-Value field. BCD (or GSM default alphabet) are converted to characters of the currently selected TE character set (refer command +CSCS. Type of address given by <i><tosca></i>)

<i><dt></i>	<i>Description</i>
String type	GSM 03.40 TP-Discharge-Time in string format "yy/mm/dd,hh:mm:ss±zz where characters indicate year, month, day, hour, minutes, seconds and time zone
<i><st></i>	<i>Description</i>
Integer	GSM 03.40 TP-status
<i><ct></i>	<i>Description</i>
Integer	GSM 03.40 TP--command-type (default 0)
<i><sn></i>	<i>Description</i>
Integer	GSM 03.41 CBM serial number
<i><mid></i>	<i>Description</i>
String type	All different possible combinations of CBM message identifiers (refer <i><mid></i>) (default is empty string); e.g. "0,1,5-7"
	<i><mid></i> GSM 03.41 CBM message identifier in integer format
<i><page></i>	<i>Description</i>
Integer format	GSM 03.41 CBM page parameter bits 4-7 in integer format
<i><pages></i>	<i>Description</i>
Integer type	GSM 03.41 CBM page parameter bits 0-3 in integer format
<i><pid></i>	<i>Description</i>
0 - 255	Protocol Identifier in integer format. Default value = 0, according to 07.05 section 9.2.3.9
<i><dc></i>	<i>Description</i>
0 - 255	Data coding scheme. See GSM 03.48. UCS2 and compressed text not supported
<i><sca></i>	<i>Description</i>
String type	GSM 04.11 RP SC address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set

<i><tosca></i>	<i>Description</i>
Integer type	GSM 04.11 RP SC address type-of-address octet in integer format
129	ISDN/telephony numbering plan, national/international unknown. Default if no "+" in sca
145	ISDN/telephony numbering plan, international number. Default if "+" in sca
161	ISDN/telephony numbering plan, national number
128 - 255	Other values refer to GSM 04.08 section 10.5.4.7

<i><vp></i>	<i>Description</i>
0 - 143	(TP-VP+1) x 5 minutes (i.e. 5 minute intervals up to 12 hours)
144 - 167	12 hours + ((TP_VP-143) x 30 minutes)
168 - 196	(TP-VP-166) x 1 day
197 - 255	(TP-VP-192) x 1 week

<i><mn></i>	<i>Description</i>
Integer type	GSM 03.40 TP-message-number

16.13 AT+CMGL List Message

PDU Mode

Description	Command	Possible Responses
List message	AT+CMGL [=<stat>]	<ul style="list-style-type: none"> +CMGL: <index>,<stat>,[<alpha>],<length> <CR><LF><pdu>[<CR><LF> +CMGL: <index>,<stat>,[<alpha>],<length><CR> <LF><pdu>[...]] +CMS ERROR: <err> OK ERROR
Show if the command is supported	AT+CMGL=?	<ul style="list-style-type: none"> +CMGL: (list of supported <stat>s) OK ERROR

Note! Returns messages with status value <stat> from preferred message storage <mem1> to the TE. Entire data units <pdu> are returned. If status of the message is 'received unread', status in the storage changes to 'received read'. If listing fails, final result code +CMS ERROR: <err> is returned.

<stat>	Description
0	Received unread message (i.e. new message)
1	Received read message
2	Stored unsent message (only applicable to SMS)
3	Stored sent message (only applicable to SMS)
4	All messages (only applicable to +CMGL command)
16	Template message. Not supported

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<alpha>	Description
String type	Manufacturing specific. Should be left empty but not omitted

<length>	Description
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<i><pdu></i>	<i>Description</i>
	In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) In the case of CBS: GSM 03.41 TPDU in hexadecimal format

Text Mode

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
List message	AT+CMGL [=<stat>]	<ul style="list-style-type: none"> • if text mode (+CMGF=1), command successful and SMS-SUBMITs and/or SMS-DELIVERs: +CMGL: <index1>,<stat>,<oa/da>,[<alpha>],[<scts>][,<tooa/toda>,<length>]<CR><LF><data>[<CR><LF> +CMGL: <index2>,<stat>,<oa/da>,[<alpha>],[<scts>][,<tooa/toda>,<length>]<CR><LF><data>[...]] • if text mode (+CMGF=1), command successful and SMS-STATUS-REPORTs: +CMGL:<index1>,<stat>,<fo>,<mr>,[<ra>],[<tora>],[<scts>,<dt>,<st>] [<CR><LF> +CMGL:<index2>,<stat>,<fo>,<mr>,[<ra>],[<tora>],[<scts>,<dt>,<st>[...]] • if text mode (+CMGF=1), command successful and SMS-COMMANDs: +CMGL:<index>,<stat>,<fo>,<ct> [<CR><LF> +CMGL:<index>,<stat>,<fo>,<ct>[...]] • if text mode (+CMGF=1), command successful and CBM storage: +CMGL:<index>,<stat>,<sn>,<mid>,<page>,<pages>,<CR><LF><data> [<CR><LF> +CMGL:+CMGL:<index>,<stat>,<sn>,<mid>,<page>,<pages><CR><LF> <data>[...]] • otherwise: +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMGL=?	<ul style="list-style-type: none"> • +CMGL: (list of supported <stat>s) • OK • ERROR

Returns messages with status value <stat> from message storage <mem1> to the TE. About text mode parameters in *Italics*, refer command Show Text Mode Parameters (+CSDH). If the status, of the message is 'received unread', status in the storage changes to 'received read'. If listing fails final result code +CMS ERROR: <err> is returned.

<i><index></i>	<i>Description</i>
Integer type	Value in the range of location numbers supported by <mem1>

<i><stat></i>	<i>Description</i>
Integer	Indicates the status of messages in memory
0	Received unread message (new message)
1	Received read message
2	Stored unsent message (only applicable to SMS)
3	Stored sent message (only applicable to SMS)
4	All messages (only applicable to +CMGL command)

<i><oa></i>	<i>Description</i>
String type	GSM 03.40 TP-Originating-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toa>

<i><da></i>	<i>Description</i>
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toa>

<i><toa></i>	<i>Description</i>
String type	GSM 04.11 TP-Destination- Address Type-of-Address octet in integer format (when first character of <da> is +(IRA 43) default is 145, otherwise default is 129)

<i><tooa></i>	<i>Description</i>
String type	GSM 04.11 TP-Originating-Address Type-of-Address octet in integer format (default refer <toa>)

<i><tora></i>	<i>Description</i>
String type	GSM 04.11 TP-Recipient-Address Type-of-Address octet in integer format (default refer <toa>)

<i><alpha></i>	<i>Description</i>
String type	Manufacturing specific. Should be left empty but not omitted i.e. commas shall mark the place were it should be. Used character set should be the one selected with command Select TE Character Set +CSCS

<i><scts></i>	<i>Description</i>
String type	GSM 03.40 TP-service-centre-time-stamp in time-string format (refer <dt>)

<i><length></i>	<i>Description</i>
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

16.14 AT+CMGD Delete Message

Common for both PDU and Text modes

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Delete message	AT+CMGD=<index> [,<delflag>]	<ul style="list-style-type: none"> +CMS ERROR: <err> OK ERROR
Show if the command is supported	AT+CMGD=?	<ul style="list-style-type: none"> OK ERROR

Deletes message from preferred message storage <mem1> location <index>. If <delflag> is present and not set to 0 then the ME will ignore <index> and follow the rules for <delflag> shown below. If deleting fails, final result code +CMS ERROR: <err> is returned. Test command shows the valid memory locations and optionally the supported values of <delflag>.

<i><index></i>	<i>Description</i>
Integer type	Indicates multiple messages delation request as follows
0	Delete the message specified in <index>
1	Delete all read messages from preferred message storage, leaving unread messages and stored mobile originated messages (whether sent or not) untouched
2	Delete all read messages from preferred message storage and sent mobile originated messages, leaving unread messages and unsent mobile originated messages untouched
3	Delete all read messages from preferred message storage, sent and unsent mobile originated messages leaving unread messages untouched
4	Delete all messages from preferred message storage including unread messages

<i><index></i>	<i>Description</i>
Integer type	Value in the range of location numbers supported by the associated memory

16.15 AT+CSDH Show Text Mode Parameters

Only Applicable to Text Mode

Description	Command	Possible Responses
Set the show text mode	AT+CSDH=[<show>]	<ul style="list-style-type: none"> +CME ERROR: <err> OK
Display current settings	AT+CSDH?	<ul style="list-style-type: none"> +CSDH: <show> +CME ERROR: <err>
Show if the command is supported	AT+CSDH=?	<ul style="list-style-type: none"> +CSDH: (list of supported <show>s) OK +CME ERROR: <err>

Controls whether detailed header information is shown in text mode result codes.

<show>	Description
0	Do not show header values defined in commands AT+CSCA and AT+CSMP (<sca>, <tosca>, <fo>, <vp>, <pid> and <dc>) nor <length>, <today> or <tooa> in +CMT, +CMGL, +CMGR result codes for SMS-DELIVERs and SMS-SUBMITs in text mode; for SMS-COMMANDs in +CMGR result code, do not show <pid>, <mn>, <da>, <today>, <length> or <cdata>
1	Show the values in result codes

16.16 AT+CSMP Set Text Mode Parameters

Only Applicable to Text Mode

Description	Command	Possible Responses
Set the text mode parameters	AT+CSMP=[<fo> [<vp>,<pid> [<dc>]]]	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Display current settings	AT+CSMP?	<ul style="list-style-type: none"> +CSMP: <fo>,<vp>,<pid>,<dc> +CME ERROR: <err>
Show if the command is supported	AT+CSMP=?	<ul style="list-style-type: none"> +CSMP: (List of supported <fo>s), (list of supported <vp>s), (list of supported <pid>s), (list of supported <dc>s) +CME ERROR: <err> OK ERROR

Used to select values for additional parameters needed when SM is sent to the network or placed in a storage when text format message mode is selected. It is possible to set the validity period starting from when the SM is received by the SMSC (<vp> is in range 0... 255). The <pid> parameter identifies the higher protocol being used or indicates

interworking with a certain type of telematic service and <dc> determines the way the information is encoded as in GSM 03.38.

<fo>	Description
0-255	Depending on the command or result code: first octet of GSM 03.40 SMS-DELIVER, SMS-SUBMIT (default 17), SMS-STATUS-REPORT, or SMS-COMMAND (default 2) in integer format

<vp>	Description
0-143	(TP-VP+1) x 5 minutes (i.e 5 minutes intervals up to 12 hours)
144-167	12 hours + ((TP_VP-143) x 30 minutes)
168-196	(TP-VP-166) x 1 day
197-255	(TP-VP-192) x 1 week

<pid>	Description
0-255	Protocol Identifier in integer format. Default value = 0. According to 07.05 section 9.2.3.9

<dc>	Description
0-255	Data coding scheme. See GSM 03.38. UCS2 and compressed text not supported

16.17 AT+CSCS Select Character Set

Description	Command	Possible Responses
Set command informs TA which character set is used by the TE	AT+CSCS=<chset>	<ul style="list-style-type: none"> • OK • ERROR
Show the current setting	AT+CSCS?	<ul style="list-style-type: none"> • +CSCS: <chset> • OK • ERROR
Show list of supported character sets	AT+CSCS=?	<ul style="list-style-type: none"> • +CSCS: (list of supported <chset>s) • OK • ERROR

This command informs the TA which character set <chset> is used by the TE. The TA is then able to convert character strings correctly between TE and ME character sets.

When TA-TE interface is set to 8-bit operation and the used TE alphabet is 7-bit, the highest bit shall be set to zero.

Note! How the internal alphabet of ME is converted to, or from, the TE alphabet is manufacturer specific.

Read command shows current setting and test command display conversion schemes implemented in the TA.

<i><chset ></i>	<i>Description</i>
"GSM"	GSM default alphabet (GSM 03.38 subclause 6.2.1). Default setting
"IRA"	International reference alphabet (ITU-T T.50 [3]). Note: recommended default setting by GSM 07.07. [2]
"8859-n"	ISO 8859 Latin <i>n</i> (1-6) character set
"UTF8"	Universal text format, 8 bits
"UCS2"	Unicode, 16-bit universal multiple-octet coded character set (ISO/IEC10646)

16.18 AT*ESTL

Ericsson SMS Template List Edit

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Add or delete item to SMS template list	AT*ESTL=<stix> [<i>,<text></i>]	<ul style="list-style-type: none"> +CME ERROR OK ERROR
List all entries in SMS template list	AT*ESTL?	<ul style="list-style-type: none"> *ESTL: <stix1>,<text1>[<CR><LF><stix2>,<text2>[...]] +CME ERROR OK ERROR
Show if the command is supported	AT*ESTL=?	<ul style="list-style-type: none"> *ESTL: (list of supported <stix>s),<text> OK ERROR

This command adds an SMS template, specified by the *<text>* parameter, to the list of SMS templates at the position specified by the *<stix>* parameter. If the list already contains an SMS template at the position *<stix>* this template is overwritten by the template given by the *<text>* parameter.

If the *<text>* parameter is omitted, the command removes the SMS Template from the list at the position specified by the *<stix>* parameter.

The read command lists all entries in the SMS Template list.

<i><stix></i>	<i>Description</i>
Integer value	Index to list of SMS templates

<i><text></i>	<i>Description</i>
String value	SMS template text

<i><ntext></i>	<i>Description</i>
Integer value	Maximum length of the SMS template (<text>-parameter)

16.19 AT+CSMS Select Message Service

Common for both PDU and Text Modes

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Select message service	AT+CSMS=<service>	<ul style="list-style-type: none"> +CSMS: <mt>,<mo>,<bm> +CMS ERROR: <err> OK ERROR
Show supported message types along with the current service setting	AT+CSMS?	<ul style="list-style-type: none"> +CSMS: <service>,<mt>,<mo>,<bm> OK ERROR
Show list of supported services	AT+CSMS=?	<ul style="list-style-type: none"> +CSMS: (list of supported <service>s) OK ERROR

Selects messaging service <service>. It returns the types of messages supported by the ME: <mt> for mobile terminated messages, <mo> for mobile originated messages and <bm> for broadcast type messages. If the chosen service is not supported by the ME (but is supported by the TA), final result code +CMS ERROR: <err> is returned.

<i><service ></i>	<i>Description</i>
0	GSM 03.40 and 03.41. The syntax of SMS AT commands is compatible with GSM 07.05 Phase 2 version 4.7.0; Phase 2+ features which do not require new command syntax may be supported (e.g. correct routing of messages with new Phase 2+ data coding schemes)
1	GSM 03.40 and 03.41 (the syntax of SMS AT commands is compatible with GSM 07.05 Phase 2+ version; the requirement of <service> setting 1 is mentioned under corresponding command descriptions). Not supported
2..127	Reserved

<i><mt></i>	<i>Description</i>
0	Mobile terminated messages not supported
1	Mobile terminated messages supported

16. SHORT MESSAGE SERVICES - POINT TO POINT

<i><mo></i>	<i>Description</i>
0	Mobile originated messages not supported
1	Mobile originated messages supported

<i><bm></i>	<i>Description</i>
0	Broadcast messages not supported
1	Broadcast messages supported

<i><err></i>	<i>Description</i>
0...127	GSM 04.11 Annex E-2 values
128...255	GSM 03.40 subclause 9.2.3.22 values
300	ME failure
302	Operation not allowed
304	Invalid PDU mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
316	SIM PUK required
317	SIM PIN2 required
318	SIM PUK2 required
500	Unknown error
...511	Other values in range 256...511 are reserved
512...	Manufacturer specific

17. Short Message Services - Cell Broadcast

17.1 AT+CNMI *New Message Indications to TE*

See 16.11, AT+CNMI New Message Indications to TE

17.2 AT+CSCB *Select Cell Broadcast Message Type*

Common for both PDU and text modes

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Select cell broadcast message type	AT+CSCB=[<mode> [,<mids>[,<dcss>]]]	<ul style="list-style-type: none"> +CMS ERROR: <err> OK ERROR
Shows the current setting	AT+CSCB?	<ul style="list-style-type: none"> +CSCB: <mode>,<mids>,<dcss> OK ERROR
Show if the command is supported	AT+CSCB=?	<ul style="list-style-type: none"> +CSCB: (list of supported <mode>s) OK ERROR

Selects which types of CBMs are to be received by the ME.

<i><mode></i>	<i>Description</i>
Q	Message types in <mids> and <dcss> are accepted
1	Message types in <mids> and <dcss> are not accepted. Not supported

<i><mids></i>	<i>Description</i>
string type	All different possible combinations of CBM message identifiers (refer <mid>) (default is empty string); e.g. "0,1,5-7" <mid> GSM 03.41 CBM Message Identifier in integer format

<i><dcss></i>	<i>Description</i>
string type	All different possible combinations of CBM data coding schemes (refer to <dc>). Default is empty string); e.g. "0-3,5". Not supported

18. SIM Application Toolkit

18.1 AT+CPIN PIN Control

See 3.27, AT+CPIN PIN Control

18.2 AT*E2STKS SIM Application Toolkit Settings

Description	Command	Possible responses
Set the presentation of the unsolicited result codes corresponding to STK	AT*E2STKS=<on_off>	<ul style="list-style-type: none"> +CME ERROR <err> OK ERROR
Read the current status of the presentation of the unsolicited result codes	AT*E2STKS?	<ul style="list-style-type: none"> *E2STKS: <on_off> +CME ERROR <err> OK ERROR
Test if the command is supported	AT*E2STKS=?	<ul style="list-style-type: none"> *E2STKD: list of supported <on_off> +CME ERROR <err> OK ERROR

Allows the external application to disable/enable the presentation of the unsolicited result codes corresponding to the STK commands.

Parameter <on_off> is used to disable/enable the presentation of an unsolicited result code *E2STK. Setting chosen is stored internally so that it is not necessary to change it each time the ME is switched on.

If the presentation of the unsolicited result codes is disabled, the messages below are not be sent to the application.

The unsolicited result codes shall be disabled by default.

<on_off>	Description
0	Disable the presentation of the unsolicited result codes related to STK (default)
1	Enable the presentation of the unsolicited result codes related to STK

18.3 AT*E2STKD M2M STK Display Text

<i>Description</i>	<i>Command</i>	<i>Possible responses</i>
Answer to the reception of DISPLAY TEXT	AT*E2STKD <answer>	<ul style="list-style-type: none"> • +CME ERROR <err> • OK • ERROR
Test if the command is supported	AT*E2STKD=?	<ul style="list-style-type: none"> • *E2STKD: (list of supported <answer>) • +CME ERROR <err> • OK • ERROR

The ME passes the parameters within DISPLAY TEXT command to the external application by means of the unsolicited result code *E2STKD.

Command AT*E2STKD allows the external application to send the appropriate answer after receiving the unsolicited result code, and before the timeout expires.

If Answer command is sent once the timeout expires, an ERROR response is generated.

Test command returns the list of supported <answer>.

<i><answer></i>	<i>Description</i>
0	OK. Performed as required: the text was displayed and cleared as requested. It corresponds to '00' Command performed successfully, described in the GSM standard
1	OK. User Terminated Session: the text was displayed as requested and the user wants to end the proactive session. It corresponds to '10' Proactive session terminated by the user, described in the GSM standard
2	OK. User requests backwards move: the text was displayed as requested and the user wants to go backwards in the session. It corresponds to '11' Backward move in the proactive SIM session requested by the user
3	OK. No response from user: the text was displayed, and although the clear condition was "Wait for user to clear", the user did not react. It corresponds to '12' No response from user
4	FAILED. Screen is busy: the text could not be displayed

18.4 AT*E2STKG M2M STK Get Inkey

<i>Description</i>	<i>Command</i>	<i>Possible responses</i>
Answer to the reception of GET INKEY	AT*E2STKG=<answer>, [<response_type>, <user_response>]	<ul style="list-style-type: none"> • +CME ERROR <err> • OK • ERROR
Test if the command is supported	AT*E2STKG=?	<ul style="list-style-type: none"> • *E2STKG: (list of supported <answer>), (list of supported <response_type>), (list of supported <user_response>) • +CME ERROR <err> • OK • ERROR

The ME passes the parameters within GET INKEY command to the external application by means of the unsolicited result code E2STKG.

The external application then sends AT*E2STKG with the user response.

Answer command allows the external application to send the appropriate answer, after receiving the unsolicited result code, and before the timeout expires.

If Answer command is sent once the timeout expires, an ERROR response is generated.

If <answer> parameter is 4, a failure has occurred and no more parameters are sent. If the extra parameters are sent, the ME indicates ERROR.

<i><user_response></i>	<i>Description</i>
String type	Field of 1 to 2 bytes length in string type format between ". Coding is defined in <response_type>. Length shall be 2 bytes when coding is UCS2 . Otherwise it shall be 1 byte

<i><answer></i>	<i>Description</i>
0	OK. Performed as required: the text was displayed. It corresponds to '00' Command performed successfully, described in the GSM standard
1	OK. User Terminated Session: the text was displayed as requested and the user wants to end the proactive session. It corresponds to '10' Proactive session terminated by the user, described in the GSM standard
2	OK. User requests backward move: the text was displayed as requested and the user wants to go backwards in the session. It corresponds to '11' Backward move in the proactive SIM session requested by the user
3	OK. No response from user: the text was displayed, and the user did not react. It corresponds to '12' No response from user
4	FAILED. Screen is busy: the text could not be displayed

<i><response_type></i>	<i>Description</i>
0	Response type shall be digits (0-9, *, # and +)
1	Response type shall be SMS default alphabet
2	Response type shall be UCS2 alphabet
3	Response type shall be "Yes/No" response

18.5 AT*E2STKI M2M STK Get Input

<i>Description</i>	<i>Command</i>	<i>Possible responses</i>
Answer to the reception of GET INPUT	AT*E2STKI <answer>, [<i><response_type></i> , <i><response_length></i> , <i><user_response></i>]	<ul style="list-style-type: none"> +CME ERROR <err> OK ERROR
Test if the command is supported	AT*E2STKI=?	<ul style="list-style-type: none"> *E2STKI: (list of supported <i><answer></i>), (list of supported <i><response_type></i>), (list of supported <i><prompt_text_length></i>) +CME ERROR <err> OK ERROR

The ME shall pass the parameters within GET INPUT command to the external application by means of the unsolicited result code E2STKI. The external application sends AT*E2STKI with the user response.

Command AT*E2STKI allows the external application to send the appropriate answer after receiving the unsolicited result code, and before the timeout expires.

If Answer command is sent once the timeout expires, an ERROR response is generated.

If <answer> parameter is 4, a failure has occurred and no more parameters are sent. If the extra parameters are sent, the ME indicates ERROR.

Note! If <response_type>=2 (UCS-2), the length of <user_response> is an even number of bytes. Otherwise, the ME gives an ERROR message.

Note! If <response_type>=3 (Yes/No), the length of <user_response> is 1 byte. Otherwise, the ME gives an ERROR message.

<i><user_response></i>	<i>Description</i>
String type	Field of 1 to 2 bytes length in string type format between ". Coding is defined in <response_type>

<i><answer></i>	<i>Description</i>
0	OK. Performed as required: the text was displayed. It corresponds to '00' command performed successfully, described in the GSM standard
1	OK. User terminated session: the text was displayed as requested and the user wants to end the proactive session. It corresponds to '10' proactive session terminated by the user, described in the GSM standard
2	OK. User requests backward move: the text was displayed as requested and the user wants to go backwards in the session. It corresponds to '11' backward move in the proactive SIM session requested by the user
3	OK. No response from user: the text was displayed, and the user did not react. It corresponds to '12' No response from user
4	FAILED. Screen is busy: the text could not be displayed

<i><response_type></i>	<i>Description</i>
0	Response type shall be digits (0-9, *, # and +)
1	Response type shall be SMS default alphabet
2	Response type shall be UCS2 alphabet
3	Response type shall be "Yes/No" response

<i><response_length></i>	<i>Description</i>
Integer type (0-160)	Value indicating the length of response field <user_response>. It shall be an integer within the range between <min_length_response> and <max_length_response>

<i><prompt_coding></i>	<i>Description</i>
0	Text is coded in unpacked format, using the SMS default 7-bit coded alphabet, as defined in GSM 03.38 with bit 8 set to 0. It corresponds to data coding scheme of 8 bit
1	Text is coded in packed format, using the SMS default 7-bit coded alphabet, packed in 8-bit octets, as defined in GSM 03.38. It corresponds to data coding scheme of 7 bit GSM default alphabet
2	Text is coded in UCS2 alphabet, as defined in GSM 03.38. It corresponds to data coding scheme of 16 bit UCS2 alphabet

<i><prompt_text_length></i>	<i>Description</i>
Integer type (0-210)	Value indicating the maximum length of field <i><prompt_text></i>

<i><prompt_text></i>	<i>Description</i>
String type	Field of maximum length <i><prompt_text_length></i> , in string type between ". Coding is defined in <i><prompt_coding></i>

18.6 AT*E2STKL M2M STK Select Item

<i>Description</i>	<i>Command</i>	<i>Possible responses</i>
Answer to the reception of SELECT ITEM	AT*E2STKL= <i><answer></i> , [<i><user_response></i>]	<ul style="list-style-type: none"> • +CME ERROR <i><err></i> • OK • ERROR
Test if the command is supported	AT*E2STKL=?	<ul style="list-style-type: none"> • *E2STKL: (list of supported <i><answer></i>), (list of supported <i><user_response></i>) • +CME ERROR <i><err></i> • OK • ERROR

The ME shall pass the parameters within SELECT ITEM command to the external application by means of the unsolicited result code *E2STKL.

Command AT*E2STKL allows the external application to send the appropriate answer after receiving the unsolicited result code, and before the timeout expires.

If Answer command is sent once the timeout expires, an ERROR response is be generated.

If `<answer>` parameter is 4, a failure has occurred and no more parameters are sent. If the extra parameters are sent, the ME indicates **ERROR**.

<code><user_response></code>	Description
integer type	The identifier is a single byte between 1 and 29. It identifies the selected <code><item_idn></code> within the items list

<code><answer></code>	Description
0	OK. Performed as required. It corresponds to '00' command performed successfully, described in the GSM standard
1	OK. User terminated session. It corresponds to '10' Proactive session terminated by the user, described in the GSM standard
2	OK. User requests backwards move. It corresponds to '11' Backward move in the proactive SIM session requested by the user
3	OK. No response from user. It corresponds to '12' no response from user
4	FAILED. Screen is busy: the text could not be displayed

18.7 AT*E2STKM M2M STK Set Up Menu

Description	Command	Possible responses
Answer to the reception of SET UP MENU	AT*E2STKM= <code><answer></code> , <code><on_off></code>	<ul style="list-style-type: none"> +CME ERROR <code><err></code> OK ERROR
Test if the command is supported	AT*E2STKM=?	<ul style="list-style-type: none"> *E2STKM: (list of supported <code><answer></code>), (list of supported <code><on_off></code>) +CME ERROR <code><err></code> OK ERROR

The ME passes the parameters within SET UP MENU command to the external application, so that the STK menu can be built externally, by means of the unsolicited result code *E2STKM.

The current menu can be removed by sending only the parameter `<on_off> = 0`.

Answer command allows the external application to send the appropriate answer after receiving the unsolicited result code, and before the timeout expires.

If Answer command is sent once the timeout expires, an ERROR response shall be generated.

<i><answer></i>	<i>Description</i>
0	OK. Performed as required: it corresponds to '00' command performed successfully, described in the GSM standard
1	OK. User Terminated Session: the command was executed as requested and the user wants to end the proactive session. It corresponds to '10' proactive session terminated by the user, described in the GSM standard
2	OK. User requests backwards move: the command was executed as requested and the user wants to go backwards in the session. It corresponds to '11' backward move in the proactive SIM session requested by the user
3	OK. No response from user: the command was executed, and the user did not react. It corresponds to '12' no response from user
4	FAILED. Screen is busy
5	FAILED. Command beyond MEs capability. It corresponds to '30'. It was not possible to successfully integrate or remove the list of menu items

Values follow GSM 11.14 standard. See General Result byte within Result TLV corresponding to TERMINAL RESPONSE.

<i><on_off></i>	<i>Description</i>
0	Remove the current menu
1	New menu to be displayed

According to GSM 11.14 if the ME receives the "Item dat object for item 1" as a null data object, then *<on_off>* shall be set to 0.

The maximum length is fixed. Notice that 227 bytes come from subtracting the bytes corresponding to E2STKM: x,"" <CR><LF>E2STKM: x,"x" from 255. As a result, an extra parameter defining the maximum length is not required.

With the coding defined in GSM 11.11, the first byte defines the coding scheme. As a result, an extra parameter defining the coding is not required.

Values follow the definition of "Identifier of Item" in "Item" TLV object, within SET-UP MENU command, as described in GSM 11.14.

The maximum length is fixed. Notice that 226 bytes come from subtracting the occupied bytes from 255. As a result, an extra parameter defining the maximum length is not required.

18.8 AT*E2STKN M2M STK Envelope (Menu Selection)

<i>Description</i>	<i>Command</i>	<i>Possible responses</i>
Do the menu selection	AT*E2STKN <sel_item>	<ul style="list-style-type: none"> +CME ERROR <err> OK ERROR
Test if the command is supported	AT*E2STKN=?	<ul style="list-style-type: none"> *E2STKN: (list of supported <sel_item>) +CME ERROR <err> OK ERROR

The application informs the ME about the selected menu item by means of the AT*E2SKTN command. The ME answers with OK, or ERROR. The Do command allows the external application to select the menu item in the item list that was created by means of the SET-UP MENU command.

<i><sel_item></i>	<i>Description</i>
integer type	The identifier is a single byte between 1 and 29. It identifies the selected menu item corresponding to SET-UP MENU command

Values follow the definition of “Item Identifier” TLV object, within ENVELOPE (MENU SELECTION) command, as described in GSM 11.14.

18.9 AT*E2STKC M2M STK Set Up Call

<i>Description</i>	<i>Command</i>	<i>Possible responses</i>
Answer to the reception of SET UP CALL	AT*E2STKC=<answer>	<ul style="list-style-type: none"> +CME ERROR <err> OK ERROR
Test if the command is supported	AT*E2STKC=?	<ul style="list-style-type: none"> *E2STKC: (list of supported <answer>) +CME ERROR <err> OK ERROR

The ME passes the parameters within SET UP CALL command to the external application by means of the unsolicited result code *E2STKC, so that it takes up the decision on progressing or rejecting the call.

Answer command allows the external application to send the appropriate answer after receiving the unsolicited result code, and before the timeout expires.

If Answer command is sent once the timeout expires, an ERROR response is generated.

<i><answer></i>	<i>Description</i>
0	OK. Performed as required. It corresponds to '00' command performed successfully, described in the GSM standard
1	OK. User terminated session. It corresponds to '10' Proactive session terminated by the user, described in the GSM standard
2	OK. User requests backwards move. It corresponds to '11' backward move in the proactive SIM session requested by the user
3	OK. No response from user. It corresponds to '12' no response from user
4	FAILED. Screen is busy: the text could not be displayed
6	FAILED. User rejected call set-up request. It corresponds to '22'
7	FAILED. User cleared down call before connection or network release. It corresponds to '23'

19. Supplementary Services

19.1 AT+CPIN PIN Control

See 3.27, AT+CPIN PIN Control

19.2 AT+CACM Accumulated Call Meter

Description	Command	Possible Responses
Reset the ACM (Accumulated Call Meter) value on the SIM	AT+CACM=[<passwd>]	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Show the current value	AT+CACM?	<ul style="list-style-type: none"> +CACM: <acm> +CME ERROR: <err> OK ERROR
Tests if the command is supported	AT+CACM=?	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR

Resets the Advice of Charge related accumulated call meter value in SIM file EFACM. ACM contains the total number of home units for both the current and preceding calls. SIM PIN2 is usually required to reset the value. If setting fails in an ME error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Note! This command must take into account what line is chosen with AT*ELIN or via the MMI

Read command returns the current value of ACM.

<passwd>	Description
String type	SIM-PIN2

<acm>	Description
String type	Accumulated call meter value similarly coded as <ccm> under +CAOC

19.3 AT+CAMM Accumulated Call Meter Maximum

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set command sets the Advice of Charge related accumulated call meter maximum value in SIM file EF _{ACMmax}	AT+CAMM=[<acmmax>[,<passwd>]]	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Read the current value	AT+CAMM?	<ul style="list-style-type: none"> • +CAMM: <acmmax> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CAMM=?	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR

Sets the Advice of Charge related accumulated call meter maximum value in SIM file EF_{ACMmax}. ACMmax contains the maximum number of home units allowed to be consumed by the subscriber. When ACM (refer +CACM) reaches ACMmax calls are prohibited (see also GSM 02.24 [26]). SIM PIN2 is usually required to set the value. If setting fails in an ME error, +CME ERROR: <err> is returned.

Read command returns the current value of ACMmax.

<i><acmmax></i>	<i>Description</i>
String type	Accumulated call meter maximum value similarly coded as <ccm> under +CAOC; value zero disables ACMmax feature

<i><passwd></i>	<i>Description</i>
String type	SIM PIN2

19.4 AT+CAOC Advice of Charge

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Execute command	AT+CAOC[=<mode>]	<ul style="list-style-type: none"> • [+CAOC: <ccm>] +CME ERROR: <err> • OK • ERROR
Read command, shows the current mode	AT+CAOC?	<ul style="list-style-type: none"> • +CAOC: <mode> • OK • ERROR
Test command, shows if the command is supported	AT+CAOC=?	<ul style="list-style-type: none"> • [+CAOC: (list of supported <mode>s)] • OK • ERROR

Use of Advice of Charge supplementary service command (GSM 02.24 [11] and GSM 02.86 [12]) enables the subscriber to get information about the cost of calls. With <mode>=0, the execute command returns the current call meter value from the ME. The command also includes the possibility to enable an unsolicited event reporting of the CCM information. The unsolicited result code +CCCM: <ccm> is sent when the CCM value changes, but no more than every 10 seconds. Deactivation of the unsolicited event reporting is made with the same command.

Read command indicates whether the unsolicited reporting is activated or not. Read command is available when the unsolicited result code is supported.

It is recommended (although optional) that the test command return the supported mode values.

<i><mode></i>	<i>Description</i>
0	Query CCM value
1	Deactivate the unsolicited reporting of CCM value
2	Activate the unsolicited reporting of CCM value

<i><ccm></i>	<i>Description</i>
String type	Three bytes of the current call meter value in hexadecimal format (e.g. "00001E" indicates decimal value 30); value is in home units and bytes are similarly coded as ACMmax value in the SIM

19.5 AT+CPUC Price Per Unit and Currency Table

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Set command sets the parameters of Advice of Charge related price per unit and currency table in SIM file EF _{PUCT}	AT+CPUC=<currency>,<ppu>[,<passwd>]	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Shows the current values	AT+CPUC?	<ul style="list-style-type: none"> • +CPUC: <currency>,<ppu> • +CME ERROR: <err> • OK • ERROR
Shows if the command is supported	AT+CPUC=?	<ul style="list-style-type: none"> • OK • ERROR

Sets the parameters of Advice of Charge related price per unit and currency table in SIM file EF_{PUCT}. PUCT information can be used to convert the home units (as used in +CAOC, +CACM and +CMM) into currency units. SIM PIN1 or SIM PIN2 (depending on which SIM card that is used) is required to set the parameters. If setting fails in an ME error, +CME ERROR: <err> is returned.

Read command returns the current parameters of PUCT.

For information on the character set see AT+CSCS in the Short Message Services section.

<i><currency></i>	<i>Description</i>
String	Alpha-identifier of the currency code (3 characters, e.g. SEK)

<i><ppu></i>	<i>Description</i>
String type	price per unit; dot is used as a decimal separator (e.g. "2.66")

<i><passwd></i>	<i>Description</i>
String type	SIM PIN1 or SIM PIN2

19.6 AT*EDIF

Ericsson Divert Function

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Enable and disable notification with the unsolicited result code *EDIF	AT*EDIF=<onoff>	<ul style="list-style-type: none"> • +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*EDIF?	<ul style="list-style-type: none"> • *EDIF: <onoff> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EDIF=?	<ul style="list-style-type: none"> • *EDIF: (list of supported <onoff>s) • +CME ERROR: <err> • OK • ERROR

This command enables and disables notification of divert status changes with the unsolicited result code *EDIF.

<i><onoff></i>	<i>Description</i>
0	Disable notification with the unsolicited result code *EDIF
1	Enable notification with the unsolicited result code *EDIF

19.7 AT*EIPS Identity Presentation Set

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Sets the alpha tag to be displayed in the ME	AT*EIPS=<ID>,<alphaname mode>	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Read the current setting	AT*EIPS?	<ul style="list-style-type: none"> *EIPS: <ID1>,<alphaname mode1><CR><LF> *EIPS:<ID2>,<alphaname mode2><CR><LF> +CME ERROR: <err> OK ERROR
Test if the command is supported and list the possible settings	AT*EIPS=?	<ul style="list-style-type: none"> *EIPS: (list of supported ID>s),(list of supported <alphaname mode>s) +CME ERROR: <err> OK ERROR

This command enables or disables the presentation of the alpha tag of the Caller ID and Called ID to the TE if the ID is recognized. The alpha tag is the first name and the last name. The presentation is done by an unsolicited result code, *ELIP for Caller ID and *EOLP for Called ID.

<i><ID></i>	<i>Description</i>
1	Caller ID (*ELIP)
2	Called ID (*EOLP)

<i><alphaname mode></i>	<i>Description</i>
0	Off
1	First name and last name displayed

19.8 AT*ELIN *Ericsson Line Set*

Description	Command	Possible Responses
Set the current line to <line>	AT*ELIN=<line>	<ul style="list-style-type: none"> +CME ERROR: <err> OK ERROR
Read the current line	AT*ELIN?	<ul style="list-style-type: none"> *ELIN: <line> +CME ERROR: <err> OK ERROR
Test if the command is supported	AT*ELIN=?	<ul style="list-style-type: none"> *ELIN: list of supported <line>s +CME ERROR: <err> OK ERROR

This command requests the ME to set the current line to <line>.

Note! The following command reads its value from the current line and is thus affected by the use of *ELIN:

AT+CACM - Accumulated Call Meter

<line>	Description
1	L1
2	L2

19.9 AT+CCFC *Call Forwarding number and Conditions*

Description	Syntax	Possible Responses
Request Calling forwarding number and conditions	AT+CCFC=<reason>,<mode>[,<number> [,<type>[,<class> [,<subaddr> [,<satype> [,<time>]]]]]]]	<ul style="list-style-type: none"> +CME ERROR <err> when <mode>=2 and command successful: +CCFC: <status>,<class1>[,<number>,<type>[,<subaddr>,<satype> [,<time>]]][<CR><LF> +CCFC: <status>,<class2>[,<number>,<type>[,<subaddr>,<satype>[,<time>]]][...] OK ERROR
Show if the command is supported	AT+CCFC=?	<ul style="list-style-type: none"> + CCFC: (list of supported <reason>s) +CME ERROR <err> OK ERROR

This command allows control of the call forwarding supplementary service according to 3GPP TS 22.082 [4]. Registration, erasure, activation, deactivation, and status query are supported. When querying

the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>.

<i><reason></i>	<i>Description</i>
0	Unconditional
1	Mobile busy
2	No reply
3	Not reachable
4	All call forwarding (refer 3GPP TS 22.030 [19])
5	All conditional call forwarding (refer 3GPP TS 22.030 [19])

<i><mode></i>	<i>Description</i>
0	Disable
1	Enable
2	Query status
3	Registration
4	Erase

<i><number></i>	<i>Description</i>
string type	String type phone number of forwarding address in format specified by <type>

<i><type></i>	<i>Description</i>
integer format	Type of address octet (refer GSM 04.08 [3] section 10.5.4.7)
129	ISDN/telephony numbering plan, national/international unknown. Default setting if '+' is not in <sca>
145	ISDN/telephony numbering plan, international number. Default setting if '+' is in <sca>
161	ISDN/telephony numbering plan, national number
128 - 255	Other values refer GSM 04.08 [3] section 10.5.4.7

<i>< subaddr ></i>	<i>Description</i>
string type	string type subaddress of format specified by <satype>. Not supported

<i><satype></i>	<i>Description</i>
integer format	Type of subaddress octet
128	NSAP (X.213/ISO 8348 AD2), even number of address signals
136	NSAP (X.213/ISO 8348 AD2), odd number of address signals
160	User defined, even number of address signals
168	User defined, odd number of address signals
128 - 255	Other values reserved

<i>< classx ></i>	<i>Description</i>
integer	Sum of integers each representing a class of information. Default value=7
1	Voice L1
2	Data
4	Fax
8	Short message service
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access
128	Dedicated PAD access

<i><time></i>	<i>Description</i>
1..30	When no reply is enabled or queried, this gives the time in seconds to wait before a call is forwarded, default value is 20. Not supported

<i>< status ></i>	<i>Description</i>
0	Not active
1	Active

19.10 AT+CCWA Call Waiting

Description	Command	Possible Responses
Request call waiting	AT+CCWA=[<n> [,<mode> [,<class>]]]	<ul style="list-style-type: none"> • when<mode>=2 and command successful: +CCWA:<status>,<class1>[<CR><LF> +CCWA: <status>,<class2>[...]] +CME ERROR <err> • OK • ERROR
Show the current setting	AT+CCWA?	<ul style="list-style-type: none"> • +CCWA: <n> +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CCWA=?	<ul style="list-style-type: none"> • +CCWA: (list of supported <n>s) +CME ERROR <err> • OK • ERROR

This command allows control of the call waiting supplementary service according to 3GPP TS 22.083 [5]. Activation, deactivation and status query are supported. When querying the status of a network service (<mode> = 2) the response line for 'not active' case (<status> = 0) should be returned only if service is not active for any <class>. Parameter <n> is used to disable/enable the presentation of an unsolicited result code +CCWA: <number>,<type>,<class>,[<alpha>][,<CLI validity>] to the TE when call waiting service is enabled. The command is abortable when the network is interrogated.

The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

Test command returns values supported by the TA as a compound value.

<n>	Description
0	Disable
1	Enable

<mode>	Description
0	Disable
1	Enable
2	Query status

<i>< classx ></i>	<i>Description</i>
integer	Sum of integers each representing a class of information. Default value=7
1	Voice L1
2	Data
4	Fax
8	Short message service
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access
128	Dedicated PAD access
<i><status ></i>	<i>Description</i>
0	Not active
1	Active
<i><number ></i>	<i>Description</i>
String type	String type phone number of forwarding address in format specified by <type>
<i><type ></i>	<i>Description</i>
Integer format	Type of address octet in integer format (GSM 04.08 10.5.4.7, [3]);
<i><err></i>	<i>Description</i>
0	Phone failure
3	Operation not allowed
4	Operation not supported
21	Invalid index
30	No network service
31	Network timeout
100	Unknown

19.11 AT+CHLD Call Hold and Multiparty

Description	Command	Possible Responses
Request call related supplementary services	AT+CHLD=<n>	<ul style="list-style-type: none"> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CHLD=?	<ul style="list-style-type: none"> • +CHLD: (list of supported <n>s) • +CME ERROR <err> • OK • ERROR

This command allows control of the following call related services:

- a call can be temporarily disconnected from the ME but the connection is retained by the network;
- multiparty conversation (conference calls);
- the served subscriber who has two calls (one held and the other either active or alerting) can connect the other parties and release the served subscriber's own connection.

Calls can be put on hold, recovered, released, added to conversation, and transferred similarly as defined in 3GPP TS 22.030.

This is based on the GSM/UMTS supplementary services HOLD (Call Hold; refer 3GPP TS 22.083 [5] clause 2), MPTY (MultiParty; refer 3GPP TS 22.084 [22]) and ECT (Explicit Call Transfer; refer 3GPP TS 22.091 [29]). The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

Note! Call Hold and MultiParty are only applicable to teleservice 11.

It is recommended (although optional) that test command returns a list of operations which are supported. The call number required by some operations is denoted by "x" (e.g. +CHLD: (0,0x,1,1x,2,2x,3)).

<n>	Description
...	Integer type; equals to numbers entered before SEND button in GSM 02.30 [7] subclause 4.5.5.1
0	Releases all held calls or sets User Determined User Busy (UDUB) for a waiting call
0X	Releases a specific call X from a held multiparty call
1	Releases all active calls (if any exist) and accepts the other (held or waiting) call
1X	Releases a specific active call X

<i><n></i>	<i>Description</i>
2	Places all active calls (if any exist) on hold and accepts the other (held or waiting) call
2X	Places all active calls on hold, except call X with which communication is supported
3	Adds a held call to the conversation
4	Connects the two calls and disconnects the subscriber from both calls

“X” is the numbering (starting with 1) of the call given by the sequence of setting up or receiving the calls (active, held or waiting) as seen by the served subscriber. Calls hold their number until they are released. New calls take the lowest available number. Where both a held and a waiting call exists, the above procedures shall apply to the waiting call (i.e. not to the held call) in conflicting situation.

Note! The “directory number” case shall be handled with dial command D, and the END case with hangup command H (or +CHUP).

19.12 AT+CLIP *Calling Line Identification*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request calling line identification	AT+CLIP=<n>	<ul style="list-style-type: none"> • +CME ERROR <err> • OK • ERROR
Shows the current setting	AT+CLIP?	<ul style="list-style-type: none"> • + CLIP : <n>,<m> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CLIP=?	<ul style="list-style-type: none"> • + CLIP : (list of supported <n>s) • +CME ERROR <err> • OK • ERROR

This command refers to the GSM/UMTS supplementary service CLIP (Calling Line Identification Presentation) that enables a called subscriber to get the calling line identity (CLI) of the calling party when receiving a mobile terminated call. Set command enables or disables the presentation of the CLI at the TE. It has no effect on the execution of the supplementary service CLIP in the network.

Read command gives the status of <n>, and also triggers an interrogation of the provision status of the CLIP service according 3GPP TS 22.081 (given in <m>). Test command returns values supported by the TA as a compound value

Test command returns values supported by the TA as a compound value.

<i><n></i>	<i>Description</i>
0	Disable
1	Enable

<i><m></i>	<i>Description</i>
0	CLIP not provisioned
1	CLIP provisioned
2	Unknown (e.g. no network)

Note! When CLI is not available ($\langle \text{CLI validity} \rangle = 2$), $\langle \text{number} \rangle$ shall be an empty string (“”) and $\langle \text{type} \rangle$ value will not be significant. Nevertheless, TA may return the recommended value 128 for $\langle \text{type} \rangle$ ((TON/NPI unknown in accordance with GSM 04.08 [8] subclause 10.5.4.7). When CLI has been withheld by the originator, ($\langle \text{CLI validity} \rangle = 1$) and the CLIP is provisioned with the "override category" option (refer 3GPP TS 22.081[3] and 3GPP TS 23.081[40]), $\langle \text{number} \rangle$ and $\langle \text{type} \rangle$ is provided. Otherwise, TA shall return the same setting for $\langle \text{number} \rangle$ and $\langle \text{type} \rangle$ as if the CLI was not available.

<i><err></i>	<i>Description</i>
0	Phone failure
3	Operation not allowed
4	Operation not supported
21	Invalid index
30	No network service
31	Network timeout
100	Unknown

19.13 AT+CLIR *Calling Line Identification Restriction*

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Request calling line identification restriction	AT+CLIR=[<n>]	<ul style="list-style-type: none"> • +CME ERROR <err> • OK • ERROR
Read the current setting	AT+CLIR?	<ul style="list-style-type: none"> • +CLIR: <n>,<m> • +CME ERROR <err> • OK • ERROR
Test if the command is supported	AT+CLIR=?	<ul style="list-style-type: none"> • +CLIR: (list of supported <n>s) • +CME ERROR <err> • OK • ERROR

This command refers to CLIR-service according to GSM 02.81 [6] that allows a calling subscriber to enable or disable the presentation of the CLI to the called party when originating a call.

Set command overrides the CLIR subscription (default is restricted or allowed) when temporary mode is provisioned as a default adjustment for all following outgoing calls. Using the opposite command can revoke this adjustment. If this command is used by a subscriber without provision of CLIR in permanent mode the network will act according GSM 02.81 [6].

The setting shall be per logical channel.

When the MS is turned off and then turned on again the parameter setting <n> shall turn back to default, i.e. the presentation of CLI shall be used according to the subscription of the CLIR service, <n> is 0.

Read command gives the default adjustment for all outgoing calls (given in <n>), and also triggers an interrogation of the provision status of the CLIR service (given in <m>).

Test command returns values supported by the TA as a compound value.

Note! On a per call base CLIR functionality is explained in subclause “ITU-T V.25ter [13] dial command”.

<i><n></i>	<i>Description</i>
0	Presentation indicator is used according to the subscription of the CLIR service
1	CLIR invocation
2	CLIR suppression

<i><m></i>	<i>Description</i>
0	CLIR not provisioned
1	CLIR provisioned in permanent mode
2	Unknown (e.g. no network)
3	CLIR temporary mode presentation restricted
4	CLIR temporary mode presentation allowed

19.14 AT+CSSN Supplementary Service Notification

<i>Description</i>	<i>Command</i>	<i>Possible Responses</i>
Presentation of notification result codes from TA to TE	AT+CSSN=[<n>[,<m>]]	<ul style="list-style-type: none"> • +CME ERROR <err> • OK • ERROR
Read the current setting	AT+CSSN?	<ul style="list-style-type: none"> • +CSSN: <n>,<m> • +CME ERROR <err> • OK • ERROR
Test if the command is supported	AT+CSSN=?	<ul style="list-style-type: none"> • +CSSN: (list of supported <n>s),(list of supported <m>s) • +CME ERROR <err> • OK • ERROR

This command refers to supplementary service related network initiated notifications. The set command enables/disables the presentation of notification result codes from TA to TE.

When <n>=1 and a supplementary service notification is received after a mobile originated call setup, unsolicited result code +CSSI: <code1>[,<index>] is sent to TE before any other MO call setup result codes presented in this ETS or in V.25ter [13]. When several different <code1>s are received from the network, each of them shall have its own +CSSI result code.

When <m>=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, or when a forward check supplementary service notification is received, unsolicited result code +CSSU: <code2>[,<index>] is sent to TE. In case of MT call setup, result code is sent after every +CLIP result code (refer command "Calling line identification presentation +CLIP") and when several different <code2>s are received from the network, each of them shall have its own +CSSU result code.

Note! The difference between <index> and <cindex> is that <index> is a position mark while <cindex> is a unique value for each CUG. <index> is not supported.

Test command returns values supported by the TA as a compound value.

<i><n></i>	<i>Description</i>
0	Disable the +CSSI result code presentation status in the TA
1	Enable the +CSSI result code presentation status in the TA

<i><m></i>	<i>Description</i>
0	Disable the +CSSU result code presentation status in the TA
1	Enable the +CSSU result code presentation status in the TA

<i><code1></i>	<i>Description</i>
0	Unconditional call forwarding is active
1	Some of the conditional call forwarding are active
2	Call has been forwarded
3	Call is waiting
4	This is a CUG call (also <i><index></i> present)
5	Outgoing calls are barred
6	Incoming calls are barred
7	CLIR suppression rejected

<i><index></i>	<i>Description</i>
<u>0</u> ...9	CUG index
10	No index (preferred CUG taken from subscriber data)

<i><code2></i>	<i>Description</i>
0	This is a forwarded call (MT call setup)
1	This is a CUG call (also <i><index></i> present) (MT call setup)
2	Call has been put on hold (during a voice call)
3	Call has been retrieved (during a voice call)
4	Multiparty call entered (during a voice call)
5	Call on hold has been released (this is not a SS notification) (during a voice call)
6	Forward check SS message received (can be received whenever)
10	Incoming call has been forwarded

19.15 AT+CUSD Unstructured Supplementary Service Data

Description	Command	Possible Responses
Request unstructured supplementary service data	AT+CUSD=[<n>[,<str>]]	<ul style="list-style-type: none"> +CME ERROR: <err> OK
Show supported message types along with the current service setting	AT+CUSD?	<ul style="list-style-type: none"> +CUSD: <n> OK ERROR
Show list of supported services	AT+CUSD=?	<ul style="list-style-type: none"> +CUSD: (list of supported <n>s) OK ERROR

This command allows control of the Unstructured Supplementary Service Data (USSD) according to GSM 02.90. Both network and mobile initiated operations are supported. Parameter <n> is used to disable/enable the presentation of an unsolicited result code (USSD response from the network, or network initiated operation) +CUSD: <m>[,<str>,<dcs>] to the TE. In addition, value <n>=2 is used to cancel an ongoing USSD session. If <n> is not given then the default value 0 is taken.

When <str> is given, a mobile initiated USSD string or a response USSD string to a network initiated operation is sent to the network. The response USSD string from the network is returned in a subsequent unsolicited +CUSD: result code.

The interaction of this command with other commands based on other GSM supplementary services is described in the GSM standard.

Test command returns values supported by the TA as a compound value.

Some different scenarios are shown below:

- An incoming network initiated USSD-Notify should be presented to the external application as an unsolicited result code +CUSD: if the external application has enabled result code presentation.
- An incoming USSD-request asking for a reply should be sent to the external application as an unsolicited result code +CUSD: if the external application has enabled result code.
- If the external application answers to the request with the command AT+CUSD then the ME sends the answer to the network.
- A USSD-request sent with the command AT+CUSD from the external application.

The different alternatives are shown below.

	<i>Network</i>	<i>Mobile Equipment</i>	<i>External application</i>
1	Signal	Sends unsolicited result code +CUSD	Result code presentation enabled, presented
2	Signal asking for reply	Sends unsolicited result code +CUSD	Result code presentation enabled, presented
3			Answer AT+CUSD
3b			Sends AT+CUSD

<i><n></i>	<i>Description</i>
<u>0</u>	Disable result code presentation in the TA
1	Enable result code presentation in the TA
2	Terminate (abort) USSD dialogue. This value is not applicable to the read command response

<i><str></i>	<i>Description</i>
string	<p>String type USSD (when <i><str></i> parameter is not given, network is not interrogated):</p> <p>-if <i><dc></i> indicates that GSM 03.38 default alphabet is used:</p> <p>*if TE character set other than "HEX" (refer command Select TE Character Set +CSCS): ME/TA converts GSM alphabet into current TE character set according to rules of GSM 07.05 Annex A</p> <p>If TE character set is "HEX": ME/TA converts each 7-bit character of GSM alphabet into two IRA character long hexadecimal number (e.g. character P (GSM 23) is presented as 17 (IRA 49 and 55)). Not supported</p> <p>- if <i><dc></i> indicates that 8-bit data coding scheme is used: ME/TA converts each 8-bit octet into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)). Not supported</p>

20. Alphabetical Listing of AT Commands

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